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ORIGINAL ARTICLE OPEN ACCESS

Healthcare technology, innovation and nursing challenges in disruptive era

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Many technologies and innovations have been increasingly introduced into healthcare system to improve the efficiency, effectiveness and quality of care as a result of social and environmental changes. The elderly population needs care from health care providers, health technologies and innovations to maintain their health or support their life as independently as possible. In addition, the increasingly complex chronic illnesses in patients require advanced technology to save patients with complicated illnesses. There is an increase in both non-communicable and communicable diseases, especially emerging infectious diseases, and the digital disruption era which are major causes of an extreme increase in the use of technologies and innovations in every sector, especially the healthcare sector. It is expected that health technologies and innovations would result in better health outcomes, higher quality of care, patient safety, and the increasing of patients' satisfaction. The infiltration of technologies and innovations into healthcare have affected a drastic change in the role of healthcare providers, including nursing professions (Aloini, Benevento, Stefanini, & Zerbino, 2023; Flessa, & Huebner, 2021).

In this rapidly changing context or disruptive era, the role of nurses is more complicated. Besides providing nursing care, nurses are challenged to learn new technologies and innovations inevitably. They need to keep pace with health care technology and innovation through having knowledge, skills and competences in using and administering of healthcare technologies and innovations to deliver the best nursing care to patients. In addition, being in a digital world, nurses need to have another role which is more than just as sophisticated technological users. They might also be a nurse-innovator for nursing practice because nurses understand their own needs better than other professions (Glasgow et al., 2018). Nurses might be a designer or a creator of new technologies or innovation for nursing practice. Developing new technologies or innovations related to nursing practice can help nurses meet patients' physical and emotional needs because technologies and innovations can bring nurses closer to their patients and give nurses deep and correct data of the patients (Barchielli, Marullo, Bonciani, & Vainieri, 2021). Therefore, nurses should develop characteristics of innovators by thinking outside the box, having positive emotions, and having team synergy (Bahari, Talosig, & Pizarro, 2021). Technologies and innovations in nursing could improve not only quality of patient care, but also quality of work, quality of nursing profession, and quality of organization, such as saving a patient's life, saving working time, and preventing errors in nursing practice.

However, working with a lot of technologies might interfere with nursing practice, workload, data security, and caring behaviors (Glasgow et al., 2018). Over technologic management in patient care affects time limitation to provide nursing practice to patients and can cause work overload, leading to physical and psychological health problems of nurses. Using over technologies and innovations might also affect increased cost of care (Okpala, 2018). In addition, concentrating on a lot of healthcare technologies and innovations might diminish the nurses' ability to demonstrate caring behavior. Caring is the central focus in nursing practice to improve health or well-being of patients. It helps nurses know, understand and perceive problems or needs of patients and their family, leading to appropriate and correct nursing care (Boykin & Schoenhofer, 2001). Therefore, nurses in this disruptive era need to be concerned about advantages and disadvantages of working with healthcare technologies and innovations.

In conclusion, the use of technology and innovation in the healthcare sector is continuously increasing. Nurses are encountering not only the phenomena of technological dependence, but also the demand to develop technology and innovation for nursing practice. Roles of nurses should not remain the users, but should be the developers of technologies and innovations in nursing in order to provide nursing care that meets the patients' needs and covers health prevention, health promotion, and rehabilitation. However, nurses should consider positive and negative impacts of using technologies and innovations in clinical and community setting.

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Determinant of functional disability in instrumental activities of daily living among elderly living in a rural area in Bali: a cross-sectional study

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ABSTRACT

Introduction: Little do we understand factors associated with functional disability in instrumental activities of daily living among the elderly living at home. This study aimed to explore determinants of functional disability in instrumental activities of daily living (IADL) among the elderly living in a rural area in Bali.

Methods: This cross-sectional study involved 1,053 elderly aged 60 years and above living in a rural area in Bali. A structured interview by trained data collectors was conducted. Questionnaires used were the Lawton IADL Scale, the 5-item of Geriatric Depression Scale, and the adoption of questionnaires for vision, hearing, and communication problems from the Washington Group Short Set of Questions on Disability. A logistic regression model was applied to explore determinant factors.

Results: Findings indicated that 26.1% of participants aged 75+ and 52.3% were female. Eight percent experienced functional disability in IADL, 1.9% lived alone, 11.8% indicated depression, 5.1%, 4.7%, and 1.6% had vision loss, hearing impairment, and communication problems, respectively. The strongest determinant factor for functional disability in IADL was depression (OR 7.869; 95% CI 4.657-13.296), followed by age (OR 4.602; 95% CI 2.764-7.663), and hearing impairment (OR 2.903; 95% CI 1.190-7.083).

Conclusions: Depression is the strongest determinant for functional disability in IADL. Nurses in rural areas should actively screen for depression to increase the ability of the elderly to fulfill their IADLs.

Keywords: aged, depression, epidemiology, Indonesia

Introduction

The number of elderly in Indonesia has increased significantly by 11 million in the last decade. In 2010, the number was 18 million (7.6% of the total population), and, in 2020, the number reached 29 million or 10.5 % of the total population (Badan Pusat Statistik, 2022). Consequently, Indonesia now faces an increase in degenerative diseases, higher independency, and higher healthcare system usage. Bali is among the three highest percentages of elderly in Indonesia, with 13.5% (Badan Pusat Statistik, 2022). Therefore, conducting a study on elderly in Bali is essential. Forty-four percent of the elderly in Indonesia live in rural areas (Badan Pusat Statistik, 2022). The elderly living in rural areas face several problems where access to healthcare services and social support is more limited than in urban areas (Banerjee, 2021). Likewise, the usage of health facilities in rural areas is lower than in urban areas (Wulandari et al., 2022). In addition, there is a tendency for social changes due to more young people moving from rural

areas to urban areas for economic reasons. Consequently, maintaining independence is essential for the elderly living in rural areas, especially in fulfilling instrumental activities of daily living (IADL).

IADLs are crucial activities necessary to maintain the elderly' independence, such as their capacity to use a phone, travel, shop, prepare their food, clean their homes, do their laundry, manage their medications, and manage their finances (Lawton & Brody, 1969). However, little has been done to explore the functional disability of IADL and its determinant factors in rural areas. A study conducted in Southeastern Poland reports a high prevalence of IADL disability (35.8%), with age, environmental factors, lack of social contact, increased pain, and multimorbidity as determinant factors (Ćwirlej-Sozańska et al., 2019). Depressive symptoms are evident as having a significant association with IADL decline in a study in Japan (Kiyoshige et al., 2019). A study in China and Europe reports that the elderly with IADL disability are at risk of developing multimorbidity, disability, and chronic diseases (Qiao et al., 2021). Another study in India reports 6% of elderly experience severe IADL disability (Chauhan et al., 2022). A recent systematic review shows the prevalence of IADL disability in ASEAN countries is 46.8% (Yau et al., 2022). However, the review also reveals that no study is included from the Indonesian perspective, highlighting the importance of the current study in the Indonesian context.

Similar studies focusing on elderly living in rural areas are currently absent in Indonesia, although a recent study indicates that living in rural areas is associated with a higher risk of dependency in fulfilling their activity daily living (Handajani et al., 2022). Handajani et al. (2022) also report that age, gender, and depression are associated with limitations in IADL. Another study reports some functional disability in IADL among the elderly living in an institutional aged care facility in Indonesia (Fitriana et al., 2019). With the absence of a similar study, this current study will be the first in Indonesia to explore determinants of functional disability in instrumental activities of daily living (IADL) among the elderly, focusing only on those living in a rural area. Determinant factors include age, gender, depression, living arrangement, vision loss, hearing impairment, and communication problems. Findings from this study will contribute to science and nursing practice by providing data and information on determinant factors of IADL disability.

Materials and Methods

Research design

This study employed a cross-sectional design. The setting of the study was a village in a rural area of Bali, Indonesia. This village was chosen because the number of elderly was high, 1,118, and it is classified as a rural area (Badan Pusat Statistik, 2023). Data collection was from August-October 2022. A structured interview by trained data collectors was conducted for data collection in this study. Prior to data collection, all data collectors attended a 2-day training session. During the data collection, data collectors read all questions and filled out the questionnaire. We allowed the presence of family during the interview if it was necessary. The independent variable of this study was IADL, and the dependent variables were age, gender, depression, living arrangement, vision loss, hearing impairment, and communication problems.

Population, samples, and sampling

The population of this study was 1,118 elderly living at home in a rural area of Bali, Indonesia. During data collection, all potential participants were approached in their own homes. Inclusion criteria were elderly aged 60 years and above and living in Melinggih village. We excluded those who were hospitalized and critically ill during data collection. Among 1,118 elderly, 1,053 were willing to participate in the study (response rate 94.2%). A convenience sampling technique was applied for the study.

Instruments

Questionnaires used to measure IADL were the Lawton IADL Scale (Lawton & Brody, 1969). Scores of 2 or less were considered functional disability in IADL (Table 1). Depression was measured using the 5-item Geriatric Depression Scale (Hoyl et al., 1999). Scores of 2 and above were considered depression (Table 2). For vision loss, hearing impairment, and communication problems, the Washington Group Short Set of Questions on Disability was adopted (Washington Group on Disability Statistics, 2020). Respondents were considered as having vision loss, hearing impairment, and communication problems if they answered either "Yes – a lot of difficulty" or "Cannot do at all" in three related questions (Table 3). All instruments measured all participants' current condition at the present time. In addition, all instruments have been tested and widely used in Indonesia (Kementerian Kesehatan, 2017).

Data analysis

Statistical analyses for this study were conducted using SPSS version 20. Bivariate analyses were conducted using a chi-square test with Fisher's test as an alternative when appropriate. All statistical analyses were two-tailed, with statistical significance defined as $p < 0.05$. Effect sizes were calculated and reported as phi coefficient. All variables with $p < 0.25$ in bivariate analysis were entered into a logistic regression to find the determinant (Bursac et al., 2008).

Ethical consideration

Statistical analyses for this study were conducted using SPSS version 20. Bivariate analyses were conducted using a chi-square.

Results

Missing Data

There were no missing data in this study. With structured interviews conducted by trained data collectors, all respondents were willing to answer all questions.

Prevalence of functional disability in iadl, depression, vision loss, hearing impairment, and communication problems

About 20.5% of respondents could use a phone, 23.6% could travel alone, 65.8% could handle all of their shopping needs alone, 65.2% could prepare adequate meals alone, 40.4% could maintain their home alone or with occasional help, 66% could do their laundry, 84.5% could take their medications in the correct dosages at the correct times, and 27% could handle financial matters alone (Table 1). Around 10.3% of respondents were unsatisfied with their life, and 36.1% preferred staying home (Table 2). Eighty-five out of 1,053 elderly (8%) experienced functional disability in IADL, 11.8% indicated depression, and 5.1%, 4.7%, and 1.6% of them had vision loss, hearing impairment, and communication problems, respectively (Table 4).

Determinant factors of functional disability in IADL

The bivariate analyses (Table 4) indicated that factors potentially associated with the functional disability of IADL were age, depression, vision loss, hearing impairment, and communication problems ($P < 0.001$). However, it is essential to highlight that the effect size of age, vision loss, hearing impairment, and communication problems were low (less than 0.3). Only depression showed a medium association with an effect size of 0.3 (Cohen, 1988). Gender and living arrangement were not significantly associated with the functional disability of IADL.

Table 1. Frequency of functional disability in IADL among elderly living in rural area in Bali (n=1,053)

Description (Score)	n	%
Ability to Use Telephone		
Independently uses a phone (1)	216	20.5
Makes a couple of standard phone calls (1)	31	2.9
Answers the phone but doesn't make a call (1)	146	13.9
Not at all a telephone user (0)	660	62.7
Mode of Transportation		
Independently uses public transport or has a vehicle (1)	248	23.6
Taxi is arranged for personal travel; other than that, no public transit is used (1)	377	35.8
Uses a companion when using public transit (1)	273	25.9
Doesn't go anywhere at all (0)	155	14.7
Shopping		
Independently takes care of all shopping (1)	693	65.8
Uses a companion when shopping (0)	212	20.1
Unable to shop (0)	148	14.1
Food Preparation		
Independently creates, prepares, and serves a sufficient meal (1)	687	65.2
Provides adequate meals if given the necessary components (0)	103	9.8
Makes meals, or prepares meals but does not keep a sufficient diet (0)	126	12.0
Needs to have meals prepared and served (0)	137	13.0
Housekeeping		
Maintains home alone or sporadically with aid (1)	425	40.4
Carries out minor daily activities like making the bed and washing the dishes (1)	372	35.3
Needs assistance with all household upkeep jobs (1)	181	17.2
Does not assist with any cleaning duties (0)	75	7.1
Laundry		
Completes personal laundry (1)	695	66.0
Launders small items-rinses stockings, etc. (1)	210	19.9
The others must do all the laundry (0)	148	14.1
Responsibility for Own Medications		
Is in charge of taking medication at the proper times and in the proper dosages (1)	890	84.5
Is unable to dispense his or her own medication (0)	163	15.5
Ability to Handle Finances		
Independently manages financial matters (1)	284	27.0
Organizes daily purchases but need assistance with banking, large purchases (1)	515	48.9
Unable to manage money (0)	254	24.1

We applied logistic regression to determine the impact of various factors on the likelihood that respondents will have an IADL functional disability. The model contained seven independent variables (age, gender, depression, living arrangement, vision loss, hearing impairment, and communication problems). Chi-square (7, N = 1,053) = 144.371, P 0.001, suggesting that the whole model, including predictors, was statistically significant and could distinguish between respondents who had and did not experience functional disability of IADL. The whole model explained between 12.7% (Cox & Snell R Square) and 29.6% (Nagelkerke R Square) of the variance in functional disability of IADL and correctly classified 92.5% of cases. The strongest predictors for functional disability in IADL were depression (OR 7.869; 95% CI 4.657-13.296), followed by age (OR 4.602; 95% CI 2.764-7.663) and hearing

Table 2. Frequency of depression among elderly living in rural area in Bali (n=1,053)

Question (in the last week)	Yes n(%)	No n(%)
Satisfaction with own life	945(89.7)	108(10.3)
Feel bored	95(9.0)	958(91.0)
Feel helpless	74(7.0)	979(93.0)
Prefer to stay at home, rather than going out and doing new things	380(36.1)	673(63.9)
Feel pretty worthless the way you are now	31(2.9)	1,022(97.1)

impairment (OR 2.903; 95% CI 1.190-7.083). The findings indicated that elderly living in rural areas and experiencing depression were 7.869 times more likely to experience functional disability of IADL (Table 5).

Discussions

In the last decade in Indonesia and other countries, life expectancy has significantly increased the number of elderly. With aging, some anatomical and physiological changes in the normal aging process may decrease the intrinsic capacity and functional ability of the elderly (Michel et al., 2021). Our current study provides determinant factors and the prevalence of functional disability in IADL. Functional ability is a significant predictive variable of IADL (Tornero-Quiñones et al., 2020). In our study, we found a lower prevalence of functional disability of IADL (8%) compared to an 11% prevalence in a study in Ireland and a 35.8% prevalence in a study in Poland (Ćwirlej-Sozańska et al., 2019). In Germany, the prevalence rate of disability in IADL is even higher, 45.8%, but the mean age of the study in Germany is 80.7 years (Beltz et al., 2022), compared to the mean age of 70 years in our study. Among eight items of Lawton IADL, the inability to use a phone (62.7%) and being incapable to handle money (24.1%) were two distinguished disabilities found in our study. These inabilities may be related to the nature of the study setting where people in rural areas do not necessarily use phones and or manage their own finances, as evidenced by current data where, in Bali, only 34% of the elderly in rural areas use phones (Badan Pusat Statistik, 2022). These responsibilities are given to other family members. It was found in this study that only 1.9% of the elderly lived alone, while others lived with family members or other extended families.

Although prevalence rates are different between studies, our current study and previous studies in Ireland, Poland, and Germany indicated similarity in terms of advancing age and its association with disability in IADL (Beltz et al., 2022; Ćwirlej-Sozańska et al., 2019; Ismail et al., 2021; Tornero-Quiñones et al., 2020). Our logistic regression indicated that the elderly aged 75 years and above were 4.602 times more likely to experience disability in IADL than those aged below 75. Our study also found 2.9% disability in IADL in age 60-74 vs. 5.1% in age 75 years and above. Compared to previous studies, in Poland, the elderly aged 65 years and above reported 42.4% of disability in IADL (Ćwirlej-Sozańska et al., 2019). In Malaysia, the elderly aged 70 and above are 3.52 more likely to experience functional disability in IADL (Ismail et al., 2021). The finding of this current study is also in line with previous studies that age is a determinant factor for disability in IADL (Yau et al., 2022). This finding also highlights the importance of conducting our current study, especially in the Indonesian setting; as life expectancy increases, the number of elderly in the advanced age group may potentially experience an increased disability in IADL. This finding implies that nurses, other health workers, and other parties must address this issue and primarily assist especially those with IADL problems.

Table 3. Frequency of vision loss, hearing impairment and communication problem among elderly living in rural area in Bali (n=1,053)

Description and Score	n	%
Difficulty seeing, even if wearing glasses		
Cannot do at all (1)	2	0.2
Yes – a lot of difficulty (1)	52	4.9
Yes – some difficulty (0)	405	38.5
No – no difficulty (0)	594	56.4
Difficulty hearing, even if using a hearing aid		
Cannot do at all (1)	5	0.5
Yes – a lot of difficulty (1)	45	4.3
Yes – some difficulty (0)	197	18.7
No – no difficulty (0)	806	76.5
Difficulty in communication		
Cannot do at all (1)	2	0.2
Yes – a lot of difficulty (1)	15	1.4
Yes – some difficulty (0)	82	7.8
No – no difficulty (0)	954	90.6

Previous studies indicate that IADL problems link to poor quality of life (Beltz et al., 2022;Fumes-Ghantous et al., 2020). Although our study did not measure the relationship between quality of life and IADL, previous studies in India focusing on functional status as indicated by disability in IADL found a significant effect on the quality of life of the elderly (Sharma, 2020). Therefore, to maintain and increase the quality of life of the elderly, maintaining adequate IADL is imperative. A further study exploring IADL and quality of life in the Indonesian context is also necessary.

Hearing impairments are also common among the elderly. Several causes include cerumen occlusion, middle ear ossification, viruses, and bacteria (Patel & McKinnon, 2018; Sahoo et al., 2020). There are some concerns reported by previous studies that hearing impairment reduces the social relationship of the elderly (Ogawa et al., 2019) and is associated with cognitive

Table 4. Bivariate analyses of disability in IADLs (n=1,053)

Variable	Categories	Disability in IADL			*p*-value	Effect size (ϕ)
		Yes n (%)	No n (%)	Overall n (%)		
Age	60-74	31(2.9)	747(70.9)	778(73.9)	**0.000**§	0.252
	75+	54(5.1)	221(21.0)	275(26.1)		
Gender	Male	34(3.2)	468(44.4)	502(47.7)	0.173§	0.046
	Female	51(4.8)	500(47.5)	551(52.3)		
Living alone	Yes	3(0.3)	17(1.6)	20(1.9)	0.215¶	0.035
	No	82(7.8)	951(90.3)	1,033(98.1)		
Depression	Yes	41(3.9)	83(7.9)	124(11.8)	**0.000**§	0.335
	No	44(4.2)	885(84.0)	929(88.2)		
Vision loss	Yes	13(1.2)	41(3.9)	54(5.1)	**0.000**¶	0.137
	No	72(6.8)	927(88.0)	999(94.9)		
Hearing impairment	Yes	18(1.7)	32(3.0)	50(4.7)	**0.000**¶	0.229
	No	67(6.4)	936(88.9)	1,003(95.3)		
Communication problem	Yes	7(0.7)	10(0.9)	17(1.6)	**0.000**¶	0.156
	No	78(7.4)	958(91.0)	1,036(98.4)		

§Chi square; ¶Fischer exact test

impairment (Saji et al., 2021). Our current study found that hearing impairment is a determinant factor of IADL problems. This finding aligns with a previous study in China that hearing loss is associated with difficulties in performing IADL (Heine et al., 2019). Another study also supports our finding in that, in Turkey, the probability of experiencing functional disability in IADL is around five times higher in elderly with hearing impairments than in those without (Mercan et al., 2021). With the support from findings that align with our current study, caring for the elderly with a hearing impairment needs to be strengthened as it affects their functional ability to perform IADL. Strengthening caring could be made by using effective communication strategies such as appropriate verbal tones, eye contact, and nonverbal communication strategies when communicating with the elderly.

Depression among the elderly is a common issue. According to a systematic review and meta-analysis, depression affects 13.3% of seniors globally (Abdoli et al., 2022). Another systematic review and meta-analysis also found that 34.4% of the elderly in India experience depression (Pilania et al., 2019). Our current study found a lower prevalence (11.8%) of elderly in rural areas experiencing depression. The two most common symptoms of depression were not satisfied with own life and the preference to stay home more than usual. In further logistic regression analyses, depression was found as the strongest determinant factor for functional disability in IADL. A study in China also reveals a similar finding that depressive symptoms among low-income elderly families in urban areas are associated with being three times more likely to experience problems with IADL (Zhao et al., 2022). Depression and disability in IADL are not new issues, as some previous studies also indicate similar findings (Ćwirlej-Sozańska et al., 2019; Hossain et al., 2021; Sharma, 2020; Zhao et al., 2022). Depression decreases mood and motivation to activity and reduces the physical functioning of the elderly (Sharma, 2020). Physical activities and mobility affect depressive symptoms levels. These symptoms may be due to the fact that the elderly begin to depend on other family members for everyday tasks and it is believed that limitations in their activities further stimulate psychological distress (Hossain et al., 2021). Considering that depression affects the elderly's functional ability in rural areas in fulfilling their IADL, nurses should consider this in their practice setting by conducting active screening and applying further assessment, nursing intervention, and further referral as necessary.

This study is the first in the Indonesian context to provide evidence around the determinant of disability in IADL among the elderly in a rural area in Indonesia. This study has some limitations. First, it was conducted only in one rural area in Bali. However, this study managed to recruit a large number of elderly to participate in the

Table 5. Logistic regression determinant factors of functional disability in IADL among elderly living in rural area in Bali (n=1,053)

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age	1.527	0.260	34.449	1	**0.000**	**4.602**	2.764	7.663
Gender	0.280	0.263	1.136	1	0.287	1.323	0.791	2.213
Living alone	0.792	0.743	1.136	1	0.287	2.207	0.515	9.465
Depression	2.063	0.268	59.426	1	**0.000**	**7.869**	4.657	13.296
Vision loss	0.760	0.425	3.198	1	0.074	2.139	0.930	4.922
Hearing impairment	1.066	0.455	5.484	1	**0.019**	**2.903**	1.190	7.083
Communication problem	0.721	0.664	1.177	1	0.278	2.056	0.559	7.563
Constant	-3.256	1.006	10.481	1	0.001	0.039	NA	NA

NA=Not applicable

study, making the sample size adequate. In addition, the final logistic regression model correctly classified 92.5% of cases of functional disability in IADL. Secondly, our study only measured seven dependent variables: age, gender, depression, living arrangement, vision loss, hearing impairment, and communication problems. Some potential determinant factors found in previous studies, such as cognitive function, social support, nutritional status, pain, and multimorbidity (Beltz et al., 2022; Ćwirlej-Sozańska et al., 2019; Tornero-Quiñones et al., 2020) were not measured because we considered the need to manage the appropriate length of time for interviews with participants. Thirdly, our study did not explore the quality of life among those with IADL disability. A further study exploring this is essential.

Conclusions

Depression is the strongest predictor for functional disability in IADL. Nurses in rural areas should actively screen for depression to increase the ability of the elderly to fulfill their IADL and assist their IADL accordingly. Increasing age and hearing impairment are the other predictors. Effective communication among the elderly with hearing problems and their caregivers is also essential in increasing the ability to fulfill the IADL of the elderly. Nurses should also train in effective communication with family caregivers, especially for the elderly with hearing problems. Future studies are suggested to expand the research settings in more than one rural area and add potential determinants such as cognitive function, social support, nutritional status, pain, and multimorbidity. Another study exploring the quality of life among those with IADL disability is also essential.

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Conflict of Interest

All authors have no conflict of interest related to this study.

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Insights from leaders on effectively addressing overweight and obesity in the Thai community

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ABSTRACT

Introduction: Effective management of healthcare system at the district level through an important health project can improve health and quality of life of people in the district. Key factors to drive a successful project are important. The purpose of this study was to explore perspectives of leaders managing the healthcare system at a district level on preventing and resolving issues of overweight and obesity within their communities.

Methods: The participants of this study consisted of nine district health board committees, ten members of the district health system startup team and twenty-three village health system managers. Data were collected by using focus group interviews, observation and documents analysis, also analyzing data by summarizing and categorizing the data of main points.

Results: The study results indicated that managing successful health problems at the district level needed: 1. creating clear and equal understanding, 2. having precious community capital and 3. integrating effective incentives for people in the community.

Conclusions: The findings of the study can be used as a guideline for managing the healthcare system at a district level through a project for the development of health issues and the quality of life among people in a community. This successful health system management can help develop the sustainability of public healthcare at the district level.

Keywords: district health system, health system management, improving health problems, success

Introduction

Healthcare reform under the concept of the District Health System (DHS) is an important strategy that the Ministry of Public Health of Thailand has pushed to strengthen health services to people in communities based on the context of each community since 2013 (Tejativaddhana et al., 2018). The concept focuses on integrating the participation of populations in each community and collaborating with multisectoral partners in the community to manage the population's health problems and develop knowledge and abilities of people in that community regarding their way of life and their culture (Office of Permanent Secretary Ministry of Public Health, 2014); Tejativaddhana et al., 2016). The important aim of using DHS is to enable people in the community to improve their quality of life, be self-reliant and take care of their health continuously and effectively, leading to a strong community healthcare system (Saelee, 2014, 2020; Tejativaddhana et al., 2018).

The management of DHS in each district in Thailand has been run by the District Health Board (DHB), the DHS startup team, and the Village Health System managers (VHSMs) since 2016. DHB consists of leaders from public, private and people sectors of each sub-district (Ministry of Public Health, 2016; Thojampa, 2019) while the DHS startup team is comprised of healthcare providers from a district hospital and health promoting hospitals of that district. In addition, the VHSMs consist of village chiefs and village health volunteers from each

village in each district. They manage and govern the DHS based on one district health project which is an important health problem for most population in the district. They also support knowledge, guidelines, budget, resources to improve quality of life among the population in that district (Jariya et al., 2018).

Several districts of Thailand were selected to run DHS projects, including a district located in the north of Thailand. This district has crucial health problems such as hypertension (HT), diabetes mellitus (DM), and especially overweight and obesity. Evidence showed that children and adolescents of this district had obesity at 11.06% and 11.34% in 2017 and 2018, respectively, and people aged 30-59 years old had obesity at 37.68% (Kamphaeng Phet Provincial Public Health Office, 2019). Overweight and obesity have become a significant health problem in Thailand and the second highest prevalence of obesity in Asia. Around 37.7% of Thai population aged ≥ fifteen years old were overweight and obese (Pinchaleaw, 2018). Overweight and obesity can cause metabolic syndrome, resulting in increasing in HT, DM, cardiovascular diseases and stroke (Karnjanapiboonwong, 2020; Lalam, Chaimai, & Fukfon, 2022). Rates of DM patients with obesity from 2015 to 2017 were 9.23%, 11.42%, and 12.20%, respectively (Kamphaeng Phet Provincial Public Health Office, 2019). Overweight and obesity is an important district health issue for most citizens with all ages in this district. Before using DHS under one important project of the district, healthcare providers of the district dealt with overweight and obesity problems through giving nutrition and physical activity education to the population in the district and following the government's policies, such as the Fatless Belly Thais policy and the Soda Ban policy. Unfortunately, there was a lack of serious cooperation from every sector and participation of populations in this district. Overweight and obesity control and prevention among population in the targeted district did not succeed. Therefore, in 2018, solving overweight and obesity and non-communicable diseases of the population at this district was run through a DHS startup project, titled "We all Far Away from Obesity," with the aim to decrease overweight or obesity, DM, and HT among citizens in this district. The results of this operation over two years found that not only the number of citizens who were overweight and were obese was reduced, but also rates of new patients with DM and HT decreased (Kamphaeng Phet Province, 2020).

It is important to learn success stories in management of DHS through a district health project. Therefore, the researchers were interested in exploring successful health system management at the district level from direct experiences of the DHS leaders. The findings would provide important information to guide the development and strengthening of DHS management through a DHS project among people in other areas according to the DHS concept.

Materials and Methods

The purpose of this study was to explore perspectives of leaders managing the healthcare system at a district level on preventing and resolving issues of overweight and obesity within their communities. The study was conducted at a district located in the lower northern region of Thailand in 2020. The population of the study was 21 DHB members, 25 DHS startup team members, and 100 village health system managers (VHSMs). Participants were eligible for participation in this study if they were (a) aged 20 years old and over, (b) had no physical or mental health problems, (c) self-identified as Thai speaking and (d) were willing to share their perspectives on driving the district healthcare system in a focus group. Convenience sampling was used as the sampling methods. There were 9 -12 people for each focus group. Data were obtained through four focus group discussions with a total of 42 participants. There were nine district health board committees, 10 members of the DHS startup team and 23 VHSMs. The participants who could not complete the focus group process were excluded.The researchers divided focus group based on homogenous group.Therefore, there were one DHB group, one DHS startup team group and two VHSM groups.

The researchers collected the data based on guideline questions regarding success of driving the "We all Far Away from Obesity" project. The focus group interview guidelines were developed by the researchers. Key questions were perspectives of participants on operational processes, outcomes, success factors and any suggestions to drive the project to effectively improve quality of life of the people in the district. The focus group interview guideline was pilot tested with eight VHSMs who were not the targeted participants. Four focus group discussions took place in a meeting room at the district hospital. The focus group discussions continued until there was no new relevant information. At the end of the fourth focus group, the researchers felt that data saturation had been met because no new theme emerged, so the researchers stopped recruitment. The duration of the focus group interviews for each group was about 100-120 minutes. In addition,

data collection was also performed through non-participant observation and documents.

Ethical approval for the study was obtained from the Institutional Review Board (IRB) of the university (Project No.0750/62). After ethical approvals were obtained, a researcher contacted the leader of the DHB, the DHS startup team, and the VHSMs in order to introduce themselves, inform the research study, and ask for help about recruitment participants. At the beginning of group discussions, the researchers explained the rules and participated in the discussions as a facilitator to create a positive interactive atmosphere throughout the discussion and let the participants express their perspectives freely. The researchers recorded the focus group interviews, using a tape recorder, following the consent of the interviewees. Afterwards, the recorded contents were transcribed verbatim.

The data analysis began with the researchers transcribing the focus group discussions' audio files verbatim. Data were coded using the content analysis method. Main themes were derived from the data and identified from the codes. Finally, the researchers integrated main themes and data to compare perspectives among the DHB, the DHS startup team, and the VHSMs. To ensure the validity of the research data, the researchers used methods of triangulation. The researchers used different data collection methods on the same subject, including observation, focus group discussions, and information from related documents. The researchers analyzed documents related to implementations of the DHS startup project, "We all Far Away from Obesity." The researchers examined goals, implementations, or activities of the project and correlated the data with the perspectives provided by the participants from group discussions. The results indicated that the information obtained from different data collection was consistent.

Results

Study sample

A total of 42 participants attended the four focus groups. The DHB group included the Deputy District Chief, the Chief Executive of Subdistrict Administrative Organization, the Subdistrict headman, the Director of the hospital, the District Public Healthcare Center Director, a policeman, a school director, a community developer, and an agricultural research officer. For the DHS startup team group, there were five public health officers, four registered nurses, and one nutritionist. Moreover, the VHSMs group included 13 village chiefs and 10 village healthcare volunteers. Characteristics of all participants are shown in Table 1.

Table 1. Participant demographics

	The DHB team (9)		The DHS startup team (10)		the VHSM team (23)	
	N	%	N	%	N	%
Gender						
Male	7	77.78	6	60.00	12	52.17
Female	2	22.22	4	40.00	11	47.83
Age (years)						
30-40	3	33.33	5	50.00	8	34.78
40-50	6	66.67	5	50.00	10	43.48
60-65	-	-	-	-	5	21.74
Experiences of work in DHS						
2-3 years	4	44.44	2	20.00	10	43.06
4-5	5	55.56	6	60.00	13	56.94
6-8	-	-	2	20.00	-	

Leaders' perspectives on preventing and resolving issues of overweight and obesity of the population in their communities

The results of this study revealed that the participants viewed that driving district-level health system management successfully through the startup project: "We all Far Away from Obesity" which used the DHS concept, consisting of three major themes: Creating clear and equal understanding, having precious community capital, and integrating effective incentives. Details are as follows:

Theme 1: Creating clear and equal understanding

In the theme of creating clear and equal understanding, the participants explained that an effective DHS management process is necessary to ensure that everyone in the district has understanding of the problem and methods of solving the problem clearly and equally. The participants referred to creating clear and equal understanding of citizens in the district through continuous meetings and giving enough information to the public.

"The community meeting every month between the DHS startup team and the leader from every community was very helpful because we could know the progress and we could inform them of our plans to manage this project correctly. We also let them tell us what they would like us to help them, and so on. So, I believe that everyone in the meeting knows the problems of others and knew the solving methods of each area equally and they applied them to their areas." (FGD2, public health officer, DHS startup team)

"I think giving the information about methods and results of the project every three months to people in the community has really worked because this could affect people to be willing to cooperate in solving health problems at the district level in various ways." (FGD1, Sub-district headman, DHB)

"We gave them knowledge about causes, impacts, prevention, and reducing of overweight, obesity, HT, and DM through all kinds of communication method as we could, such as community meetings, billboards or announcements, on line application, our Facebook page, or public address system (PA system) so that everyone and every age may gain this knowledge. When they knew, they were concerned with the issue and joined every activity of the project." (FGD2, registered nurse1, DHS startup)

"…Complete understanding from every team and every person in the district about the real health problem and what our district should change is a very important point. This can help us to drive the project to the direct way easily...." (FGD4, village headman, VHSM group)

Theme 2: Having precious community capital

Most participants explained successful management of DHS in terms of having precious community capital. Precious community capital in this district consists of social capital, human capital and physical capital. Half of the participants explained social capital in this area as cooperation of people and other organizations in the district and strong networks in the district.

"We are very lucky because most people and every organization in this district have cooperated in every activity very well, including this project." (FGD1, Deputy District Chief, DHB)

"Luckily, we have strong networks. Every sector, such as schools, temples, and other community organizations, has worked with us continuously and actively so far…. If we don't have this connection, the project could not be successful." (FGD2, Public health technical officer2, DHS startup team)

Almost all participants expressed that important human capital in this district included effective leaders and community health volunteers.

"I think we were very lucky to have good community leaders. They were very knowledgeable members… They knew very well about what, when and where to do and whom to do with." (FGD2, Physician1, DHS startup team)

"Every community leader and most community health volunteers are very helpful for operating the project continuously and effectively. They knew how to get people involved in the project continuously. If we didn't have them, the project could not be successful for sure." (FGD1, Community developer, DHB)

In addition, almost half of the participants clarified physical capital in terms of a model community farm and healthy food markets as follows:

"I'm very proud to say that we have already had a model community farm for organic farming. ... Many people from both in the district and other districts came to visit it continuously." "…. The farm could encourage people to be aware of eating healthy foods to prevent many diseases and obesity." (FGD3, village headman3, VHSM)

"We also have health food markets to sell many healthy foods and they are accepted by people across the district very well." (FGD1, Sub-district headman, DHB)

Theme 3: Integrating effective incentives

There were a variety of effective incentives that the participants used to support the "We Far Away from Obesity" project, including their favorite sports, competition and rewards, and interesting campaigning. Most participants viewed that providing various types of sports for citizens in each sub-district was a good incentive to encourage people to do exercise based on their preference. There were a lot of exercises, including aerobic dance, Thai dance, football, jogging, cycling, petanque and bar slope dance. They could select a sport they liked.

"*We tried to encourage people in our area to control weight by setting up exercising clubs such as a petanque club and a cycling club for everyone. However, some elderly people asked for other exercises…. Finally, we set up a Thai dance club and bar slope dance as well. They work very well…All clubs haven't been closed yet."* (FGD3, village headman5, VHSM)

"*The aerobics club always opened every evening. This sport could attract people all ages, especially adults, very well because we usually turned on fun music and people in this sub-district like music very much… So, almost everyone joined the sport they like."* (FGD4, village health volunteer2, VHSM)

Many participants shared their experiences of success, driving the project through providing competitions and rewards.

"Our district had a sport competition among a sub-district. I think this method really worked. People in each sub-district tried to practice for winning the competition and receiving rewards. I saw they played football and did aerobic dance and Thai dance almost every day before the competition." (FGD1, the Deputy District Chief, DHB)

"We announced that we would give rewards to whoever can lose weight from exercising or eating. You know? Afterwards, many people were interested in this

project. They followed the announcement and many people got rewards when they lost weight." (FGD1, Chief executive of the Sub-district Administrative Organization, DHB)

"Our sub-district used a competition through a project of growing vegetables by themselves. We ran a vegetable gardening competition. Almost every house had planted. You know? After that, most of them cooked it or someone sold it in a health food market in our district." (FGD3, village headman, VHSM)

In addition, many participants focused on interesting campaigns, for instance, growing vegetables, cooking foods, monthly physical examination and waist measurement.

"*We had a monthly waist and blood pressure measurement project for everyone in our district. This method could monitor people's health very well…Many citizens told me that waist and blood pressure measurements were good indicators to control their weight and health*." (FGD2, registered nurse1, DHS startup team)

"We also had a continuous campaign to encourage our citizens to grow vegetables, cook their own foods, and reduce eating salty, fatty and sweet foods. Ones who joined this campaign said that they could control their weight and health very well." (FGD2, nutritionist, DHS startup team)

Discussions

Healthcare system management in the district of this study was an operation with the participation of all sectors based on major health issues of people in the community. The DHB team, the DHS startup team and the Village Health System manager team of this district focused on the importance of solving district health problems through creating clear and equal understanding of the problem and operation, using precious community capital, and integrating effective incentives. Clear and equal understanding regarding health-related issues might be able to promote problem perceptions in the same way and raise self-awareness to all people in the district. In addition, clear and equal understanding about methods to solve the problems might encourage people to be willing to participate in the project for improving their quality of life and health problems. The results of this study are consistent with a study by Koompai (2016), which found that clear understanding could encourage participation of people in the community. This is also consistent with a study by Wanaratwichit et al. (2018), which indicated that understanding the problem and the project is an important mechanism to drive a project within the DHS and can be a factor to help the project to be successful. Moreover, the present study is consistent with a study by Nilsen et al. (2020) and Thojampa et al. (2023), who found that clear communication could increase the chance of successful changes. The result of the study which is similar to several previous studies can demonstrate that clear and equal understanding from populations and every sector in the district is an important method to prevent or reduce overweight and obesity. In addition, this method might be able to be applied to manage NCDs. Therefore, it is important in creating understanding through continuous meetings and giving appropriate and complete information with various forms of communication, such as online application, community bulletin board, PA system, and meetings, with people and organizations in the district to have them understand and improve the ability to practice easily (Indharatana, 2014), leading to health improvement.

In addition, the leaders at all levels of this study indicated that community capital, including human capital, social capital and physical capital, plays an important role in driving the project success. Strong leaders and community health volunteers, popular model community farms, well-established health food markets, and good networks at all levels fostered participation of people in the community in all sectors. When people in the district cooperated in the project, they managed their health problems by themselves. Finally, the community health problems could be continuously and directly solved, leading to improving quality of life and sustainable health development. The findings of this study are consistent with some previous studies (Dhammasaccakarn et al, 2022; Nithisirawat, 2020; Sanarmkate & Kabjan, 2021; Supabhato et al., 2020) which concluded that the community capital influences self-management for sustainable development of a local community. The present research study is also consistent with a study by Wanaratwichit et al. (2018) which reported that using community capital is an important strategy because it is familiar to people in the community. When applied, it can be easily practiced in normal life.

Another important key to drive the project successfully is that participants referred to providing various effective incentives. This theme means providing a variety of incentives based on one's satisfaction. The participants explained incentives as sports, competitions and rewards, and campaigning about foods and monthly waist measurement in each

sub-district. The findings of the study are consistent with previous incentives studies revealed that incentives, such as sports, competitions, rewards, and campaigning, could motivate people's actions (DiMenichi & Tricomi, 2015; Giles et al., 2014; Hafner et al., 2020; Plangger et al., 2022; Sibanda et al., 2017). An incentive is a mechanism that motivates a person to act or influences the decision of each person (Bradley et al., 2018). Therefore, integrating favorite incentives into any activities of the "We all Far Away from Obesity" project might be a power to encourage people in the district of this study to participate in any activities to change their behavior and lead to better health. Various incentives based on ones' satisfaction are a very useful motivation (Bradley et al., 2018). Therefore, providing effective incentives should be of concern about types and satisfaction of incentives. The participants in the study provided various incentives based on their citizens' wants.

Limitations

Although this study's findings provide waypoints of how to drive DHS through a project successfully, the study explored perspectives from only leaders who managed the project, not people in the district. This is a limitation of this study. Therefore, further studies should consider the perspectives of people in the district about the operation and results of the project.

Implications

Driving the DHS under one project based on creating clear and equal understanding, having precious community capital, and integrating effective incentives is a strategy that should be applied to prevent or control overweight and obesity in other areas where rates of overweight and obesity remain challenging. In addition, it should be possible to apply the strategy to manage chronic non-communicable diseases or diseases caused by health behavior. This strategy will help improve health lifestyles and address overweight, obesity, related non-communicable diseases effectively and sustainably.

Conclusion

The results of this study have shown valuable methods to drive the DHS under one project successfully, based on perspectives of leaders, consisting of creating clear and equal understanding, having precious community capital, and integrating effective incentives to improve health problems of people in the district. The findings of this study offer important methods to manage health system successfully to healthcare leaders and community leaders in other communities having health problems, especially overweight or obese, to apply these methods to solve their citizens' health problems continuously and effectively, leading to developing the sustainability of public healthcare at the district level.

Conflict of Interest Statement

No conflict of interest has been declared by the authors.

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ORIGINAL ARTICLE

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The effectiveness of modified conventional CPR training among North Borneo University Hospital healthcare providers

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ABSTRACT

Introduction: Numerous studies reported that healthcare providers are not as effective in rendering high-quality CPR over time, despite receiving basic life support (BLS) or advanced cardiac life support (ACLS) training. Thus, to overcome the issue and develop a more feasible implementation of CPR training model, this study aims to identify the effectiveness of a modified conventional training (MT-CPR) method.

Methods: This was an experimental study conducted to 72 healthcare providers in a teaching hospital in north Borneo. Subjects underwent MT-CPR and data were collected using a validated questionnaire and skills assessment checklist adopted from AHA (2020). Data then was analysed using Friedman, Wilcoxon and McNemar test aided with IBM's Statistical Package for the Social Science (SPSS) statistic software.

Results: This study reported that MT-CPR significantly improved the knowledge and skills on CPR (p-value: <0.001). However, the training module significantly incapable to retain the knowledge and skills as early as 3 months post initial MT-CPR (p-value: <0.001). There was a statistically significant difference between the MCQ test scores (pre-course, post-course, and post 3 months-course) with $\chi 2$ (2) = 36.2 (2), p-value = <0.001. There is an association between post-course overall results and post 3 month overall results using McNemar test (p-value < 0.002).

Conclusions: Overall, this study indicated that modified CPR training (MT-CPR) were able to develop and improve the CPR knowledge and skill. The adaptation of conventional CPR training method seen effective as it has the capability for better engagement between trainer and participants.

Keywords: cardiopulmonary resuscitation, cardiac arrest, experimental, healthcare providers, modified conventional training method

Introduction

Cardiopulmonary resuscitation (CPR) refers to a chain of survival to be performed on a victim or patients who experience cardiac arrest, respiratory arrest and airway obstruction (Chen et al., 2017). It comprises of the combination of effective ventilation and manual chest compression to a person known to be pulseless and having abnormal breathing and gasping. The CPR course educates the participants to identify the signs of cardiac arrest, provide a high-quality of chest compression as well as operate the automated external defibrillator (AED) (Mersha et al., 2020). Adequate knowledge and skills on CPR is fundamental for healthcare providers (HCP) who work in a healthcare setting. Without proper and prompt action to cardiac arrest victims, it may lead to severe implications and

could cause death. Therefore, early recognition of cardiac arrest events followed by effective CPR is important for a better outcome.

Cardiopulmonary resuscitation (CPR) is the only procedure recommended by international and local resuscitation protocols to be performed on cardiac arrest victims (Kleinman et al., 2018). The outcome of cardiopulmonary resuscitation depends on the competence of the first responder who initiated the procedure (Silverplats et al., 2022). The parameters used to evaluate CPR quality are chest compression rate and depth (AHA, 2020). Despite receiving basic life support (BLS) or advanced cardiac life support (ACLS) training, several studies have demonstrated that nurses, as the dominant healthcare providers, become less effective at providing high-quality CPR over time (Silverplats et al., 2022). During CPR skills and knowledge evaluations, nurses frequently cannot perform adequate compression depth and rate in accordance with guidelines (du Plessis et al., 2022).

Nurses are the closest healthcare provider to the hospitalized individual and, therefore, they are usually the primary rescuer to initiate CPR for patients who develop cardiac arrest. Unfortunately, it was reported that nurses were poor in the recognition of the impending deterioration of patient condition due to cardiac problems which leads to sudden cardiac arrest (SCA) (Chaudhary et al., 2023), identification of abnormal cardiac arrest rhythms (Aljohani, 2022) and immediate action in the event of SCA (Varughese and Silva, 2019). These weaknesses form the essential reason for providing an adequate and structured model of CPR training for nurses. Periodic and structured CPR training has improved the CPR competencies among nurses (Nu et al., 2023). However, there is still a need to attend the refresher course as the guideline will routinely be modified (AHA, 2020).

Refresher CPR courses have long been used to maintain the skills of healthcare professionals. To determine the competency of participants and the efficacy of each new training model, however, multiple versions of the mode and content of CPR training have been implemented. The conventional method of CPR training is unquestionably the most effective method of instruction (Sand et al., 2021). It was defined as a physically attended and face-to-face course that requires multiple sets of equipment for training. This model typically takes one to two days to complete, depending on whether the participants are novices or merely seeking a refresher course. Despite the fact that numerous health institutions have begun incorporating artificial intelligence into CPR training, both models were deemed equally effective in terms of competency outcomes (Ali et al., 2021). However, not all institutions were found capable of developing training software or subscribing to the existing CPR training application. This study aims to identify the effectiveness of a modified traditional training method for better knowledge and skill sustainability in tertiary health facilities to address the issue and develop a more practical model for CPR training implementation.

Most victims of sudden cardiac arrest die due to poor prognosis and poor CPR performance by first responders or bystanders (Alnutaifi, 2021). Poor performance is defined as a delay in initiating CPR and insufficient chest compression depth and rate (Masood et al., 2020). Poor CPR outcome is often a result of rescuers' reluctance and apprehension in performing CPR (Chien et al., 2020). The majority of health institutions in Malaysia continue to implement CPR training using the conventional approach (Ali et al., 2021b). Even though they use similar American Heart Association (AHA) and National Committee of Resuscitation Team (NCORT) guidelines, each institution has been found to implement training differently. Due to the diverse clinical backgrounds and work experience of hospital participants, CPR training in hospitals necessitates different pedagogical principles and instructional strategies (Ali et al., 2021a). In comparison to those who work in a tertiary hospital, those who work in a district area will encounter fewer cardiac arrest cases. Lack of proper training would, inevitably, make acquiring and maintaining CPR skills difficult. To organize effective CPR training, however, it is essential to have access to knowledgeable trainers and useful equipment (Elmali and Balkan Kiyici, 2022). Therefore, limited resources necessitate some modifications to the conventional method of CPR instruction. In this study, the conventional method of training has been adapted to fit the needs of health institutions dealing with a similar issue. In Malaysia, CPR training programs adhere to the simplified and essential portion of adult BLS, which includes early recognition of SCA and activation of the emergency response system, early CPR with an emphasis on hands-on techniques, and rapid defibrillation (AHA, 2020; NCORT, 2020). Some institutions cannot use the standard certification training model for large-scale CPR training due to training costs, the lack of expert trainers (Ali et al., 2021b), and time constraints (Rabanales-Sotos et al., 2022). For busy tertiary health institutions to be feasible, cost-effective, and time-friendly, it is necessary to develop a modified conventional training method. As

the number of health providers increases, numerous health institutions seek to increase the proportion of CPR-trained health providers (Chien et al., 2020). Numerous studies have indicated that theoretical CPR training is ineffective for developing practical skills (Onan et al., 2019). According to some sources, a modified CPR training model, such as instructor-led instruction and video-assisted education emphasizing hands-on training, could effectively maintain trained participants (Alnutaifi, 2021). In addition, receiving direct instruction from the instructor may result in a higher level of competency for CPR training that is both sustainable and effective (Masood et al., 2020).

Materials and Methods

Study design

This was a quasi-experimental study aimed to identify the effectiveness of a modified traditional training method for better knowledge and skill sustainability in tertiary health facilities so as to address the issue and develop a more practical model for CPR training implementation. It was conducted in May 2022 until September 2022 (4 months) in the clinical simulation unit of a teaching hospital in northern Borneo. It consists of the traditional method, modified module and the dependent variable which measures the competency level of healthcare providers focused on cognitive knowledge and hands-on skills. Hands-on skills are defined as the ability to recognize and perform immediate CPR emphasizing on hand placement, depth, and rate.

Sample

The study population consisted of medical officers, nurses, assistant medical officers, and nursing assistants from a teaching hospital in north Borneo. The site study was selected as it was the first teaching hospital in north Borneo of Malaysia that required an effective method of CPR training for the staff. The sample population selection was chosen based on the usual composition of a resus team in local clinical setting. The inclusion criteria were 1) healthcare providers in University Malaysia Sabah, 2) not pregnant, 3) underwent formal CPR training for less than five (5) years and the exclusion criteria were vice versa.

Intervention

In the first phase of the study, the subjects participated in a modified BLS training course; in the second phase, three months later, they were evaluated for their knowledge and skill retention. Pregnant subjects who refused to participate in this study were excluded from the analysis. All the potential participants who met the inclusion criteria read the consent form. The author answered the questions from the participants related to the study before they decided to take a part. The author described the study purpose, the significance of the study, and the expected time of completing the study questionnaires for all participants. In addition, participant's rights, including voluntary participation, the right to withdraw from the study at any time, and confidentially of the participants were assured.

Table 1. Distribution of sample based on demographic data (n=33)

	Respondents (*n*)	Respondents (%)
Age group		
20-30	22	66.7
30-40	11	33.3
Gender		
Male	4	12.1
Female	29	87.9
Designation		
Doctor	4	12.1
Nurse (RN)	22	66.7
Assistant Medical Officer (AMO)	5	15.2
Assistant Nurse (AN)	2	6.1
Year of experience		
< 1 year	2	6.1
1 - 2 years	7	21.2
2 - 3 years	4	12.2
3 - 4 years	15	45.5
> 5 years	5	15.2

n = numbers, % = percentage

Study instrument

This was a partial validated instrument called modified conventional CPR training (MT-CPR). It consists of theoretical and practical session, pre- and post-test for MCQ and post-test only for the practical part. The theoretical and practical content was based on the American Heart Association (2020) guideline for healthcare providers. MT-CPR was purposely designed to be implemented in eight (8) hours total and potentially can be reduced depending on the number of participants. To reduce the theoretical session time consumed, a lecture handbook was given two weeks prior the course being implemented.

Knowledge measurement

In phases one and two, subjects were required to answer the 50 MCQ questionnaires related to CPR knowledge. A scoring key was designed where each correct answer was awarded 1 mark and the wrong answer 0. Thus, the item maximum score was 50 and the minimum was 0. Consequently, the participants were required to get >43 scores to be considered as pass. Since health workers should have sufficient knowledge in this very critical area, knowledge scores of above 43 or 86% were considered “adequate” knowledge, scores

Table 2. Distribution of participants based on the level of knowledge

Level of knowledge	Score (Maximum=50)	Respondents					
		Pre-course		Post-course		Post-3 months	
		n	%	n	%	n	%
Adequate knowledge	>43 or >86%	5	16.7	17	56.7	6	20
Moderate knowledge	35 - 42 or 70 - 84%	23	76.7	10	33.3	14	46.7
Poor knowledge	<34 or < 68%	2	6.7	3	10	10	33.3

35 - 42 or 70 - 84% were considered "moderate" knowledge, and scores of below 34 or < 68% were considered as "poor" knowledge.

Skills measurement

The practical skills were evaluated using four parameters: rate, depth, pause duration between compression and ventilation techniques. The AHA (2020) skills assessment checklist was utilized to evaluate the practical skills which consisted of assessment (recognition sign of SCA and activation of ERT and high-quality chest compression (rate 100-120 cpm, depth at least 5cm, minimize interruptions, avoid excessive ventilation, complete chest recoil, opening the airway using head tilt chin lift). The skills assessment was done by the certified trainer among medical officers and assistant medical officers. The participants were considered passed or failed based on the expert judgment with the emphasis on the correct sequence of looking for danger, checking for response, calling for help and performing high quality chest compression

Data collection

Prior to data collection, participants were briefed and given the opportunity to enquire about the implementation of the study. Ethical consideration was taken from Medical Research Ethics Committee of UMS [Approval Code: JKEtika 1/22(14)]. Collected data were checked for their completeness before the analysis process took place

Data analysis

The results of the participants' theory test and performance on the practical skills test were entered into a data collection form as numeric values. Data collection forms were reviewed and transferred to an Excel spreadsheet. Statistical Package for the Social Sciences (SPSS version 25) was utilized to analyze the data.

Table 3. Comparison of MCQ test result (pre-, post-, 3 months post-course)

	Median (IQR)	χ^2 (df)	*p*-value
MCQ Test score		32.6 (2)	<0.001
Pre-course	38.0 (5)		
Post-course	43.0 (5)		
Three months post-course	39.5 (7)		

Note: Friedman test was performed, and *p*-value obtained was significant.

Results

The majority of respondents were in the age of 20-30 years old (66.7%) followed by 33.3% of the 30-40 age group. The mean age for the study participants was 28 of 33 respondents, where 29 (87.9%) were females and four (4) (12.1%) were males. This study reveals that 22 (66.7%) respondents were nurses, followed by five (5) assistant medical officers (15.2%), four (4) doctors (12.1%) and two (2) assistant nurses (6.1%). Based on work experience, this study demonstrates that the maximum year of experience is of 3- 4 years (15,45.5%), followed by 1-2 years' experience (7, 21.2%), more than five (5) years 5, (15.2%), 2-3 years (4, 12.2%) and less than 1 year (2, 6.1%).

Table 2 represents that pre-course indicated most of the respondents as having moderate knowledge (23, 76%), followed by adequate knowledge (5, 16.7%) and poor knowledge (2, 6.7%). After undergoing the MT-CPR, the distribution of knowledge reported to be positive was 17 (56.7%) having adequate knowledge, 10 (33.3%) with moderate knowledge and three (3) (10%) with poor knowledge. Unfortunately, the level of knowledge deteriorated three months after training, which revealed 14 (46.7%) as having moderate knowledge, six (6) (20%) having adequate knowledge and 10 (33.3%) with poor knowledge.

Based on Table 3, there was a statistically significant difference between the MCQ test scores (pre-course, post-course, and three months post-course) with $\chi2(2) = 36.2$, $p < 0.001$. For the post-hoc test to determine where the differences among these three scores were, the Wilcoxon signed-rank test was performed on the different combinations of the three score groups (Table 4). From the post hoc test, the median change of score for pre- and post-course significantly differed from zero

Table 4. Comparison of MCQ test result (pre- vs post-course, pre- vs post-3 months, post- vs post-3 months)

Comparisons	Median difference	Z	*p*-value
Pre- vs Post-course	-5	-4.185[a]	<0.001
Pre- vs Post-3 months	-1.5	-0.189[a]	0.850
Post- vs Post-3 months	3.5	-4.501[b]	<0.001

Note: *Wilcoxon Signed-Rank* test was performed.
[a]Based on negative ranks.
[b]Based on positive ranks.

Table 5. Comparison of post-course and post-3 months practical skills

Variables	Post-3 months practical skills		*p*-value
	Pass	Fail	
Post-course practical skills			
Pass	18	10	0.002
Fail	0	0	

Table 6. Comparison of post-course and three months post-course overall results

Variables	3 months post course overall results		*p*-value
	Pass	Fail	
Post-course overall results			
Pass	6	21	< 0.001
Fail	0	1	

($p < 0.001$), which indicates that the score was significantly increased after the course. However, there was no significant difference between pre- and three months post-course ($p = 0.850$), which indicates that the score between pre- and three months post-course were almost the same. There was a significant difference between post- and three months post-course ($p < 0.001$) indicating that the score was significantly decreased three months after the course compared to the post-course score.

Table 5 displays the association between the post-course practical skills and the practical skills of participants after three months, as analysed by McNemar test. A total of 28 participants passed the post-course skills station, while 0 participants failed. After three months, 18 participants passed the practical skills again, while 10 failed. The p-value obtained from the test was 0.002, indicating a statistically significant association between the two variables.

Table 6 displays the association between the post-course overall results and the post-3 months overall results of participants, as analyzed by McNemar test. A total of 27 participants passed the post-course overall results, while one (1) participant failed. After three months, six (6) participants passed the overall results, while 22 failed. A McNemar test was performed to determine if there was a significant association between post-course overall results and the post-3-months overall results. The p-value obtained from the test was < 0.001, indicating a statistically significant association between the two variables.

Discussions

The MT-CPR model was created by an emergency department expert with the primary goal of educating and ensuring that healthcare providers acquire adequate CPR knowledge and skills. This model was created in response to current hospital operations, taking into account the availability of expert trainers, equipment, budget, and time constraints. The study found a significant difference between the pre-, post-, and post-3-month MCQ knowledge assessment courses. The preliminary results of the pre-course show that the majority of the subjects had a low level of knowledge before undergoing the MT-CPR. However, the level of knowledge drops dramatically after three months. Ahn et al. (2016) reported that CPR knowledge and skill deteriorate as early as three months without practice. This result was similar to practical skills performance wherein it deteriorates as early as three months post initial training.

Following MT-CPR, the subjects' CPR practical skills were deemed adequate. However, the MCQ assessment result showed a similar pattern of deterioration in practical skills after three months. The assessor (after three months) commented that most of the subjects were unsure and found it difficult to recall the DRSCAB sequence (danger, respond, shout for help, compression, airway, breathing), and that the rate of chest compression was irregular and could be less than 100 compressions per minute. There is no doubt that modified and simplified traditional CPR training is highly recommended to improve trainee knowledge and skills (Alnutaifi, 2021). However, there is no guarantee that the participants would use the traditional training method on a regular basis due to several constraints such as time, course availability, and the fee to attend this type of training approach. Because CPR certification courses are in high demand, most government public health institutions are focusing on this aspect. Some critical clinical departments, such as emergency and anesthesia, may have key performance indicators (KPIs) that must be met in order to organize CPR training on an annual basis. However, due to the workload, the availability of expert trainers, and the lack of equipment, the KPI were difficult to meet. Nonetheless, lack of CPR practice due to lack of SCA cases leads to poor hands-on performance by the HCP.

Nonetheless, the recent COVID-19 pandemic, which prohibits any physical contact, and the strict rules requiring the use of proper PPE, has exacerbated the implementation of traditional physical training approaches (Castillo et al., 2022). Aside from modifying the traditional training approach for improved and sustained competency, the study recommends simplifying the sequence of CPR training to only include the core components such as look for danger, check for response, call for help, and hands-on chest compression.

It is well-known that a simple and straightforward training module can have a positive impact on overall training results, implementation, and retention of CPR competency (Grief et al., 2021). This training model could also be used by the community for training purposes. International resuscitation guidelines recommended optimizing the use of technology in CPR training as alternatives to the traditional training approach (Lim et al., 2022). With the current COVID-19 pandemic situation and other barriers mentioned earlier, numerous studies have been conducted to determine the efficacy of this technology-based training. In Europe, smartphones were widely used as primary tools in technology-based CPR training to increase the survival rate during out-of-hospital cardiac arrest (OHCA). CPR training can also be done in hybrid mode, which is a combination of technology and traditional training methods. The theory portion of the hybrid training model will be delivered via web-based learning, instructional video, mobile apps, and computer programs. VR and AR systems can be used to supplement physical practice. Nonetheless, the incorporation of technology in an appropriate device not only aids in training, but is also beneficial when confronted with a cardiac arrest event (Dong et al., 2020). The advantages of incorporating the traditional method into a technology-based approach may empower the user to do self-directed learning and reduce reliance on instructor availability. This advanced approach is also cost-effective because it does not necessitate additional trainers or equipment, depending on the technology-based training module used (Rabanales-Sotos et al., 2022). Aside from that, this alternative approach to supplementing current standardized and modified CPR training can help healthcare providers and communities overcome time constraints.

Limitation

A larger sample size is recommended for better and more consistent results. The sample size in this study, however, was small. As a result, it does not represent all healthcare providers in the study setting. Larger sample sizes should be considered in future studies to provide more consistent and generalizable results. This will help to ensure that the findings apply to a larger population of healthcare providers and communities.

Conclusions

Overall, this study found that modified CPR training (MT-CPR) was effective in developing and improving CPR knowledge and skills. The adaptation of traditional CPR training method is seen as effective because it allows for greater engagement between trainer and participants. Numerous studies reported that competency could deteriorate as early as three months. Therefore, it is recommended to retrain HCP in monthly basis using the MT-CPR or other simplified training approach. Organizing eight hours of MT-CPR is feasible in this study setting as it has a potential to be organized for a few sessions on weekly basis. Thus, more HCP will be able to refresh their competency. However, the implementation of MT-CPR on monthly basis still depends on a few factors such as the availability of expert trainer, equipment, workload, and budget.

The retention of competency after initial training is still debatable. As a result, it is advised to supplement current training methods with technology-based training methods. For better psychomotor and cognitive outcomes, important elements such as instructor guidance, real-time feedback, interaction between trainer and participants, hands-on practice and assessment, and an interesting method of training implementation are still required. On top of that, the MT-CPR could be implemented in hybrid mode to minimize the weakness of traditional training methods such as the availability of expert trainer and cost issue. Therefore, it is critical to organize regular simplified and easier implementation of training in order to maintain competency for both healthcare providers and the community.

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ORIGINAL ARTICLE

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Exploring children's condition of adolescent mothers in East Kalimantan Indonesia: an ethnography study

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ABSTRACT

Introduction: Children born to adolescent mothers tend to experience problems in health, growth, and development, also social problems. These problems persist and worsen due to various factors such as a pandemic, deteriorating economic conditions, and people's readiness to become parents. It is associated with the unpreparedness of adolescent mothers to face the dual roles carried out as mothers and adolescents themselves. The study aims to explore and describe children's condition of adolescent mothers during their motherhood in the community.

Methods: This is an ethnography study which involves adolescent mothers in two public health centers in Samarinda, East Kalimantan. Twenty participants aged between 13 to 19 years old, and who had children were gained by purposive sampling. Data were collected using in-depth interviews, observation, and field notes to explore behaviors, beliefs, values, and perceptions of adolescent mothers about children's health status. Data saturation was accomplished and analyzed with content analysis.

Results: The result revealed 3 themes about children's conditions of adolescent mothers in the community which involve: 1) Children's health status, 2) Children's breastfeeding status, and 3) Children's immunization status.

Conclusions: Many of their children have health problems at birth related to health problems during pregnancy. The low coverage of exclusive breastfeeding and basic immunization is caused by low support from families, inconsistent cultural beliefs, incomplete information, and the conditions of the COVID-19 pandemic. Being stigmatized as adolescent mothers caused them to lack regular check-ups on their children.

Keywords: children's health status, adolescent mothers, qualitative, breastfeeding, basic immunization

Introduction

Poor maternal and child health (MNCH) is considered a global public health burden (Sobhy et al., 2019). In 2019, an estimated 5.2 million children under five years died from mostly preventable or treatable causes, while children aged 1 to 11 months accounted for 1.5 million (World Health Organization, 2020). In Indonesia, the estimated number of deaths of children under the age of 5 in 2021 is 22.17 per 1000 live births (UN IGME, 2023). The causes of their death include respiratory infection, diarrheal disease, measles, malaria, malnutrition, and newborn condition (World Health Organization, 2023). In line with prior study, the vital development of a child starts after conception until two years of age (Bradley et al., 2022), while other scholars have stated neurodevelopmental outcomes suggest a slightly broader window extending to three years (Cusick and Georgieff, 2016; Erny, Prasetyo and Soekanto, 2022).

In the middle of 2019, adolescent population was 17.2% and the population of adolescent females was 8.3% (Worldometer, 2019). Indonesia ranked fourth in adolescent birth rate in Southeast Asia region (World Bank, 2020), and 1 in 9 girls married before they were 18 years old (BPS, Bappenas and UNICEF, 2020). This condition occurs in almost all provinces in Indonesia. East Kalimantan is province that is a red zone for adolescent marriage, that means prevalence of child marriage is higher than in the national case, with prevalence of adolescent marriage 31.13% (BPS, 2016). Adolescent mothers are a vulnerable group compared to adult mothers, and become major global health and social problems (Oyeyemi et al., 2019). This is because their physical and mental conditions are not ready to undergo pregnancy, childbirth, and become a mother, increasing the risk for medical, psychological, developmental, and social problems (Pinzon and Jones, 2012). Getting pregnant at an adolescent age is a stigma, making them isolated and not doing antenatal care (Sriyasak, Åkerlind and Akhavan, 2013; Govender, Naidoo and Taylor, 2020). This is the beginning of child health problems because children's health is determined from the prenatal period (Pem, 2015; Schwarzenberg and Georgieff, 2018). Likewise, when children of adolescent mothers experience illness or have to monitor their growth and development, adolescent mothers tend not to bring their children to health facilities because they are often treated impolitely and verbally abused (Sriyasak, Åkerlind and Akhavan, 2013; Govender, Naidoo and Taylor, 2020).

Children's physical and mental health will determine how they become adults in the future. This condition is influenced by the readiness of adolescents to be the parents, included their health during pregnancy. Even though there have been government regulations regarding welfare, education, and health insurance for citizens in Indonesia (Minister of Law and Human Rights, 2008; 2020; Yusriadi, 2019), adolescent mothers and their children are all a problem. According to prior study, they are relatively untouched by the government and come from disadvantaged groups (Gurung et al., 2020). The unregistered marital status (sirri marriage) is also an obstacle for adolescent mothers because they feel insecure, embarrassed, and afraid of meeting new people, thus neglecting their child's health needs (Oyeyemi et al., 2019). In addition, children born from sirri marriages have constraint to access welfare insurance from the government, children do not get their full rights, and there are inheritance problems, and population administrative problems (Ministry of Women's Empowerment and Child Protection, 2015).

Children are born with a readiness to learn anything around them. To be able to learn well, they need good nutrition, even when they are still in the womb (Erny, Prasetyo and Soekanto, 2022; Likhar and Patil, 2022; Nahak, Fouk and Esperanca, 2022). Children who have a good start will become healthier adults which results in better social, economic, physical, and cognition status (Pem, 2015). The effects of failure to provide adequate essential nutrition during the first 1000 days of life can result in increased expenses later in life in the form of medical care, psychiatric and psychological care, remedial education, lost wages, and behavior management (Schwarzenberg and Georgieff, 2018). Fulfillment of adequate nutritional needs makes them live better lives for their families and communities and promotes the country's Gross National Happiness (Pem, 2015). However, mistakes in providing nutrition to children will make children experience digestive disorders, be prone to allergies and experience growth and development disorders. Many pregnant adolescents experience chronic energy deficiency and anemia in Indonesia caused by a lack of energy in the long term, closely related to knowledge of nutritious food, age, employment status, and previous poor nutritional status (Wiyono et al., 2020). At the research site there are still some beliefs and cultures that endanger children's health, which are believed by adolescent mothers and their families, such as giving young coconuts that are still clear to make the baby's digestive system good. They believe that breastfeeding for two years is good for babies, but babies must also be immediately given complementary foods in the form of young coconut, a mixture of bananas and soft rice so that the child's nutritional needs are met and can grow healthy. In line with previous study in rural Indonesia, mothers in Indonesia understand the importance of breastfeeding for their children, but still provide complementary food from the start because they believe that giving food to babies faster is better, and there is the influence of other mothers in their environment who also provide complementary food earlier (Anggraeni et al., 2022).

The babies require just breast milk for the first six months of life (Likhar and Patil, 2022), because breast milk contains nutrients, growth factors, and cells important for brain development that formula does not (Schwarzenberg and Georgieff, 2018). Exclusive breastfeeding, adequate complementary feeding, stimulation, a safe environment, and care are necessary to ensure optimal physical, mental, social, and cognitive development and to prevent adverse impacts on short-term survival and long-term health and development (Pem, 2015), and also play a crucial role in

neurodevelopment (Schwarzenberg and Georgieff, 2018). The unpreparedness of adolescents to become mothers affects their response in meeting the nutritional needs of their children (Govender, Naidoo and Taylor, 2020). Lack of knowledge and information about infant and child care, makes them less likely to have the courage to make decisions about their child's health (Sriyasak, Åkerlind and Akhavan, 2013). Adolescent mothers will follow the advice and suggestions of their parents (Erfina et al., 2019). The problem is that not all suggestions from parents are health-wise, but based on experience, culture, and beliefs that have been passed down from their ancestors. One of the beliefs that they carry from their origins is refusing to immunize children, because they believe it will make children sick, and, according to them, this condition has proven that their children are healthy without immunizations, in line with prior study that parents rejected to immunize their child for health consent due to being contrary to belief and religion, and mistrust of the government (Syiroj, Pardosi and Heywood, 2019). The study aimed to explore and describe children's condition of adolescent mothers during their motherhood using an ethnography approach. Although in previous studies there has been research on the condition of children, information about the condition of children of teenage mothers is very limited, so this research needs to be carried out, so that they get specific support from family, government and other related parties.

Materials and Methods

Design

This is qualitative research using postmodern philosophy, that emphasizes there is no absolute truth and knowledge is relative (Dickens and Fontana, 2015) with an ethnographic approach that focuses on the way of life, different factors, and conditions related to the occurrence of each phenomenon which depends on the context of child health condition of adolescent mothers. Following Sardar and Loon (1998), it explored child health's condition among adolescent mothers group, including personal relationship within the group, preconception, and their ethnicity. This approach was considered an appropriate method because the study aims to explore and describe children's condition of adolescent mothers in their life span. After all, culture is a complex whole that includes knowledge, belief, art, morals, law, customs, and other capabilities and habits acquired by man as a member of society (Sardar and Loon, 1998). This research provides valuable information about the health conditions of adolescent mothers' children based on their culture.

Setting

A total of 42 participants attended the four focus groups. The DHB group included the Deputy District Chief, the Chief Executive of Subdistrict Administrative Organization.

Population

The population in this study was adolescent mothers aged between 13 and 19 years old, who had children. The sample was adolescent mothers who had children under 5 years of age as inclusion criteria. Purposive sampling was used to recruit participants from the work area of the Samarinda Municipality Health Office. The researcher was accompanied by cadres to visit the participants, after obtaining permission from the head village, the researcher met the head to of the neighborhood association to inform him if he was going to visit his residents, by showing a research permit from the public health center. Recruitment of participants ceased when the data obtained saturation, that means the researcher began to hear the same answer again and again, resulting in 20 participants.

Data collection

This study used three ways of data collection methods: observation, in-depth interview, and field note. The observation was carried out as a grand tour, which was carried out before the in-depth interviews were conducted, such as when adolescent mothers interact with their children such as feeding, breastfeeding, bathing, playing, and stimulating. Researchers also observed how adolescent mothers and their children interacted with their husband, family, healthcare provider, and people around them. Field notes from observations were written. After observing the environment where the participants live, the researcher conducted in-depth interviews using semi-structured questions formulated by researchers, as the interview guide served only as the stimulating or triggering of questions. Trigger questions have been consulted with the experts (advisors), and proven relevant to the research aims. During the in-depth-interviews, the questions flowed following the conversation between the key informant and the researcher. The questions focused to explore and understand their child health status at birth and nowadays, how they breastfeed, and their child's basic immunization status. The first author conducted all interviews, and all were interviewed individually in

Table 1 List of questions for participants in in-depth interview

No	List of questions
1	Could you tell me about your child's condition after birth? How was his or her health condition?
2	How is her/his current health condition??
3	Do you give her/him breastmilk? How many months did you give her/him breastfeeding only, without any complementary food?
4	Could you tell me why you gave him/her complementary food earlier?
5	What do you think about the immunization for babies?

Bahasa (Indonesian language). The trigger questions are mentioned in Table 1.

The study was conducted from March 2, 2021 to December 2021 and comprised of participant observation (March 15, 2021 to August 31, 2021), and in-depth interviews from 26 April to 15 December, 2021. Eleven of the participants were informed the study aims and the study designs, nine of the 20 participants were aged less than 18 years old (45%), seven of the nine participants lived with their parent from whom the researcher asked permission, and two of the participants lived with the guardians, and researcher telephoned the participant's parent to ask permission.

The in-depth interviews lasted about 45 – 60 minutes for each key informant, and were conducted at places as per the participants' preference, such as their houses or a room at public health center. Types of question used for interview were general question, specific question and other questions which were related to the research questions. In order to obtain an adequate information suiting the research question, sometimes the researcher carried out in-depth-interviews to the same key informant up to 2 to 3 times depending on the needs and the adequacy of information needed until the data reached saturation, first time by face-to-face, the second and the third by using a video call, due to increasing COVID-19 cases. Observations and field notes were used to complete the data from in-depth interviews, and stopped when the data were saturated.

Data analysis

In this study, the researcher followed the analysis data process of ethnography study, according to Gerrish and Lacey (2010) in seven steps: 1) Bringing order to the data and organizing the material with transcripts of data case-by-case from field notes of participant observation, and the recording of in-depth interviews; 2) Reading and re-reading about the data, 3) Coding the data; 4) Summarizing and reducing the codes to larger data; 5) Searching for patterns and regularities in the data, sorting and recognizing themes; 6) Uncovering variations in the data and revealing those cases that do not fit with the rest of the data, and accounting for them; 7) Engaging with, and integrating, the related literature. This all consisted of themes, sub-themes, data supported from participant observation, in-depth interview, and the literature related to those themes and sub-themes

The first researcher conducted initial data analysis, and this was discussed with another researcher (advisor, who has expertise in qualitative research in mental health and women health), enabling interaction and understanding to allow themes and categories to emerge. All findings were cross-checked to enhance the

Table 2 Descriptive summary of participants and their children

Participant	Age (years)	Number of children	Child's age (month)	Child's sex	Birth weight (gram)	Birth complications	Health status now	Exclusive breast-feeding	Basic immunization (as their age)
1	19	2	4	Girl	1600	LBW, Asphyxia	Malnutrition, allergic	No	Incomplete
			4	Girl	1750	LBW, Asphyxia	Malnutrition	No	Incomplete
2	19	2	32	Boy	2600	None	Stunting	Yes	Complete
			11	Girl	2800	None	Health	Yes	Complete
3	16	1	4	Girl	2250	LBW	Allergic	No	Incomplete
4	19	1	20	Girl	3000	None	Health	No	Complete
5	17	1	15	Boy	2500	Asphyxia	Allergic LW	No	Incomplete
6	19	1	6	Boy	2300	LBW	LW	No	Complete
7	18	1	5	Girl	2650	None	Health	No	Complete
8	17	1	9	Boy	2700	None	Health	No	Complete
9	17	1	6	Girl	2800	None	Health	No	Incomplete
10	16	1	6	Boy	2550	None	Health	Yes	Complete
11	19	1	14	Boy	3200	None	Health	Yes	Complete
12	17	1	16	Girl	2100	LBW, postmature	Malnutrition	No	Incomplete
13	19	1	12	Girl	1900	LBW	Malnutrition	No	Complete
14	18	1	7	Girl	2650	None	Health	No	Complete
15	18	1	22	Girl	2900	None	Allergic	No	Complete
16	17	1	7	Girl	2500	None	Health	No	Incomplete
17	17	1	6	Boy	1900	LBW, Asphyxia	Asthma LW	No	Incomplete
18	17	1	24	Girl	2550	None	Health	No	Incomplete
19	18	1	9	Boy	2700	None	Allergic	No	Incomplete
20	18	1	14	Girl	2650	None	Health	No	Incomplete

quality of reporting. To follow up, the categories and themes were resulted after the coding. Data were analyzed used latent content analysis, which connects text with aspect.

Trustworthiness refers to “truth value” of the study findings or how accurately the investigator interpreted the participants’ experiences (Jeanfreau and Jack, 2010). According to Guba and Lincoln (2017), there are four criteria to measure trustworthiness of qualitative research: credibility, dependability, transferability, and confirmability. Several ways can be used to achieve credibility; the researcher spend sufficient time in the research field to get information and real data, building trust and a good relationship with participants in the research site, doing persistent observation, and carrying out a triangulation process. Transferability was achieved through detailed descriptions of findings and comparing them with relevant research and concepts surrounding adolescent mothers’ child condition. Dependability and confirmability were enhanced by detailed discussions between researchers during analysis to reach agreement.

During data collection, the participants could choose to withdraw without further prejudice. The researcher ensured that all participants remained anonymous. In addition, the researcher verified that the participants' privacy and confidentiality were protected. The researcher did not use a specific name and relied on a code instead. The researcher also kept all documents from informants securely.

Results

There were 22 children from 20 adolescent mothers in this study. The mean age of the children was 11 months, ranging from 4 to 32 months. Two of them were twins, another two were siblings, and 18 children were single. Eight out of 22 children from adolescent mothers had health problems at birth, namely LBW and respiratory syndrome such as asphyxia; no child had a congenital defect. Twenty-one children were born at 37 weeks of gestational age, and one child was born at 42 weeks of gestational age. The descriptive summary of adolescent mothers and their children is shown at Table 2. To determine the themes, latent content analysis was carried out as shown in Table 2.

The result revealed three themes about children’s conditions of adolescent mothers in the community which involve: 1) Children’s health status, 2) Children’s breastfeeding status, and 3) Children’s immunization status as shown in Figure 1.

Theme 1. Child health condition

The theme child health condition summarizes the result of how the condition of the child is related with health problems at birth and child health problems now. The health condition of the baby at birth is influenced by the condition of the adolescent mother's pregnancy. Most adolescent mothers get pregnant before marriage. They don't go to health facilities for antenatal care because they tried to hide their pregnancy from parents and community member. They did pregnancy checks after they had complications, or after the cadre knew and reported it to the healthcare provider, and then an examination was carried out if both parents allowed it.

There are several cultures and beliefs associated with the health condition of children in general. Particularly for adolescent mothers, the stigma of being pregnant is synonymous with the moral problem that they got pregnant before marriage, making them reluctant to have an examination. Apart from that, their disobedience in consuming iron tablets, because of the belief that iron tablets will make the baby bigger, makes pregnant women the target of "kuyang" ghosts, and consuming iron tablets is a prayer so that pregnant women become sick, due to taking medicine.

Table 3 Example of content analysis to explore child’s conditions of adolescent mothers

Meaning unit	Condense meaning unit	Code	Sub-categories	Categories	Theme
I've read about the importance of exclusive breastfeeding for my baby, the midwife also explained the importance of exclusive breast-feeding for my child's immunity, but the traditional birth attendance (dukun bayi) who care for me and my baby said that the first breast milk had to be thrown away because it was stale, and young coconut was good for helping the baby poop the first time. My mother-in law told me to obey the traditional birth attendants, as she has a lot of experience in caring for newborn. She used to take care of me when I was born 19 years ago according to our culture and our beliefs.	She is confused about whether to exclusively breastfeed her baby or follow the advice of mother-in-law and traditional birth attendants who have experience caring for postpartum mothers and their babies for decades according to their culture	Lack support in exclusive breastfeed from family’s culture and community members	Culture that is not supportive for exclusive breastfeeding	Failure in breastfeeding	Breastfeeding history

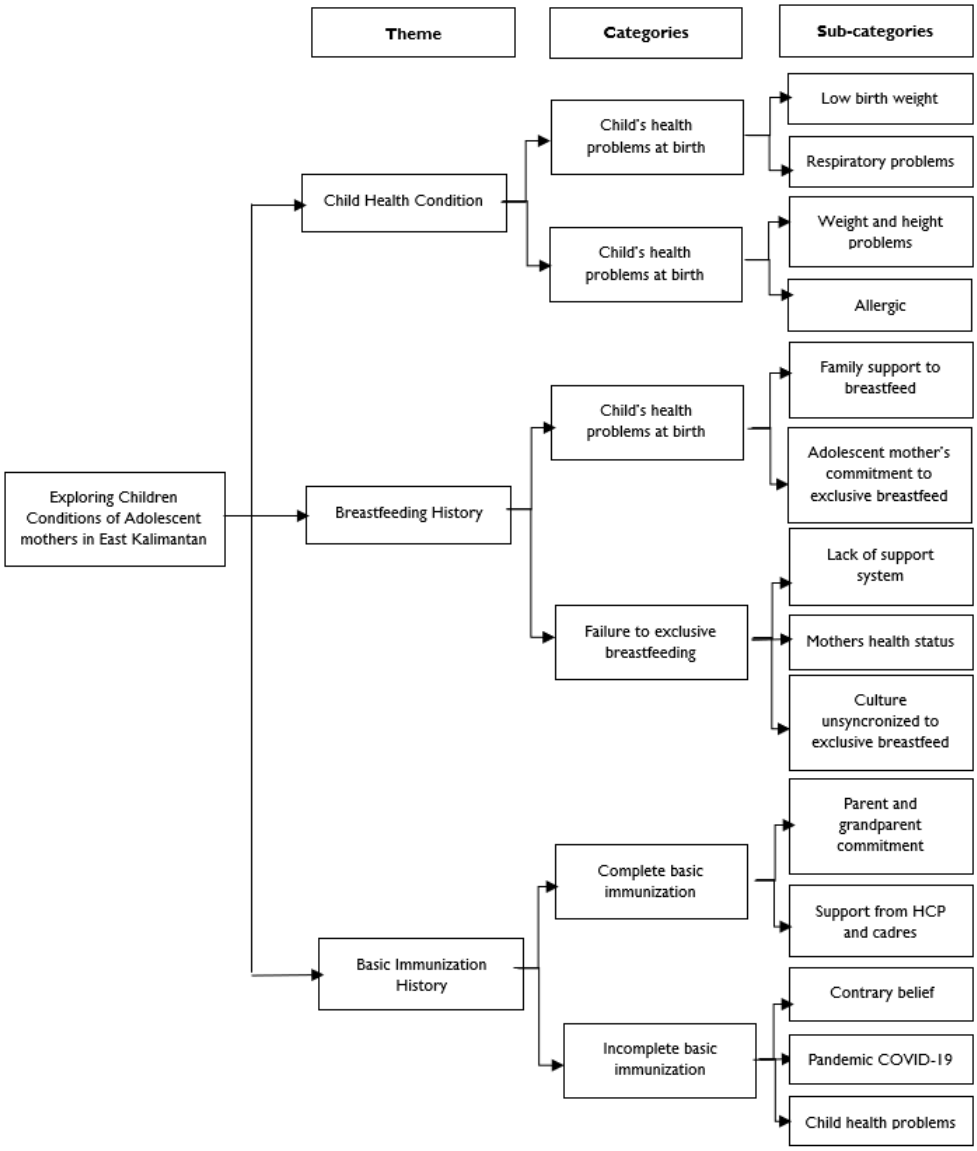

Figure 1 Themes, categories, and subcategories of the descriptive results

Categories 1: child health problem at birth

Eight out of 22 babies experienced health problems during delivery. Six babies were born with low birth weight, even though they were of sufficient gestational age. In addition to low birth weight, twins also experienced asphyxia. Fourteen babies were born in good health, having a birth weight of more than 2500 grams. The child health problems were occurred because of the child and mother's condition. Culture and beliefs also influence this problem, such as an adolescent mother is stigmatized, unmarried pregnancy is a stigma that inhibits them to getting antenatal care. Changes in their health during pregnancy which endangered themselves and their babies were not detected early.

Some adolescent mothers revealed their babies were born small compared with others babies. One adolescent mother reported why her babies were born with small weight, as follows:

"When I was pregnant my mother forbade me to eat a lot because my stomach is very big, and I have never done a pregnancy check because I am ashamed, I am not married." (P1, 19 years old)

Another participant expressed why her baby's weight low at birth as:

"My son was small when born, only 1.9 kg, even though the gestational age was appropriate, the HCP said I had severe blood deficiency, because I don't want to take red pills (iron tablets) for fear of big babies and too young to get pregnant." (P17, 17 years old)

There is a belief in the culture of East Kalimantan that the participants believe that iron tablets that smell fishy will make them the target of the "kuyang" ghost (a ghost who is believed to suck the mother's blood before giving birth).

Regarding the respiratory problems experienced by babies at birth, a participant expressed as follows:

"The HCP said that my gestational age was too old, so I had to try to be labor by induced, it was very painful and the baby didn't cry right away when he was born and he needs to care in neonate intensive care unit." (P12, 17 years old)

Categories 2: current child health condition

Eleven out of 22 children were aged under 1 year, and the rest aged between 1 to under 3 years. Half of the number of children experienced health problems such as malnutrition, susceptibility to allergies, asthma, and stunting. Lack of knowledge about good nutrition for child development, poor parents' economic conditions, history of illness during pregnancy, and the conditions of the COVID-19 pandemic contribute to problems in children's health. This condition is also influenced by the parents of adolescent mothers.

Apart from that, there are beliefs and cultures that prevail in society such as restrictions on high protein foods such as fish and eggs as causes of ulcers, nutritious food is prioritized for husbands as the main breadwinner, while children and wives only get leftovers from their food. Grandparents believe that small babies don't matter as long as they stay active, so that adolescent mothers don't feel worried about their child's condition.

Several participants mentioned the current health condition of their children, who are less healthy and get sick more easily than their peers. One reported that her child was diagnosed with stunting, and that made her feel sad and guilty, for not being able to properly care for her child:

"*The cadre said that my son was stunted, malnourished... maybe because I was pregnant again when he was only 1 year old, and I was very drunk (hyperemesis gravidarum) until I was treated for lack of fluids, and he was not well cared for."* (P2, 19 years old)

In this study, among the babies who had low birth weight, currently all children have problems with underweight or malnutrition. Feeding too early does not make children well, but they have digestive problems, such as being prone to diarrhea and allergies. Three children of adolescent mothers experienced malnutrition, but the children were quite healthy, and had no other complaints. They have provided food like adult food for their children, but not chili so it is not spicy. For the babies, they provided porridge made from mashed bananas with rice, or biscuits for babies with formula milk, as one expressed: The midwife said that my child was malnourished, I thought it was normal, she never sick, active. She was born with low weigh, and my mother had given her porridge and formula milk since her aged 2 days. (P13, 19 years old)

Two other children suffered from malnutrition and allergies. They suspect the cause is their baby was born with a low birth weight, so they get sick easily, as one expressed:

"My child has diarrhea easily, I think the milk is not suitable, but when I change the milk, he is still diarrhea, is it because the water is not good for him, I don't know." (P19, 18 years old)

Theme 2. History of breastfeeding

Breast milk is the best food for babies because it contains nutrients and IgG immune substances needed for the baby's growth and development. In Islam, perfecting breastfeeding is explained in the Koran, Surah Al Baqarah verse 233, which recommends breastfeeding for two years. Exclusive breastfeeding is a struggle for parents, especially for mothers. Exclusive breastfeeding is very possible for babies, with strong support from partners, families, health workers and cadres. However, there are some cultural and wrong beliefs about breast milk and breastfeeding. The culture of throwing away colostrum is still practiced by some participants because it is considered stale breast milk which makes babies have stomachache. In addition, there is a belief that if the shape of the nipple is split, then the mother may not breastfeed, because the breast milk will mix with blood, and this will make the child disobedient to the mother, or make them die.

Categories 1: exclusive breastfeeding

There were three teenage mothers who exclusively breastfed their babies. One mother had two children, both of whom were exclusively breastfed. The reason for exclusive breastfeeding is because of the strong support from their parents, while their husbands just follow the advice of their parents-in-law or their parents, and as form of adolescent mother's commitment to provide the best life for her child, because she feels the sadness of being separated from her mother because she is pregnant without being married.

The success of breastfeeding in teenage mothers is influenced by family support, commitment from the

adolescent mother, and the adolescent mother's knowledge about exclusive breastfeeding. Religious knowledge and good general knowledge of parents about breastfeeding are strong reasons for teenage mothers to exclusively breastfeed their children. The reason of exclusive breastfeed was as follows:

"*I breastfeed exclusively for my children; my father explained that breastfeeding is regulated in the Koran, meaning it is very important and good, even though I sometimes feel tired and feel that breast milk is not enough, but my mother always supports me and prepares good food for breastfeeding mothers*." (P2, 19 years old)

One single adolescent mother revealed that the reason for exclusive breastfeeding was because she wanted to prove to her parents that she was trying hard to provide the best food for her baby:

"*I promise myself to give the best for my child, including exclusive breastfeeding, because I have failed to be a good child, I don't want to fail as a mother*." (P10, 16 years old)

Another participant committed to give her son exclusive breastfeeding because she is a midwifery academy student, who understands the benefits of breastfeeding for her child's health, and because of the support from family members, because he is the first grandchild for their extended family: "I learned about the benefits of breastfeeding for mothers and babies at University, and want to implement it for my son, as well as support from the family, because my son is the first grandson in our extended family." (P11, 19 years old)

Categories 2: failure of exclusive breastfeeding

Participants and their families agreed on the importance of breastfeeding for babies. But in their culture, newborn must clean their tongue, mouth and digestive system by being fed with young coconuts. They also believe that colostrum is stale breast milk, and should not be given. The cause of the failure in exclusive breastfeeding is due to several factors such as the physical health status of the mother, the condition of the mother's breasts such as sinking or cracked nipples, maternal mental health, incorrect information about breastfeeding in adolescent mothers, and also impact of knowledge about COVID-19. One participant expressed her health condition after birth as:

"I didn't breastfeed from the start because I was treated in the ICU because of a seizure before giving birth." (P1, 19 years old)

Several participants stated that the condition of their breasts was the reason for not breastfeeding their babies perfectly, as follows:

"My nipples are inverted, and my daughter can't suck the nipple and keeps crying. Finally, my mother gave formula milk to my baby according to my mother-in-law's advice." (P3, 16 years old)

Other participants explained the reasons why they stopped breastfeeding their babies:

"I used to breastfeed, but my nipples were blistered and bleeding, and painful, and my baby kept crying because she was hungry, my mother finally gave formula milk to calm him down." (P18, 17 years old)

Another cause of babies not getting exclusive breastfeeding is the existence of cultures and beliefs that are not in accordance with the knowledge that is believed by the family. The assumption that when breast milk comes out for the first time (colostrum) it is considered stale milk, which must be thrown away to avoid stomach pain for the baby, is expressed as follows:

"*My mother and my aunty said that the first breast milk was stale, the yellowish color and the fishy smell indicate that the first breast milk is stale so it had to be thrown away because it could cause the baby to be bloated and have stomach pains, and give my baby honey.*" (P8, 17 years old)

Erroneous beliefs about the shape of the nipples are also the reason why babies are given formula milk early on, as follows:

"*My mother forbade me to breastfeed because my nipples were split, and bleeding when sucked. She said, it is not good, because breast milk is mixed with blood causing stomachache, and cause infant death, like our neighbor's children."* (P6, 18 years old, married)

Postpartum maternal mental health conditions are also the cause of exclusive breastfeeding, as expressed by one of the participants:

"*My child was born prematurely, and when he was born, I was stressed and didn't want to touch him, don't want to breastfeed… I used to hate him. I feel angry because of him I was scolded by my parents and was expelled from school. My parents don't want to talk to me, they hate me for his presence.*" (P17, 17 years old)

The COVID-19 outbreak which increased sharply, and the unclear management at that time, made all kinds of complaints related to coughing and fever associated with COVID-19 disease. This condition forces mothers

who are still breastfeeding their babies to self-isolate. This causes the breastfeeding process to be forced to stop for fear of infecting the baby:

"My baby was 4 months old. I had a cough, fever, and lost my sense of smell. My mother-in-law and husband told me to stop breastfeeding, afraid that if I caught COVID-19 it would pass it on to my baby. I ended up living in the back room, and my son was in the care of in-laws and given bottled milk." (P19, 18 years old)

Theme 3. Basic immunization history

Basic immunization in infants is important to maintain their health against various diseases caused by bacteria and viruses. In Indonesia, basic immunization is provided free of charge to all Indonesian children, either through services at the hospital, private practice of a medical doctor or midwife, community health center, or at the integrated service unit (posyandu). The completeness of immunization is that a child's immunization schedule is maintained according to the child's age, and it validated with a child's health card record.

The success of parents in getting complete basic immunization is influenced by several factors. Parents' knowledge about the benefits of immunization, family support, healthcare provider support, and support from cadres also determines children get basic immunizations. In this study, children who received incomplete basic immunizations were caused by their grandfathers refusing to vaccinate their grandchildren, because they believed that the vaccine would cause problems for their grandchildren, rising cases of COVID-19, health workers who were infected with COVID-19, empty vaccines due to delays in delivery from the center, parents who are sick, or children who are sick, making immunizations impossible to give, and preventing children from getting complete basic immunizations.

Categories 1: complete basic immunization

Completeness of basic immunization in infants was influenced by knowledge, attitudes, and family support. The support of the grandfathers to bring their grandchild to get immunized was due to their good knowledge and education, as well as their belief about their grandsons as the successors of their ancestor's name, as one stated:

"*My father-in-law provides the best facilities for my child, including immunization at a pediatrician, because he is the first grandson, from the first son, who is predicted to carry on the great name of their ancestors*." (P11, 19 years old)

During the COVID-19 pandemic, many health workers are infected with COVID-19, they had to isolate, so the public health center was closed. Some parents had to take their child to a pediatrician, to get immunization because immunization is important for their child, as stated:

"I took my child for immunization to a private pediatrician practice because the public health center was closed, many health workers were infected with COVID-19, even though we had to pay, we were fine, my husband said immunization was important for our child. So, it must be immunized when the time comes." (P7, 18 years old)

Categories 2: incomplete basic immunization

All mothers who have babies and monitor the growth and development of children at posyandu or community health centers, explained the importance of immunization for a child's immunity. However, there are some parents who don't carry out immunizations because they don't comply with their beliefs, sick children, effect of immunization, empty vaccines, and health workers infected with COVID-19 causing health facilities to close. One participant explained why she did not take her children to be immunized:

"*My father forbade me to carry out immunizations for my children, according to him, in our tribe it is useless, and will actually make children sick, because children are given diseases*." (P1, 19 years old)

Another participant did not bring their child for immunization because at the time of the immunization schedule their child was sick, as disclosed as follows:

"*My daughter lacked two immunizations because at the time of immunization, she was sick, and it was recommended by the midwife to postpone it until he recovered first, but at the appointed time, he had diarrhea, until the time was up, and had to be immunized with another type*." (P19, 18 years old)

Several immunizations have an impact on babies such as fever and children becoming fussy and having difficulties sleeping, such as the BCG and DPT vaccines. This causes concern for parents to take their children to be immunized:

"*There was one immunization that my child didn't get, because I was afraid, she would have a fever and be cranky, she had just recovered from an illness*." (P16, 17 years old)

The COVID-19 pandemic has also become a problem in vaccine distribution from the central government to the regions. To prevent the spread of the virus, the government was making efforts to impose restrictions on community activities. This has had an impact on the distribution of goods to regions including vaccines, resulting in empty vaccine stocks at health facilities. This condition was expressed by a participant as follows:

"*I want my child to be fully immunized, but according to cadre information, immunizations have been suspended for an indefinite period because vaccine stocks were empty*." (P15, 18 years old)

Discussions

The results of the study show how adolescent mothers live their lives in caring for their children. Most of them tend to be quiet, and make their parents the main support, including in caring for their children. Their husbands also rely on their parents as teachers in caring for their children. Half of the total children experienced health problems at birth such as low birth weight and asphyxia. Similar with previous studies, the children of adolescent mothers were born with low body weight, respiratory problems, and lower Apgar scores compared to adult mothers (Gurung et al., 2020; Jae´n-Sa´nchez et al., 2020; World Health Organization, 2020). This condition shows that being a mother in their teens affects the health of their children, so we must support the maturity to become parents to reduce the risk of health problems in children. Some adolescent mothers and their parents said that it was normal for their babies to be small because they had small offspring, and it was not because they were pregnant in their teens. Lack of knowledge about the effects of adolescent pregnancy, not only on adolescent mothers, but also on their parents must be stopped, so that cases of adolescent pregnancy can be reduced.

Eleven out of 22 children of adolescent mother experienced health problems, most of them suffered from malnutrition, underweight, prone to allergies, asthma, and stunting, as in previous studies (Salmon et al., 2018). Two of these children were born under normal conditions, without health problems, but due to parental limitations of knowledge and no experience in child care, it made them experience obstacles in caring for children, in line with previous studies (David, Dyk and Ashipala, 2017; Mangeli et al., 2018). Information about child's health that is not comprehensive makes them confused to act, in line with prior study, and fulfill basic physical needs related with stunting (Surani and Susilowati, 2020). Health problems in children in the first 1000 days of life are a big problem, because this is a critical period. Fulfillment of adequate nutritional is needed to encourage normal brain development (Cusick and Georgieff, 2016). This obstacle was caused by their process of becoming mothers, mostly due to getting pregnant before marriage, which is considered as a mistake in social institutions (Govender, Naidoo and Taylor, 2020). Chronic energy deficiency commonly found in pregnant women in Indonesia has an effect on the growth and development of the fetus in the womb (Wiyono et al., 2020). This condition is related to unhealthy eating habits in school-age children and adolescents, such as eliminating breakfast, and eating not according to the body's needs for fear of becoming fat. And when they get pregnant, it will have an impact on themselves and their baby, because their bodies are not yet ready for pregnancy.

The child health's condition of adolescent mothers is influenced by adolescent mother's health status during pregnancy (Schwarzenberg and Georgieff, 2018; Nahak, Fouk and Esperanca, 2022). Health problems during pregnancy affect the health of the fetus at birth, and also the current condition of the child. For the children born with these health problems, their mothers experience complications during pregnancy such as hypertension, pre-eclampsia, anemia, and chronic energy deficiency. The anemia experienced by pregnant adolescent mothers is often ignored, due to a lack of knowledge about the benefits of iron tablet supplements for their pregnancy (Klankhajhon et al., 2021). This is in line with previous study that there is a wrong belief that taking iron tablets during pregnancy will make the baby bigger (Wahyuni and Setyowati, 2010),. This is in accordance with research conducted by Pinho-Pompeu et al. (2017) who confirmed anemia iron deficiency as a predisposing factor for preterm birth. The results of this study are in line with previous research, where adolescent mothers are at high risk of experiencing health problems such as gestational hypertension, mild to severe preeclampsia, intrauterine infection, post-term pregnancy, and eclampsia (Riyana et al., 2015).

In Indonesia, anemia is common in school-age children and adolescents. This is due to the selection of foods that are low in good nutrition, and anemia is not considered an important problem, because they feel that the effect is not severe. This bad habit is also passed down in giving food to their children, the important thing is that their children want to eat it; it doesn't matter about the nutritional content. Chronic energy deficiency in pregnant women in Indonesia caused by a lack of energy in the long term is closely related to knowledge of nutritious food, age, employment status,

and previous poor nutritional status (Wiyono et al., 2020). The principle of "what is important to eat" by ignoring nutritional content is still a problem in the community where this research was carried out.

Society's stigma towards adolescents, and unfriendly treatment of health workers, makes them isolated themselves from society, and causes them not to do enough antenatal care (Sriyasak, Åkerlind and Akhavan, 2013; Govender, Naidoo and Taylor, 2020). Their appearance in society as pregnant before marriage, and having children at a young age is considered a disgrace to the family and society, and makes society ostracize them (Smithbattle, 2013; Kumar et al., 2018) In line with study in Texas, adolescent mothers experiencing stigmatization leads to negative outcome including depression, social isolation, lowered self-esteem and poorer academic performance (Wiemann et al., 2005). Even though adolescent pregnancy before marriage is a violation of social norms, nevertheless, we have to support them, so that they can go through difficult conditions and be able to raise their children well. Supporting them does not mean justifying their wrongdoing, but saving the next generation.

Exclusive breastfeeding was a challenge for mothers, including for adolescent mothers. In this study, only 3 out of 20 adolescent mothers gave exclusive breastfeeding. In line with previous studies, most of mothers do not provide exclusive breastfeeding to their babies, because they believe that giving complementary food to the babies earlier is better (Lailatussu'da et al., 2018; Anggraeni et al., 2022). The failure of exclusive breastfeeding is due to the belief that breastfeeding for four months does not cause problems for the baby (Nahak, Fouk and Esperanca, 2022). The belief that colostrum is considered as stale milk is a cause of failure of exclusive breastfeeding. In addition, the culture of giving young coconut to newborns as an effort to cleanse the baby's digestive system is a challenge in itself to be stopped by health workers as an effort to support the success of exclusive breastfeeding and reduce infant mortality rate. The hereditary belief and culture of providing complementary food to babies from an early age is a sign of respect by mothers for their parents, even though some of them already know about exclusive breastfeeding (Anggraeni et al., 2022). The success of exclusive breastfeeding is influenced by many factors, such as the support of spouses, families, health workers, and cadres. Family support is the biggest factor in the success of exclusive breastfeeding, compared to husband support in Bantul, Jogjakarta, Indonesia (Lailatussu'da et al., 2018).

Some children easily get diarrhea and are allergic to food or snacks. In line with prior study, children born to adolescent mothers had lower z-scores for height-for-age, weight-for-age, and higher prevalence of stunting, than children born to adult mothers, the strongest link being through women's weight, education, socioeconomic status and complementary feeding practices (Nguyen et al., 2020). It also increased the risk for infant mortality (Yurdakul, 2018), respiratory distress, and low Apgar Score (Jae´n-Sa´nchez et al., 2020). Allergies in children are associated with immunity, where in infants immunity can be obtained from exclusive breastfeeding, immunization and adequate nutrition. In this study, children often experience diarrhea and allergies, do not get exclusive breastfeeding, and immunizations are incomplete. In line with prior study, in infants who were non-exclusively breastfed, the odds of having an illness with fever in the last two weeks among infants who were exclusively breastfed decreased by 66%, and exclusively breastfed infants had lower odds of having an illness with a cough and having diarrhea compared to non-exclusively breastfed infants (Mulatu et al., 2021). Misunderstandings about the benefits of colostrum and inappropriate breastfeeding practices must be corrected through the interaction of religious leaders and health workers to avoid repeated misunderstandings. For teenage mothers and their families who are Muslim, it is necessary to understand the meaning of Surah Al Baqarah verse 233 concerning improving breastfeeding. Community members have a tendency to follow the advice of ustad or priests because they are considered as pious scholars.

Basic immunization in infants is important to maintain their health against various diseases caused by bacteria and viruses. Immunization has been proven in the past two centuries to help reduce the incidence of diseases such as polio, smallpox and measles in children worldwide (UNICEF, 2020). Providing incomplete basic immunization to children was influenced by the beliefs and culture of their parents or grandparents (Syiroj, Pardosi and Heywood, 2019). There are several immunizations that have an impact on infants such as fever and the child becomes fussy and has difficulty sleeping, such as the BCG and DPT vaccines. This causes concern for parents to take their children to be immunized. In this study, 10 babies of adolescent mothers did not receive complete immunizations, for various reasons such as worries that babies would get sick when immunized, wrong information about immunizations, not having means of transportation, and the COVID-19 pandemic which caused health workers to

become infected with the virus, and the temporary elimination of immunizations from the health office at the PHC. Similar study showed the factors of parents refused vaccines related to religious belief (Anderson, 2017), personal beliefs, safety concern, and lack of information from healthcare providers (McKee and Bohannon, 2018; Syiroj, Pardosi and Heywood, 2019). In order for babies to get complete basic immunization, it is necessary to increase knowledge among teenage mothers, as well as their parents, as the closest support system. In addition, trained cadres, as an extension of the health workers, can explain to them in their language that is easy to understand, so that babies get their right to get complete immunization for their body's immunity.

The COVID-19 pandemic has also caused a decrease in basic immunization coverage in Indonesia. This is due to several factors, such as the closing of the posyandu or PHC because health workers are infected with COVID-19, limited personal protective equipment for health workers, and parents' fear of taking their children to public facilities for fear of contracting COVID-19 (Ministry of Health of Indonesia and UNICEF, 2020). Adolescent mothers worried about the effects of immunization. Their lack of knowledge is detrimental to their children because basic immunizations which are important for the child's immune system are missed. Erroneous beliefs about the benefits of immunization need to be straightened out through the intensive participation of health workers and community leaders, through activities that incorporate local cultural wisdom, so that they can change without feeling forced.

Limitations

There are limitations in this current study that need to be stated. Firstly, the study was undertaken at a single location. However, this area had the highest number of adolescent mothers; secondly, there is a higher case of stunting in the province, and so may not represent the children's health problems of adolescent mothers in Indonesia generally. Secondly, care provided may differ across settings so there may be other experiences elsewhere. With a qualitative design, new insights are provided into adolescent mothers' experiences of parenting and thereby contribute to understanding the problems they face and their needs for support.

Implications

As an archipelagic country, Indonesia has thousands of different tribes and cultures, has a different culture in caring for pregnancy, childbirth and raising children. This study found some cultures and myths against the health system. A special approach is needed for them to optimize care for adolescent pregnant women, adolescent mothers and their children.

Nurses in Indonesia have an opportunity to improve public health by using a family-centered maternity care model to support adolescent mothers achieve their motherhood. In Indonesian culture, the family is the health center for family members. In addition, there is a wider need to influence society's more accepting views of adolescent mothers. The development of interventional care for adolescent mothers must include the involvement of the extended family. Further studies are needed to explore the maternal role of adolescent mothers from different cultures globally, and also investigate the effectiveness of nursing interventions to enhance the development of adolescent mothers' roles.

Conclusion

The growth and development of children in early life is influenced by the health conditions of the mother during pregnancy, including nutrition and antenatal care during pregnancy, childbirth, and care during early life. Exclusive breastfeeding and appropriate complementary food after exclusive breastfeeding, complete basic immunization, good growth and development stimulation, child-friendly environment, and caring for children in a harmonious family with good economic status will promote children's health status from adolescent mothers. Some cultures and beliefs that are not in harmony with the health of mothers and babies, but can be harmonized by involving community leaders and religious leaders as their role models.

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Conflict of interest

The authors declared they have no conflicting interest.

Ethical statement

This research obtained approved from The International Review Boards of Khon Kaen University with ID HE642011 date 1 March 2021. All participants were provided informed consent and anonymity. For participants below 18 years old, authors sought approval from the parents and guardians.

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Potential effect of green tea extract for adjuvant treatment of acute ischemic stroke by s100ß upregulation in non-thrombolysis patient

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ABSTRACT

Introduction: In ischemic stroke, the cerebral cortex suffers from hypoxia-ischemia, leading to inflammation and oxidative stress. Green tea extract has an anti-inflammation effect and antioxidant. This study aimed to determine the efficacy of green tea extract for adjuvant treatment of acute ischemic stroke in non-thrombolysis patients.

Methods: A double-blind randomised controlled trial was conducted in November 2020-November 2021. The subjects were all acute ischemic stroke patients who presented to the Emergency Room during recruitment, randomised into control (n=13) and intervention groups (n=18); the intervention groups were given green tea extract 350 mg. Treatment was for 30 days. National Institutes of Health Stroke Scale (NIHSS), modified Rankin Scale (mRS), Montreal Cognitive Assessment - Indonesia (MoCAIna), IL-10 and S100ß were analysed.

Results: Data were compared with a significance level of $p<0.05$. The differences in NIHSS from day 0 to 7, day 0 to 14 and day 0 to 30 were statistically significant in the intervention group (p=0.019, p=0.002 and p=0.000, respectively). The mRS score was statistically significant in the intervention group on day 30 (p=0.46). The differences in mRS score from day 0 to 14 and day 0 to 30 were statistically significant (p=0.042 and p=0.001, respectively) The S100ß were statistically significant in day 7 (p=0.006). The difference in S100ß from day 0 to 7 was statistically significant (p=0.001).

Conclusions: The green tea extract, through up-regulation S100ß, can improve the clinical outcomes of acute ischemic stroke.

Keywords: acute ischemic stroke, EGCG, green tea extract, S100ß

Introduction

Stroke is the second leading cause of death and the first cause of disability worldwide (Caplan and Caplan, 2016; Powers et al., 2019). Thrombolysis using Intravenous Recombinant Tissue Plasminogen Activator (iv-rTPA) in 3-4,5 hours after stroke attack is the only treatment approved by the Food and Drug Administration (FDA) (Che et al., 2019). Another drug class for acute stroke is neuroprotectant, but it has not been mentioned in AHA stroke guidelines since 2007 because of a lack of evidence. Searching for alternative treatment for acute stroke is ongoing. There are many

drug candidates for acute stroke, about 430 drug candidates for stroke treatment, and many of them have failed to show benefit in acute stroke patients.

Stroke is a complex event; it begins with decreased blood flow and causes energy depletion that will cause cell membrane impairment. Ischemic brain tissue can cause neuronal cells to secrete some Danger Associated Molecular Patterns (DAMPs); one of the DAMPs is S100ß (Michetti et al., 2012). S100ß is normally very low, and the event is not detectable; its level will be only detected during certain pathological conditions. Serum S100ß represent infarct volume in stroke patients (Einav et al., 2012). It suggests that the blood-brain barrier is leaked during ischemic stroke, so its level will increase in the serum (Nash, Bellolio and Stead, 2008). Ischemic brain tissue can also induce inflammatory pathways. IL-10 is an anti-inflammatory cytokine (Arponen et al., 2015). Increased IL-10 concentration may have a neuroprotective effect, according to some research. Spera et al. (1998) said that administration of IL-10 in the MCAO model significantly reduces infarct volume and percent hemisphere infarct.

Green tea is the second most common drink in the world. It has polyphenols that have some benefits for health. One of its polyphenols is Epigallocatechin-3-gallate (EGCG) which has a potent antioxidant effect. EGCG has an anti-inflammation effect and prevents cell death during ischemic events (Singh, Mandal and Khan, 2016; Zhang et al., 2017). An epidemiological study in 2019 showed that green tea consumption of > 1 cup daily can prevent a cerebrovascular event, and in a patient who has had a cerebrovascular event, those who routinely consume green tea have better outcomes compared to those who do not (Lee and Kim, 2019). Previous animal model studies show that either EGCG or green tea extract can prevent necroptosis and apoptosis. It can decrease RIP3 expression in the MCAO model compared to the control MCAO. It also decreases inflammatory markers. EGCG and green tea extract can inhibit Caspase-3, a proapoptotic protein, and increase the expression of the anti-apoptotic protein, BCL-2 (Machin, Susilo and Purwanto, 2021).

Based on previous research, there is need to conduct clinical research to determine the efficacy of green tea extract for adjuvant treatment of acute ischemic stroke in non-thrombolysis patients.

Materials and Methods

The study has received permission from The Research Ethics Committee of Universitas Airlangga Hospital which examined and approved study procedure with the certificate number 176/KEP/2022 on 8 September, 2020. Anwar Medika General Hospital and Siti Khodijah Islamic Hospital have agreed and given permission to include the study ethic process from Airlangga Hospital.

Study design

This study is a double-blind, randomised controlled trial to know the effect of green tea extract on acute ischemic stroke. Study participants were recruited from November 2020 to November 2021 and included 31 acute ischemic stroke patients. The study was conducted at Universitas Airlangga Hospital, Anwar Medika General Hospital, and Siti Khodijah Islamic Hospital. Since the research was conducted during the Covid-19 pandemic and the same doctor handled the patients, we chose these three hospitals since it was simpler to collect samples there.

Selection of patients

Total sampling is used in the sampling method. The sample size was determined based on the total sample acquired from November 2020 to November 2021. The study participants were divided into two groups. The first group consisted of acute ischemic stroke patients who received a placebo, while the second group consisted of acute ischemic stroke patients who received green tea extract.

To be included in this study, the subject must have a first-time stroke, the onset of the stroke is less than 24 hours, age 18-70 years, and the first NIHSS score is 4-18. NIHSS score of less than 4 is considered a mild stroke, whereas a score of more than 18 is considered a severe stroke. There may be an ethical issue with research when the score is higher than 18, which has a significant mortality risk. Because of this, we adopt NIHSS 4-18, which is considered a moderate stroke. The exclusion criteria are seizure at stroke onset, sepsis, blood sugar at ER <70 mg/dl or >450 mg/dl, patient with dysphagia, and patient Covid-19 positive. The subject will be dropped from this research if they get sepsis or has bad compliance during research.

Randomisation and treatment

Each eligible subject was given informed consent and information for consent forms at the time of admission to the emergency room. Participation in this study was completely voluntary, and the subject was allowed to withdraw from it at any time. Each patient received a randomly generated computer ticket assigned to one of the two groups. This ticket will be exchanged in the pharmacy for either a placebo or green tea sachet for 30

Table 1. Characteristics of the subjects

Characteristic	n (%)	Mean	Intervention(n=18)		Control (n=13)		P value
			n (%)	Mean	n (%)	Mean	
Gender							0.291
Male	20 (64.5)		13 (72.2%)		7 (53.8%)		
Female	11 (35.5)		5 (27.8%)		6 (46.2%)		
Age group (years)		56.48		56.50		56.46	
Education							0.635
Elementary school	14 (45.2)		7 (38.9%)		7 (53.8%)		
Junior high school	4 (12.9)		3 (16.7%)		1 (7.7%)		
Senior high school	13 (41.9)		8 (44.4%)		5 (38.5%)		
Profession							0.653
Does not work	10 (30.3)		6 (33.3%)		4 (30.8%)		
Housewife	8 (24.2)		4 (22.2%)		4 (30.8%)		
Labourer	5 (15.2)		2 (11.1)		3 (23.1%)		
Merchant	2 (6.1)		1 (5.6%)		1 (7.7%)		
Had Retired / Pensionary	2 (6.1)		2 (11.1%)		0		
Taxi bike	1 (3.0)		0		1 (7.7%)		
Security	1 (3.0)		1 (5.6%)		0		
Farmer	1 (3.0)		1 (5.6%)		0		
Driver	1 (3.0)		1 (5.6%)		0		
Race							0.388
Javanese	30 (96.8)		17 (94.4%)		13 (100%)		
Madurese	1 (3.2)		1(5.6%)		0		
History of diseases							
Hypertension	29 (93.5)		18 (100%)		11 (84.6%)		0.085
Diabetes Mellitus type 2	6 (19.4)		3 (23.1%)		3 (16.7%)		0.656
Cardiac disease	2 (6.5)		2 (11.1%)		0		0.214
Hyper-cholesterol	1 (3.0)		1 (5.6%)		0		0.388
Atrial fibrilysis	0 (0)		0		0		-
Malignancy	0 (0)		0		0		-
Depression	0 (0)		0		0		-
Dementia	0 (0)		0		0		-
Risk factors							0.440
Smoking history	12 (38.7)		8 (44.4%)		4 (30.8%)		
Alcohol	1 (3.2)		1 (5,6%)		0		

days. On the first and seventh days of this study, blood was drawn. On the first, seventh, fourteenth, and thirty days of this research, the NIHSS, mRS score, and MoCAIna score were conducted.

We use a green tea extract from Meditea (BPOM 192233901), Agaricus Sido Makmur Sentosa, Malang, Indonesia, which comes in sachet powder form. Each sachet included 2 grams of maltodextrin and 50 milligrams of EGCG. We also provide a placebo regimen with the same components but only 2 grams of maltodextrin. For 30 days, each group was instructed to consume a sachet of powder diluted with 50 mL of water three times a day, two sachets in the morning, two sachets in the afternoon, and three sachets in the evening.

Outcome

The outcome of this research is the change of NIHSS, mRS score, and MoCAIna score from baseline at day 0, 7, 14, and 30t. The IL-10 and S100ß change from day 0 to 7th days.

Statistical analysis

We perform descriptive statistics for each variable and Kolmogorov-Smirnov for each variable to describe the normality of data. We perform an independent t-test if the distribution is normal, and we perform the Mann-Whitney test if the data is abnormal. We compare control and intervention groups for delta NIHSS between NIHSS score on day 0 and day 7, day 0 and day 14, day 0 and day 30. We also conduct a chi-square analysis for the comparing of NIHSS score of more than 2 on the observation day.

Results

Result should be presented continuously start from main result until supporting results. Our study was conducted from January to November 2021. Of the 31 patients, 20 were male, and 11 were female. The mean of patient's ages was 56.48. The patient's last education was 14 (45%) elementary school, four (12.9%) junior high school, and 13 (41.9%) senior high school. Ten patients (30.3%) did not work. The patients were divided into two races, 30 (96.8%) Javanese and 1 (3.2%) Madurese. Twenty-nine patients (93.5%) presented with hypertension, six patients (19.4%) suffered from diabetes mellitus type 2, two patients (6.5%) had cardiac

Table 2. NIHSS differences between the control group and the interventional group

Group		Median (Min-Max)	Kolmogorov-Smirnov	p-value
NIHSS Day 0	Control (n = 13)	6 (4–10)	0.005	0. 186
	Intervention (n =18)	8 (3–16)		
NIHSS Day 7	Control (n = 13)	4 (2–10)	0.021	0. 984
	Intervention (n =18)	4.5 (0–16)		
NIHSS Day 14	Control (n = 13)	4 (0–10)	0.010	0. 650
	Intervention (n =18)	3 (0–14)		
NIHSS Day 30	Control (n = 13)	3 (0–9)	0.013	0.242
	Intervention (n =18)	2 (0–14)		
Delta NIHSS Day 0 to 7	Control (n = 13)	0 (0–2)	0.000	0. 019
	Intervention (n =18)	2.5 (0–8)		
Delta NIHSS Day 0 to 14	Control (n = 13)	1 (0–4)	0.012	0.002
	Intervention (n =18)	4 (1–9)		
Delta NIHSS Day 0 to 30	Control (n = 13)	2 (0–4)	0.029	0. 000
	Intervention (n =18)	4.5 (1– 9)		

disease, and one patient (3%) had hyper-cholesterol. Twelve patients (38.7%) had smoking history, and one patient (2%) consumed alcohol (Table 1).

NIHSS differences between the control group and the interventional group

Table 2 presents the NIHSS differences between the control and interventional groups. The NIHSS control groups were lower than the interventional group, except on days 14 and 30. The NIHSS days 14 and 30 seemed to be higher in the control group (4 (0–10) and 3 (0–9), respectively) than in the interventional group (3 (0–9) and 2 (0–14), respectively). There was no significant difference in NIHSS between groups for days 0,7,14, and 30 (p=0.186, p=0.984, p=0.650, p=0.242, respectively).

All the data of delta-NIHSS showed that the control group's median was lower than the interventional group's. All the delta-NIHSS (day 0 to 7, day 0 to 14, day 0 to 30) were found to be statistically significant (p=0.019, p=0.002 and p<0.001, respectively).

Improvement of NIHSS between the control group and the intervention group

Table 3 presents the improvement of NIHSS between the control and intervention groups. From day 0 to day 7, there was no NIHSS improvement in the placebo group, while the NIHSS of five patients (27.78%) improved in the intervention group. The relative risk was 8.105, which means the intervention group will improve 8.105 times compared to the placebo group. There is no significance for the intervention (p=0.058).

From day 0 until day 14, there were two patients (15.38%) with NIHSS improvement in the placebo group. While the NIHSS of 10 patients (55.56%) improved in the intervention group. The relative risk was 3.611, which means the intervention group will improve 3.611 times compared to the placebo group. There is no significance for the intervention (p=0.058).

From day 0 until day, w While the NIHSS score of 95%f 12 patients (66.67%) improved in the intervention group. The relative risk was 4.333, which means the intervention group will improve 4.333 times compared to the placebo group. There is a significant result for the intervention (p=0.014).

Differences in mRS score between the control group and intervention group

Table 4 shows the differences in mRS scores between the control and intervention groups. The control group's average mRS score on day 0 was lower than the intervention group. These three groups (day 0, 7 and 14) had non-significant results (p=0.341, p=0.869, p=0.447, respectively). There was a significant difference in mRS day 30 between control and intervention groups (p=0.046).

Of the delta-mRS day 0 to 7, the control group's median was 0 (-1–0), and the intervention group's median was 0 (-1–3). There was no significance for the intervention (p=0.134). The mean delta-mRS for day 0 to 14 was -1 (-1–0) for the control group and -1 (-1– (-4)) for the intervention group (p=0.042). For day 0 to 30, the mean is -1 (-1 – 0) for the control group and 2 (-4–0) for the intervention group (p=0.001). The intervention for these two groups is found to be statistically significant

Differences in MoCAIna score between the control group and the intervention group

Table 5 shows the differences in MoCAIna scores between the control and intervention groups. The

Table 3. Improvement of NIHSS between the control group and the intervention group

		Group		RR (CI 95%)	P
		Control	Green Tea Extract		
NIHSS Improvement	Day 0 to 7	0 (0,00%)	5 (27,78%)	8,105 (0,487 – 134,843)	0,058
	Day 0 to 14	2 (15,38%)	10 (55,56%)	3,611 (0,945 – 13,793)	0,058
	Day 0 to 30	2 (15,38%)	12 (66,67%)	4,333 (1,162 – 16,157)	0.014*

Note : *p<0.05; **p<0.01; ***p<0.001

Table 4. Differences in mRS score between the control group and the intervention group

Group		Median (Min-Max)	Kolmogorov-Smirnov	p-value
mRS Day 0	Control (n = 13)	3 (2–4)	0.000	0. 341
	Intervention (n =18)	4 (2–4)		
mRS Day 7	Control (n = 13)	2 (1–4)	0.003	0. 869
	Intervention (n =18)	2 (0–4)		
mRS Day 14	Control (n = 13)	2 (1–4)	0.018	0. 447
	Intervention (n =18)	2 (0–4)		
mRS Day 30	Control (n = 13)	2 (1–4)	0.001	0. 046
	Intervention (n =18)	1 (0–4)		
Delta mRS Day 0 to 7	Control (n = 13)	0 (-1–0)	0.000	0. 134
	Intervention (n =18)	0 (-1–3)		
Delta mRS Day 0 to 14	Control (n = 13)	-1 (-1–0)	0.000	0. 042
	Intervention (n =18)	-1 (-1–(-4))		
Delta mRS Day 0 to 30	Control (n = 13)	-1 (-1–0)	0.001	0. 001
	Intervention (n =18)	-2 (-4–0)		

median MoCAIna scores on days 7, 14 and 30 in the control group were 17 (9–26), 27 (13–30), and 18 (13–30), respectively. The median MoCAIna scores on day 7, 14 and 30 in the intervention group were 20 (7–27), 22.5 (7–28), and 23.5 (7–28), respectively. These three groups (days 7, 14 and 30) had non-significant results (p=0.984, p=0.643, p=0.587, respectively).

The median delta-MoCAIna day 7 to 14 in the control group was 1 (-1–7), and the intervention group was 1 (0–7) with no significant result (p=0.933). The median delta-MoCAIna day 7 to 30 in the control group was 1 (0–7) and the intervention group was 2 (0–9) with no significant result (p=0.373).

Differences in IL-10 level between the control group and the intervention group

Table 6 presents the differences in IL-10 level between the control group and the intervention group. The mean IL-10 day 0 in the control group was 0.339 (0.250002), and in the intervention group was 0.255 (0.160689) with no significant result (p=0.264). The median IL-10 day 7 in the control group was 0.235 (0.084–2.235), and in the intervention group was 0.318 (0.136 –0.696) with no significant result (p=0.123). The delta-IL-10 day7-0 in the control and intervention groups were -0.040 (-0.450–1.150) and 0.143 (-0.400–0.600). The delta IL-10 had no significant result (p = 0.157).

Table 5. Differences in MoCAIna score between the control group and the intervention group

Group		Median (Min-Max)	Kolmogorov-Smirnov	p-value
MoCAIna Day 7	Control (n = 13)	17 (9–26)	0.012	0.984
	Intervention (n =18)	20 (7–27)		
MoCAIna Day 14	Control (n = 13)	27 (13–30)	0.016	0.643
	Intervention (n =18)	22.5 (7–28)		
MoCAIna Day 30	Control (n = 13)	18 (13–30)	0.029	0.587
	Intervention (n =18)	23.5 (7–28)		
Delta MoCAIna Day 7 to 14	Control (n = 13)	1 (-1–7)	0.000	0.933
	Intervention (n =18)	1 (0–7)		
Delta MoCAIna Day 7 to 30	Control (n = 13)	1 (0–7)	0.000	0.373
	Intervention (n =18)	2 (0–9)		

Differences in S100β level between the control group and the intervention group

Table 7 presents the differences in S100β level between the control and intervention groups. The mean S100β day 0 in the control group was 2.49554 (2.0033259), and in the intervention group was 1.30733 (1.396559). There was no significance for the intervention (p=0.084). The mean S100β day 7 in the control group was 1.11015 (0.706374), and in the intervention group was 2.67072 (2.031395). There was a significant difference in S100ß day 7 between the control and intervention groups (p=0.006). The delta-S100β day7-0 in the control and intervention groups were -1.3854 (1.95609) and 1.3634 (2.04562). There was a significant difference in delta S100ß day 0 to 7 between the control and intervention groups (p=0.001).

Discussions

Green tea (Camellia Sinensis) has polyphenols that act as antioxidants to counteract oxidative stress, which is known to cause various neurodegenerative disorders and neuronal injuries. Polyphenols have an anti-inflammation effect and prevent cell death during ischemic events (Singh, Mandal and Khan, 2016; Zhang et al., 2017). Epigallocatechin-3-gallate (EGCG), epicatechin (EC), epigallocatechin (EGC), and (-) epicatechin-gallate are the four primary types of monomers found in each polyphenol (ECG). EGCG has the strongest biological activity. Tea has the largest EGCG concentration. An epidemiological study shows that green tea consumption can prevent a cerebrovascular event, and for patients who have a

Table 6. Differences in IL-10 level between the control group and the intervention group

Group			Kolmogorov-Smirnov	p-value
IL-10 Day 0 (mean±SD)	Control (n = 13)	0.339 (0.250002)	0.067	0.264
	Intervention (n =18)	0.255 (0.160689)		
IL-10 Day 7 (Median [Min-Max])	Control (n = 13)	0.235(0.084 – 2.235)	0.000	0.123
	Intervention (n =18)	0.318 (0.136 – 0.696)		
Delta IL-10 Day 0 to 7 (Median [Min-Max])	Control (n = 13)	-0.04 (-0.45 – 1.15)	0.025	0.157
	Intervention (n =18)	0.143 (-0.4 – 0.6)		

cerebrovascular event, the outcome in those who routinely consume green tea has better outcomes compared to those who do not. Nan et al. (2018) found that EGCG protects MCAO animal models by regulating the PI3K/AKT/eNOS signalling pathway. As a free-radical scavenger, EGCG can prevent oxidative damage to brain cells by pro-oxidant agents. According to several animal researches, EGCG improves mitochondrial function while reducing oxidative stress (Machin et al., 2021).

Stroke is a complex event that causes ischemic brain tissue. Thrombolysis is the first choice for treating acute ischemic stroke. However, it has narrow therapeutic windows. Because of that, not all patients can receive thrombolysis (Che et al., 2019). Another drug class for acute stroke is neuroprotectants, but it has not been mentioned in AHA stroke guidelines since 2007 because of a lack of evidence. Searching for alternative treatment for acute stroke is ongoing. There are many drug candidates for acute stroke, about 430 for stroke treatment, and many of them have failed to show benefit in acute stroke patients.

Our previous study in animal models shows that either EGCG or green tea extract can prevent necroptosis and apoptosis. It can decrease RIP3 expression in the MCAO model compared to the control MCAO. It also reduces inflammatory markers. EGCG and green tea extract can inhibit Caspase-3, a proapoptotic protein, and increase the expression of the anti-apoptotic protein, BCL-2 (Machin, Susilo and Purwanto, 2021).

Table 7. Differences in S100β level between the control group and the intervention group

Group		Mean (SD)	Kolmogorov-Smirnov	p-value
S100ß Day 0	Control (n = 13)	2.49554 (2.0033259)	0.165	0.084
	Intervention (n =18)	1.30733 (1.396559)		
S100ß Day 7	Control (n = 13)	1.11015 (0.706374)	0.148	0.006
	Intervention (n =18)	2.67072 (2.031395)		
Delta S100ß Day 0 to 7	Control (n = 13)	-1.3854 (1.95609)	0.133	0.001
	Intervention (n =18)	1.3634 (2.04562)		

This study was conducted from November 2020 until November 2021. A total of 31 stroke patients were enrolled in the study, considering this study was conducted during the COVID-19 pandemic. Of 31 patients, 20 patients (64.5%) were female, with a mean age of 56.48. Most of them have the risk factor of stroke, such as hypertension (93.5%), diabetes mellitus type 2 (19.4%), cardiac disease (6.5%), hyper cholesterol (3%) and smoking history (38.7%).

The National Institutes of Health Stroke Scale (NIHSS) measures the neurological deficit in stroke patients. In previous study, the NIHSS score significantly related to the clinical outcomes at three months after stroke attack (Sari Aslani, Rezaeian and Safari, 2020). In 1995, the National Institute of Neurological Disorders and Stroke (NINDS) study group reported that patients with acute ischemic stroke who received r-TPA within three hours after onset had no significant difference in neurological improvement at 24 hours as assessed by the NIHSS, compared with the placebo group. But the group given r-TPA had a favourable outcome as assessed by the NIHSS on three months follow-up ('Tissue Plasminogen Activator for Acute Ischemic Stroke', 1995). Aoki et al. (2013) and Sari Aslani, Rezaeian and Safari (2020) reported that patients with r-TPA treatment improved NIHSS score at three months after stroke onset 2020. Our present study shows the difference in NIHSS score between the control and intervention groups taking green tea extract in 30 days. The delta NIHSS on day 0-7, 0-14, and 0-30 were statistically significant, especially in the difference on day 0-30. The difference was more prominent in the intervention group than in the control group. The intervention group had an NIHSS improvement and was statistically significant on day 30 (CI 95% = 4.333; p-value = 0.014). Lim et al. (2010) found that treatment with EGCG improved forelimb function in the MCAO rat model at two weeks after stroke onset. The forelimb function is one of the categories in the NIHSS score.

The modified Rankin Scale (mRS) score is used to measure the disability outcome of stroke patients. The mRS score has been valuable in clinical outcomes when evaluated three months after stroke onset (Chalos et al.,

2020; Sari Aslani, Rezaeian, and Safari, 2020; ElHabr et al., 2021). Our study shows the intervention group had a lower mRS score, especially on day 30 and was more statistically significant than mRS score in the control group. The delta mRS scores on day 0-14 and 0-30 were found to be statistically significant. Elhabr et al. (2021) found the mRS score between 30 days and 90 days after stroke onset had changed significantly in two-thirds of patients (⅓ improved, ⅓ unchanged, and ⅓ worsened) with following treatment such as r-TPA, EVT, or both). It needs further study to have more follow-up time.

The Montreal Cognitive Assessment - Indonesia (MoCA-Ina) score is an assessment instrument to determine the cognitive impairment in neurological patients (Abzhandadze et al., 2019). Our study found differences in MoCA-Ina scores between both groups, but they were not statistically significant. This condition may be because the patients only had 30 days of follow-up. MoCA-Ina score can predict post-stroke cognitive impairment progression at 3,6, and 12 months (with accuracy > 90%) (Chiti and Pantoni, 2014; Sitepu, Loebis and Husada, 2022).

IL-10 is an anti-inflammatory cytokine (Arponen et al., 2015). Increased IL-10 concentration may have a neuroprotective effect, according to some research. Spera et al. (1998) found that administration of IL-10 in the MCAO model significantly reduces infarct volume and percent hemisphere infarct. Our study shows no difference in the IL-10 between the control and intervention groups. It shows that green tea extract doesn't influence the level of IL-10 in stroke patients. Previous study showed that green tea extract could improve the clinical outcome of stroke patients but not through the inflammatory pathways (Machin, Susilo and Purwanto, 2021). The mechanism of how ECGC inhibits inflammatory pathways is unclear (Ellis et al., 2011).

S100ß is a calcium-binding protein mainly in the cytosol of glial and Schwann cells (Nash, Bellolio and Stead, 2008; Einav et al., 2012). S100ß is a marker for neurological damage and blood-brain barrier dysfunction. S100ß can be detected at a low level in healthy individuals. Nash, Bellolio and Stead (2008) found that S100ß is a marker of acute brain ischemic and significantly increased after stroke onset. S100ß peak level is 12 to 120 hours after the neural damage (Nash, Bellolio and Stead, 2008). S100ß interacts with RAGE and can release damage-associated molecular pattern molecules (DAMPs) and other endogen molecules that participate in pro-inflammatory pathways (Michetti et al., 2012). Activation of RAGE causes neural death and increased reactive oxygen species (ROS) production (Rodrigues et al., 2013). Our study shows the difference in S100ß between the intervention and control groups. The S100ß level in the intervention group was higher than the control group, and it was statistically significant on day 7. The delta S100ß day 0-7 was found to be statistically significant. The study result differed from Einav et al. (2012), which said patients with good outcomes had lower S100ß levels than poor outcomes patients after leaving hospital. However, Einav et al. evaluated the S100ß on day 0 and day 3, meanwhile our study did so on days 0 and 7. Other studies found S100ß has neuroprotective and neurotrophic effects in the nanomolecular concentration (Yardan et al., 2011; Rodrigues et al., 2013). The S100ß-induced proliferation and neuron formation of hippocampal progenitor cells can repair brain damage. The neurotrophic and gliotrophic actions of S100ß had essential roles in CNS development and recovery after brain injury (Willoughby et al., 2004; Yardan et al., 2011). Rodrigues et al. (2013) found the long-term increased nanomolar S100ß level did not promote astrogliosis but decreased hippocampal Glial fibrillary acidic protein (GFAP) content. GFAP is a marker of mature astrocytes or astroglial reactivity. The long-term increased nanomolar S100ß level correlated with the proliferation marker such as BrdU and Ki67. BrdU and Ki67 are effective content for measuring neurogenesis. They did not find any long-term increased S100ß level effect on RAGE expression. To interpret this finding, the administration of green tea extract in acute cerebral infarction patients increases the S100ß level in nanomolecular concentrations resulting in ischemic brain repair.

In summary, our study highlights the role of green tea extract in acute cerebral infarction through S100ß upregulation. This present study has improved clinical outcomes in acute cerebral infarction patients with green tea extract as assessed by the NIHSS, mRS, and MoCA-Ina scores. This finding suggests that green tea extract is a promising stroke therapy.

This is the first study that reports the effect of green tea extract on acute cerebral infarction patients with a double-blind controlled trial in humans. The limitations of our study are the small number of patients and the short duration of the follow-up period, and the administration of green tea extract. Our study does not consider other factors, such as revascularisation conditions and risk factors for stroke. Further study is needed with a multicentre randomised control trial; long-term therapy, and follow-up (3-6 months); also considering the revascularisation condition.

Conclusion

Green tea (Camellia Sinensis) has polyphenols that act as antioxidants to counteract oxidative stress, which is known to cause various neurodegenerative disorders and neuronal injuries. This study found that acute ischemic stroke patients with green tea extract treatment have improved clinical outcomes as assessed by the NIHSS, mRS, and MoCA-Ina scores. The green tea extract with epigallocatechin-3-gallate (EGCG) increases S100ß expression. This approach suggests that green tea extract is a promising stroke therapy. Recommendation for further study is needed with multicentre randomised control trial; long-term therapy, and follow-up (3-6 months); also considering the revascularisation condition.

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Conflict of interest

All authors in this article declared no potential conflict of interest.

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Knowledge, attitudes, and practice against COVID-19 in West Nusa Tenggara, Indonesia

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ABSTRACT

Introduction: COVID-19 spread rapidly, but little is known regarding knowledge, attitudes, and practices (KAP) against COVID-19 among residents from various regions in Indonesia. This study aims to determine the level of knowledge, practice and attitudes related to COVID-19 to provide a scientific basis for the prevention and control of this major outbreak in Indonesia.

Methods: Online survey with convenience sampling was conducted among urban and rural residents in West Nusa Tenggara Province, and collected 523 questionnaires through online media. The instruments used in this research are demographic information, such as age, gender, educational level, marital status and area of residence (urban or rural) and knowledge, attitude and practice questionnaires.

Results: The results of multiple linear regression analysis showed that education level (p=0.01), gender (p=0.00) and age (p=0.03) had a significant effect on knowledge about COVID-19. Residential area (urban) affects practices related to COVID-19 (p=0.00). Furthermore, knowledge of COVID-19 (p=0.00) and area of residence (urban) (p=0.00) are closely related to residents' attitudes toward preventive measures that can control this disease.

Conclusions: Both urban and rural residents of West Nusa Tenggara Province displayed moderate levels of knowledge as well as the practice of COVID-19 and showed the disease with a positive attitude. Developing suitable education programs targeted at the general residents in West Nusa Tenggara Province is essential to increase knowledge, attitudes, as well as practices of COVID-19, especially for rustic and low-educated citizens.

Keywords: attitude, COVID-19, knowledge, practice, residents

Introduction

Ever since the COVID-19 pandemic was declared in 2020, there have been 6,730,016 confirmed cases and 160,814 deaths recorded in Indonesia (as per 31 January, 2023) (Chen et al., 2020). Although categorized as a class B (clinical disease frequent, few deaths, high pathogenesis, and low virulence) infectious disease, its high transmission resulted in a prevention and control management level of A (inapparent infection). The virus disseminates mainly through contact with infected individuals and droplets. Similarly, common symptoms include difficulty breathing, dry cough, myalgias, and fever. Other less common symptoms include losing smell or taste and diarrhea. The varied symptom severity is influenced by older age and co-morbidities being risk factors for more severe disease (Wiersinga et al., 2020; Albahri et al., 2021).

The number of confirmed cases of COVID-19 in Indonesia will increase every month in 2022. The transmission of COVID-19 is estimated to be similar to that of previous cases of MERS and SARS, which mainly occur through droplets and contact with infected surfaces. To prevent the spread of the infection, it is

recommended to practice good cough and sneeze etiquette, wash hands regularly with soap, cook meat and eggs thoroughly, and avoid close contact with people exhibiting respiratory disease symptoms, such as coughing and sneezing (Ministry of Health Republic Indonesia, 2020).

The most effective strategy presently used in containing the COVID-19 pandemic is prevention methods including washing hands continually, keeping physical distance, as well as using masks (Adhikari et al., 2020; Lewnard and Lo, 2020; Gadarian, Goodman and Pepinsky, 2021). Knowledge, attitudes, and practices toward disease are important factors in determining health decisions and health outcomes (Szymona-Pałkowska et al., 2016). Effective control of the virus's spread relies on individuals taking necessary precautions and following health protocol guidelines. The study has demonstrated that people's adherence to disease prevention measures is strongly influenced by their knowledge, attitude, and practice levels. Earlier studies accomplished on the SARS outbreak during 2002-2004 as well as the MERS outbreak in 2012 showed that levels of stress, anxiety, panic emotions, as well as coping skills were particularly related to their knowledge and attitudes against infectious diseases. Additionally, attitudes and knowledge also impact an individual's efforts to stop the disease's infection (Clements, 2020; Zhong et al., 2020).

The trend of increasing positive cases in West Nusa Tenggara Province continues to occur, therefore it needs to be seriously anticipated. Community active participation in controlling the spread of the coronavirus (COVID-19) is very important. Currently, people in West Nusa Tenggara Province are facing various challenges related to COVID-19, including limited knowledge, low public attitudes, and inadequate disease control practices. Despite the precarious situation, the status of community attitudes, knowledge, and practices regarding COVID-19 in the province remains largely unknown, and no national data have yet been found to address this issue. Therefore, this research aims to assess the level of attitudes, knowledge, as well as practices related to COVID-19 among residents of West Nusa Tenggara Province to provide a scientific basis for the prevention and control of this major outbreak.

Materials and Methods

Study design and participant

This is a cross-sectional analytical observational study that was conducted in June 2022 in Central Lombok District and Mataram City in West Nusa Tenggara. The sample size was obtained by the rule of thumb by means of 10 times the number of questions in the questionnaire so that 310 were obtained. The sample size was increased by 20% to make it more representative so that the sample in this study was 523 respondents. Convenience sampling has been used in this study in order to reach the respondents quickly. People aged 17 years or older with access to the computer and/or mobile phone were invited to participate in the study. The variables under investigation are knowledge, attitudes, and practice toward COVID-19.

Measurement tool

We designed an online questionnaire created with Google Forms for data collection. The questionnaire consists of two parts: 1. the demographic characteristics of age, education level, gender, marital status, occupation, as well as residence area (urban or rural), 2. KAP questionnaire consists of 31 items assessing knowledge, attitudes, and behavior. The knowledge instrument contains 14 items asking about the etiology of COVID-19, signs and symptoms, prevention, transmission, and risk factors. The attitude instrument consisting of six questions was used to evaluate participants' attitudes toward COVID-19, their willingness to take preventive measures, isolate when infected, and their confidence in reducing the pace of the pandemic. The practice instrument contained 11 questions about the evaluation of participants' infection control during a pandemic. The questionnaires were tested for validity with the Pearson Product formula and were considered valid with a correlation value of ≥0.5. All knowledge and attitude questions achieved good validity. The reliability was tested with Cronbach's alpha formula and considered reliable with a coefficient ≥0.7. (Syakurah and Moudy, 2020; Limbong, Kuswinarti and Sitorus, 2021). The results of validity and reliability for the KAP questionnaire were Knowledge (r=.601; Cronbach's alpha=.809), Attitude: (r= .437; Cronbach's alpha= .926). Behavior: (r=.623; Cronbach's alpha=.826).

Data collection

Due to the pandemic and home quarantine, participants could not be contacted directly; data collection was carried out by distributing online questionnaires through several social networking platforms, such as WhatsApp and Telegram. The data collection process took four months in order to achieve the targeted sample size.

Table 1. Participants' demographic characteristics

Demographic characteristics	Number of participants (%)
Age	
Mean	36.65 years old
Gender	
Female	316 (60.4%)
Male	207 (39.6%)
Area of residence	
Urban	294 (45.9%)
Rural	347 (54.1%)
Education level	
Primary school	7 (1.3%)
Middle school	12 (2.3%)
Senior high school	150 (28.7%)
Higher Education	354 (67.7%)
Marital status	
Never married	103 (19.7%)
Married	353 (67.5%)
Divorced	5 (1%)
Widowed	62 (11.9%)

Statistical analysis

Descriptive analysis is used to present demographic characteristics as well as the level and distribution of knowledge, attitudes and practices toward COVID-19 consisting of frequency (N), proportion (%) and mean. Binary logistic regression analysis was used to identify factors related to knowledge, attitude, and practice of COVID-19.

Ethical statements

Informed consent was obtained from all participants involved in this study, which has been deemed ethically feasible by the health research ethics commission of the UNIQHBA Faculty of Health (No:015/EC/FKES-UNIQHBA/YPPQH/VII/2022).

Results

Descriptive characteristics

A total of 523 questionnaires were distributed using Google Forms, and all participants recruited filled out the questionnaire to completion. Urban residents were 294 (45.9%) and 347 (54.1%) were rural residents. Of the total sample, 207 (39.6%) were males, while 316 (60.4%) were females. Table 1 displays the distribution of demographic characteristics.

The knowledge, attitude as well as practice of COVID-19 measures

The mean scores for knowledge and behavior among participants who answered correctly were 89% and 84%, respectively. In terms of knowledge, almost all participants (98.8%) recognized the effectiveness of isolating and treating infected individuals as a strategy to reduce the spread of COVID-19. Regarding behavior, 57.3% of respondents believed that the virus only spreads through objects contaminated with the SARS-CoV-2 virus and not through the air. Additionally, 95.7% of respondents reported using masks when in crowded places, and 64.4% of respondents stated that they exercise regularly. In terms of attitudes, all respondents acknowledged the severity of COVID-19, and 98.2% believed that people with COVID-19 who self-isolate are responsible for preventing the virus's transmission. Moreover, 51.8% of respondents stated that those who violate government advice in efforts to stop the virus's spread are the only ones who suffer from COVID-19. Finally, 96.7% of respondents believed that it is essential to follow information related to government appeals regarding efforts to prevent COVID-19 in the community.

Table 2. The binary logistic regression analysis result of COVID-19 knowledge, attitudes, practice and its associated factors

Variable	Knowledge	Attitudes	Practice
Age	0.00*	0.65	0.51
Gender	0.02*	0.02*	0.00*
Education lev	0.00*	0.01*	0.80
Marital status	0.09	0.15	0.33
Area (urban v rural)	0.00*	0.00*	0.00*

*P < 0.05

The affecting factors of knowledge, attitude as well as practice on COVID-19

Based on the results of the binary logistic regression test, it was found that factors related to knowledge about COVID-19 were age, gender, education level, and area of residence. Factors related to attitudes toward COVID-19 are gender, education level, and area of residence. Meanwhile, actions against COVID-19 are influenced by gender and area of residence (as shown in Table 2).

Discussions

The percentage levels of sufficient knowledge and sufficient practice were 60% and 69%. This shows that the level of knowledge and practice of urban and rural residents in West Nusa Tenggara Province is at a sufficient level. A cross-sectional study in India showed similar results (Roy et al., 2020). As more and more countries experience COVID-19 outbreaks and with the efforts made by WHO and local governments, knowledge regarding COVID-19 is growing. Our study found that all respondents were aware of the seriousness of this disease and were concerned about the worsening of the epidemic. Most residents believe that preventive measures can prevent infection with COVID-19 and think that the community should immediately report or cut contact with those around them who are positive for COVID-19. The results regarding attitudes toward COVID-19 are similar to those found in previous studies conducted in China (Zhong et al., 2020). Residents' self-protection

awareness still needs to be strengthened, and the protective measures taken by residents still need to be improved. Studies have shown that health education interventions can increase knowledge about communicable diseases and adherence to healthy living habits among both urban and rural residents (Fan et al., 2021).

Based on this study, age, gender level of education and area (rural vs urban) affect knowledge about COVID-19. Greater education level is positively correlated with higher knowledge levels regarding COVID-19 in line with the findings of previous studies. Hence, it is crucial to prioritize health education for the general public, particularly for individuals with lower education levels (Abdelhafiz et al., 2020). The level of knowledge of women is higher than that of men, which is the same as the survey carried out by Kumar, Pinky, and Nurudden (2021). The possible explanation for this finding could be the fact that 68% of the females surveyed held a bachelor's degree or higher. Prior discussion has demonstrated females tend to have a higher literacy level in preventing as well as controlling infectious diseases compared to males, who are more prone to engaging in risky behavior (Kumar, Pinky, and Nurudden, 2021; Yue et al., 2021).

The results of our study found that both urban and rural residents have an adequate attitude toward COVID-19. It should be noted that a score of knowledge of COVID-19 is associated with an optimistic attitude to take protective measures, and people living in urban areas are more likely than people in rural areas to seek medical advice if they suspect infection. This actually illustrates the importance of increasing knowledge and awareness of the COVID-19 outbreak among the population, especially people who live in rural areas (Geldsetzer, 2020; Luo, Zeng and Liao, 2020).

The study found that both rural and urban residents had moderate attitudes toward COVID-19. However, it revealed that a higher score in COVID-19 knowledge is related to a more optimistic attitude toward taking defensive efforts, and urban residents tend to follow medical recommendations when they suspect an infection. This highlights the importance of increasing knowledge and awareness of the COVID-19 outbreak among the population, particularly in rural areas (Geldsetzer, 2020; Luo, Zeng and Liao, 2020). Based on the multiple linear regression analysis, urban citizens had better prevention techniques, which could be attributed to their high levels of health literacy and exposure to extensive health information (Zheng, Zhang and Xu, 2020).

In contrast, rural residents generally have lower levels of education, inadequate health services, and less exposure to health information, highlighting the need for increased prevention and control measures in rural areas (Abdelhafiz et al., 2020).

Strength and limitation of the study

This study describes the knowledge, attitudes and actions of the community toward infectious diseases and the factors that influence them. The findings of this study can be used as a reference in developing promotive and preventive programs for infectious diseases. However, there are some limitations in this study. Knowledge of COVID-19 in respondents with a low education level cannot be described in this study because most of the respondents are at the higher education level. In this study, the involvement of the elderly was minimal, so information about knowledge, attitudes and behavior regarding COVID-19 in the elderly could not be described.

Conclusions

Practice towards COVID-19 is strongly influenced by gender and region (rural vs urban). Urban area has sufficient practice against COVID-19. This study found that attitudes toward COVID-19 were generally fair between urban and rural residents. Knowledge of COVID-19 has been influenced by age, gender and level of education. The need to strengthen and increase the level of knowledge, attitudes and health behavior is very important to prevent infectious diseases. Health education can help prepare individuals and communities to implement effective health protocols in the future and prevent rapid transmission.

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Conflict of Interest

There is no conflict of interest.

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A Simple Awareness For Women About (SAWA) stages of labor on women's childbirth experience using the childbirth roadmap tool: a quasi-experimental study

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ABSTRACT

Introduction: Lack of knowledge about the childbirth process may lead to stress during labor. However, research confirmed that women's knowledge regarding childbirth progress can increase their comfort and satisfaction during labor. This study aimed to assess the effectiveness of the Simple Awareness for Women About (SAWA) labor stages program on their childbirth experience using the childbirth roadmap tool.

Methods: A pretest and posttest technique was employed and conducted at the Labor Department, Woman Health Hospital, affiliated with Assiut University, Egypt. Based on the eligibility criteria, a convenience sampling method was used to recruit all parturient women admitted between December 2019 and February 2020. The sample consisted of 172 participants and the data were analyzed with chi-square and t-test using SPSS version 25.

Results: A statistically significant difference was observed in the baseline information regarding the stages of childbirth after the SAWA program implementation at P< 0.001. There was a significant relationship between the mode of delivery and the participant's satisfaction with the study tool at P<0.001.

Conclusions: This study highlighted the benefits of using a simple, attractively illustrated instrument, the childbirth roadmap, for achieving the meaning of support and women's satisfaction through the SAWA program during labor stages.

Keywords: effectiveness, simple awareness, women, stages of labor, childbirth roadmap experience

Introduction

Women and families consider pregnancy and childbirth as unique events. Therefore, they hold different expectations during childbearing based on their knowledge, experiences, beliefs, cultures, and social and family backgrounds. In light of these differences, care should be modified and systematized to meet their needs by understanding and respecting their attitudes (Iravani et al., 2015). Women's knowledge regarding the process of childbirth can increase their comfort and satisfaction during labor. Various methods including reading, watching videos, attending childbirth classes, and discussing with caregivers, doulas, family, and friends may provide women with comfort. This information enables women to experience a safe and satisfying journey of childbirth

(Churchill, 2012). This, in turn, has a long-term impact on women as well as their families (Maimburg et al., 2016).

On the other hand, extra medical involvements and with low knowledge of childbirth positions among women (Zileni et al., 2017) and recumbent positions have been adopted by many obstetricians (Solnes Miltenburg et al., 2018) through the childbirth process (Mselle & Eustace, 2020). However, previous research confirmed that free positioning and being in an upright position can also increase women's comfort (Gizzo et al., 2014) during the first stage of labor and enhances speed of normal childbirth, reduce medical mediations, and meets the mother's physiological and mental demands. Moreover, research evidence has proven that free positioning during childbirth can distract concentration and increase a woman's sense of control and sequency, lower consuming of epidural analgesia (Hodnett et al., 2013) and alleviate labor pain and anxiety (Gau et al., 2011).

Therefore, the childbirth roadmap highlights the effect of a variety of methods such as birth-ball massage and breathing management during uterine contraction. The birth ball helps the relaxing of pelvic muscles, especially the levator ani muscles and pelvic ligaments (Gallo et al., 2014) and helps women to actively participate in the childbirth process (Gau et al., 2011). Hence, concerning the association between high-quality maternity care and infant health, the women freely changing uncomfortable positions and holding stability and coordination increases her self-confidence and consequently enriches high-quality maternity care and infant health.

Moreover, previous studies have confirmed a strong relationship between positive experiences during childbearing and a sense of safety and satisfaction. In addition to other vital factors, "a safe environment and emotional strength" lead to improved childbirth satisfaction (Aune et al., 2015; Karlström et al., 2015). Furthermore, labor contentment has been linked with caregivers' support, healthcare providers' communication skills, and the staff's understanding of women's needs (Ahmad et al., 2012). However, both mothers' and midwives' perceptions regarding the content of childbearing information are important in the development of an effective childbirth education program for pregnant women (Malata & Chirwa, 2011).

Therefore, the proper preparation, in terms of support with information related to each stage of childbirth, may be reflective of the whole fear-inducing lack of understanding and familiarity with women with the birthing process. Hence, educating women about the labor procedure as well as offering them information about each stage and the progress of delivery would enrich their childbirth satisfaction. In addition, providing a simple birth illustration, such as a story, may be an excellent choice to enhance women's labor contentment (Howarth et al., 2019).

Some years ago, Penny Simkin developed a visual model to guide women through the labor progress using an illustrated image of a roadmap. The model shows the key childbirth landmarks, appropriate actions, and comfort measures during its progression (see Figure 1). The roadmap represents three pathways. The main brick road denotes normal labor and demonstrates supportive actions, positions, and comfort techniques for its progress. The turns and spirals in the brick road indicate that normal labor does not progress in a straight line. The care provider can utilize it as a tool to conduct organized discussions of normal labor progress, providing a clear and effective way to impart knowledge related to normal labor (Churchill, 2012).

Women's active participation in the childbirth process include such as decision-making, accessibility of information, awareness of the care provided, and support during childbirth and delivery (Fair & Morrison, 2012). Recently, a comparative multi-country study conducted in three Arab countries, including Egypt, confirmed that women's experiences and satisfaction with labor were linked to women's feelings of control regarding the facility's routine work, rather than awareness and knowledge related to childbirth stages (Kabakian-Khasholian et al., 2017).

The World Health Organization has suggested intrapartum care as affecting the childbirth experience positively (WHO, 2016). In addition, women who receive continuous support from hospital professionals during labor, such as nurses, tend to have better birth outcomes such as lower rates of emergency cesarean section and instrument deliveries, and higher satisfaction with the childbirth experience (Hodnett et al., 2013; Stark et al., 2016; Wang et al., 2021). Our study considered a pioneer study in Egypt to use the childbirth roadmap as a simple tool for guiding women during the progress of childbirth accompanied by the healthcare provider throughout, in the form of the Arabic acronym Simple Awareness for Women About ("SAWA") which refers to being together. This study aimed to assess the effectiveness of the SAWA program of the stages of birth using a childbirth roadmap. The study aimed to assess women's knowledge about the stages of labor after the implementation of SAWA and to determine the effect of

Figure 1. Roadmap of labor (Simkin, 2014)

using a childbirth roadmap on women's satisfaction and labor outcomes.

Materials and Methods

Study design

A quasi-experimental pretest-posttest method was employed to examine parturient women's knowledge about the first stage of labor to the fourth before and after using the childbirth roadmap as a guiding awareness tool, and their satisfaction, respectively. This study was conducted at the labor department of the Woman Health Hospital, affiliated with Assiut University, Egypt.

Study sample

This study employed convenience sampling to recruit all the parturient women admitted to the hospital between December 2019 and February 2020. The sampling technique was based on the eligibility criteria and the convenience of the participants. Then the recruitment used a simple randomization method by using an envelope containing two folded papers with two letters A for participation and B for no participation.

The sample consisted of 172 participants selected according to the eligibility criteria. The sample size was calculated using the G power program using the following data: effect size 0.3, α error prop 0.05, one tail, power (1-β err prop) 97% using the difference between two independent means (matched paired). The sample size was supposed to be 166 but increased to 172 participants to increase the power.

Participant criteria

The study enrolled all pregnant women when they were in the first stage of labor (early latent phase), in which the cervix is 0-3 cm dilated, contractions occurred every 10-20 min, lasting for 15-30 seconds, and mild intensity pain and healthy pregnancy without medical diseases. Those in the first stage (active phase: cervix, 4-7 cm) experienced contractions every 2-3 min continuing for 50-60 sec, and moderate and high-risk pregnancies related to chronic diseases were excluded from the research.

Instruments

The current study used two questionnaires, the first questionnaire was developed based on the available literature (Begley et al., 2014; Carquillat et al., 2017). The questionnaire consisted of six sections: the first section included seven questions: age, residence, education, occupation, husband's occupation, and

education. The second section comprised of four questions about obstetric history. Third section comprised six items on childbirth physiology information. The fourth section included 22 questions regarding normal labor and women's actions during each stage of labor. The fifth section comprised six items related to women's perception and the satisfaction with childbirth roadmap as a childbirth facilitation tool. The sixth and final section included four questions regarding labor outcomes.

The second questionnaire is the childbirth roadmap is a visual tool created by Churchill, (2012) to guide women during their childbirth journey. The roadmap includes three pathways, namely, the normal labor path, the detour for back pain, and the epidural highway. In our study, only the normal childbirth pathway was employed because of the inclusion criteria. The demonstration shows childbearing as a journey that begins with early labor and ends with delivery. The childbirth roadmap includes three tracks: a winding yellow brick road with twists, turns, and devoid of fixed timelines; a diversion for back pain, which is a longer, irregular road that eventually rejoins the yellow brick road; and the epidural highway, which represents the choice to have an epidural for pain relief. Each pathway ends joyfully with the infant's birth. This demonstration includes illustrations of a variety of comfort measures that can be used as labor progresses. The roadmap employs the road symbol to define each stage of labor (Figure 1).

Validity and reliability

The questionnaire validity was tested through face, content, and experts performed convergent validity of the questionnaire in the disciplines of obstetrics and gynecology nursing and medical fields. In addition, its reliability was assessed using Cronbach's alpha which was found to be 0.80, indicating the scale's high level of internal consistency for our study's sample. The questionnaire was tested on 17 parturients using Arabic language to conduct data collections. The translated questionnaire was reviewed by five experts in obstetrics and gynecology from nursing and medical school. The jury confirmed the applicability of the translated version. The researcher conducted a pilot study to examine its feasibility, applicability, acceptability, and consistency. The author omitted the last open-ended question because the participants didn't answer.

Intervention

Intervention was conducted by the researcher, who holds a PhD in obstetric and gynecologic nursing. The first part was initiated by explaining the study's objective to obtain informed consent from the participants. A patient questionnaire was used to collect data regarding demographic characteristics and knowledge level of procedures performed during labor and determined the needs related to each stage through the pretest. The second part, which is the posttest, used the interactive tool, "the childbirth roadmap," which was an amusing way to educate expectant mothers about what to anticipate during labor. During the use of the childbirth roadmap, the researcher applied the steps involved guided by the map while making certain modifications according to the hospital's facilities.

Step 1: If the cervical dilation was 1-2 cm and the contractions were every 5 min, the researcher encouraged walking, eating, drinking, resting, and relaxing by lying down. Furthermore, the researcher taught breathing techniques, if needed, and, if

Table 1. Demographic characteristics of the participants

Demographic characteristics	n (%)	Mean (SD)
Age (in years):		23.60 (5.93)
18-24	120 (69.8)	
25-30	38 (22.1)	
31-36	0.0 (0.00)	
37-42	14 (8.1)	
Education level:		
Illiterate	2 (1.2)	
Read and write (without	53 (30.8)	
finishing formal school)	13 (7.6)	
Primary school	22 (12.8)	
Prep school	33 (19.2)	
Secondary school	49 (28.4)	
University		
Residence:		
Rural	86 (50.0)	
Urban	41 (23.8)	
Semi-urban	45 (26.2)	
Occupation:		
Housewife	147 (85.5)	
Employee	25 (14.5)	
Obstetric profile		
Gravidity:		1.41 (0.82)
Primigravida	130 (75.5)	
Gravida 2-4	40 (23.2)	
Gravida >5	2 (1.3)	
Parity:		0.34 (0.71)
Para 1-2	39 (22.7)	
Para 3-4	3 (2.3)	
Abortion		0.05 (0.23)
None	162 (94.2)	
1 abortion	10 (5.8)	
Living children:		
None	130 (76.6)	
1 child	28 (16.3)	
2 children	12 (7.0)	
3 children	2 (1.2)	
Neonatal deaths:		
No	160 (93.0)	
Yes	12 (7.0)	

Table 2. Previous information of participants regarding childbirth circumstances for the total sample (N=172)

Childbirth circumstances	Yes		No		Mean (SD)
	n	(%)	n	(%)	
Previous information regarding childbirth	133	77.3	39	22.7	1.22 (0.41)
Source information:					
Mother	51	38.3			
Relative	30	22.5			0.71 (1.30)
Doctor	23	17.2			
Books and magazine	13	1.7			
Internet	16	12.3			
The adequacy of information to release anxiety	23	13.4	149	86.6	1.86 (0.34)
The desire to know more about the childbirth process	168	97.7	4	2.3	1.02 (0.15)
Reasons for receiving childbirth information:					
None	7	4.1			
Need information urgently	6	3.5			
To differentiate between normal and abnormal	21	12.3			
To decrease anxiety	41	23.8			5.14 (7.60)
For reassurance	83	48.5			
This is my right	2	1.2			
(2 & 4 choices)	9*	2.8			
(3 & 4 choices)	7*	4.1			
(3 & 6 choices)	3*	1.7			
The appropriate time to get childbirth information:					
First trimester	2	1.2			
Second trimester	1	0.6			
Last trimester	66	38.4			
During labor	103	59.9			

Note: * The participants responded with multiple answers, thus, the total percentage is 119 rather than 100.

membranes were intact, women were encouraged to participate in the care. In case of women feeling thirsty, the researcher offered fluids or ice chips and withholding of food and fluids to prevent aspiration in the event of an unexpected cesarean section.

Step 2: At 3-5 cm, with contractions 4 min apart, lasting for 1 minute, the researcher used non-pharmacologic techniques of pain control measures, education was provided between uterine contractions, and the woman was encouraged to use the comfort measures, e.g., use of the focal point, visual imagery, breathing, and application of relaxing massage). In addition, the 3Rs were followed to maintain reinforcement of relaxation, with a regular rhythm, using relax.

Step 3: At 5-8 cm, with contractions occurring consistently 3-4 minutes apart, the pain tends to increase by 7 cm. The researcher allowed the patient to make informed decisions regarding pain control. In the

Table 3. Participants' information regarding the current childbirth process for the total sample before and after using the childbirth roadmap (N=172)

Current childbirth	Before using the roadmap		After using the roadmap		
	Yes n (%)	No n (%)	Yes n (%)	No n (%)	*P-Value*
General information regarding normal labor					
Childbirth start time	34 (19.8)	138 (80.2)	136 (78.1)	36 (21.9)	<0.001
Warning signs of labor	34 (19.8)	138 (80.2)	134 (77.9)	38 (22.1)	0.001
Differentiate between true and false labor	6 (3.5)	166 (96.5)	114 (66.3)	58 (33.7)	0.001
Stages of labor	35 (10.8)	137 (79.7)	135 (78.5)	37 (21.5)	<0.001
Action of medications taken during labor	40 (23.3)	132 (76.7)	160 (93.0)	12 (7.0)	<0.001
1st stage					
Criteria of the first stage of labor	10 (5.9)	162 (94.2)	123 (76.7)	49 (23.3)	0.001
Labor starts	7 (4.1)	165 (95.9)	160 (93.0)	12 (0.7)	<0.001
Normal duration of the 2nd stage of labor	90 (52.3)	82 (47.7)	151 (87.8)	21 (12.2)	0.001
Physiology and location of the pain	107 (62.2)	65 (37.8)	130 (75.6)	42 (24.4)	0.001
Cervix and its dilatation	46 (26.7)	126 (73.3)	144 (83.7)	28 (16.3)	0.001
How should one move in this stage	110 (64.0)	62 (36.0)	124 (72.1)	48 (27.9)	0.001
How should one breathe	139 (80.8)	33 (19.2)	150 (87.2)	22 (12.8)	0.001
2nd stage					
Criteria of the 2nd stage of labor	48 (27.9)	124 (72.1)	142 (27.9)	124 (72.1)	0.272
Duration of the 2nd stage	63 (36.6)	109 (63.4)	151 (78.8)	21 (12.2)	0.001
Cervical changes in the 2nd stage	81 (47.1)	91 (52.9)	128 (74.4)	44 (25.6)	<0.001
Physiology and location of pain in this stage	24 (14.0)	148 (86.0)	104 (60.5)	68 (39.5)	0.002
Reaction in this stage toward bearing down	32 (18.6)	140 (81.4)	110 (64.0)	62 (36.0)	0.002
Right position that should be taken	34 (19.8)	138 (80.2)	166 (96.5)	6 (3.5)	<0.001
3rd stage					
Criteria of this stage of labor	45 (26.2)	127 (73.8)	135 (78.5)	37 (21.5)	0.001
Physiological changes of this stage	71 (41.3)	101 (58.7)	172 (100)	0 (0)	<0.001
The normal duration of the 3rd stage	46 (26.7)	126 (73.3)	109 (63.4)	63 (36.6)	0.021
reaction during the 3rd stage	132 (76.7)	40 (23.3)	172 (100)	0 (0)	<0.001
Right position during the 3rd stage	46 (26.7)	126 (73.3)	165 (96.0)	7 (4.0)	<0.001
Information on the 4th stage of labor	110 (64.0)	62 (36.0)	124 (72.1)	48 (27.9)	0.001

Table 4. The relationship between the participants' satisfaction regarding their childbirth information before and after using the childbirth roadmap

Current childbirth information	Strongly satisfied	Satisfied	Neutral	Dissatisfied	Strongly dissatisfied
Normal labor					
Before n (%)	6 (3.5)	58 (33.7)	64 (37.2)	44 (25.6)	0 (0)
After n (%)	77 (44.8)	82 (47.7)	12 (7.0)	1 (0.5)	
P-value	0.001	0.002	0.010	<0.001	
1st stage of labor					
Before n (%)	12 (0.7)	23 (13.4)	52 (30.2)	80 (46.5)	5 (2.9)
After n (%)	50 (29.1)	69 (40.1)	22 (13.0)	30 (17.4)	1 (0.5)
P-value	0.012	0.001	0.013	0.024	0.010
2nd stage of labor					
Before n (%)	18 (10.5)	24 (14.0)	122 (70.9)	5 (2.9)	3 (1.7)
After n (%)	53 (30.8)	61 (35.5)	49 (28.5)	3 (1.7)	2 (1.2)
P-value	0.002	0.002	0.010	0.032	0.41
3rd stage of labor					
Before n (%)	17	28	101 (91.3)	16 (8.7)	10
After n (%)	60 (34.9)	112 (65.1)	0 (0)	0 (0)	0 (0)
P-value	0.004	0.001	<0.001	<0.001	<0.001
4th stage of labor					
Before n (%)	7 (4.1)	18 (10.5)	109 (63.4)	30 (17.4)	8 (4.6)
After n (%)	26 (15.1)	86 (50.0)	49 (28.5)	10 (5.8)	1 (0.5)
P-value	0.002	0.001	0.053	0.050	0.002

case of NORMAL LABOR, the woman was staying hydrated, resting, and leaning forward. If there was a DETOUR - "BACK" LABOR, the woman leant on the birth ball or on the bed. The ball was replaced with a pillow and moved from side to side with bending the knees while counter pressure was applied using the double hip squeeze method, thus reaching the TAKE THE TOLL ROAD - GET THE PAIN RELIEF. During this stage, the researcher observed the labor team during the administration of intravenous fluids and urinary catheter as well as frequent recordings of blood pressure, in addition to Pitocin which was administered frequently according to physician order.

Step 4: At 8-10 cm, with contractions 2-3 minutes apart. The researcher guided the woman to explain how she is feeling such as cold or hot, and instructed the woman to get sleep and waits if she can.

Step 5: At 10 cm also called the "second wind," the researcher advised the woman to push with the urge, while using upright positions such as squatting, hands, and knees. The PhD researcher continued in providing positive reinforcement and reassurance to both the women and their support persons to implement these techniques. Finally, the patient satisfaction part of the questionnaire was completed. Post-labor, mothers were requested to express their satisfaction on a 5-point Likert scale (strongly satisfied, satisfied, neutral, dissatisfied, and strongly dissatisfied) after they were provided with moment by moment information regarding their condition during the childbirth process. The whole time that researcher spent with the woman during labor ranged between 2-5 hours based on the progress of labor.

Ethical considerations

Informed consent was obtained from all participants before data collection and all the participants could read and write except two were illiterate and the author got the agreement from their husbands after an explanation of the study's purpose for them too. The ethical committee of the faculty of medicine and nursing faculty at Assiut University approved the research proposal (No. 245/ 2019). The informed consent included written consent and verbal consent from 172 participants who had limited literacy.

Statistical analysis

The data were managed and analyzed using the Statistical Package for the Social Sciences version 20. The findings were expressed using frequencies and percentages. Inferential statistics, such as a chi-square test, were conducted to find the association between nominal (categorical) variables. In addition, the Pearson correlation coefficients were used to evaluate the direction of the relationship (positive or negative) between two or more quantitative or numerical variables. P-values were statistically significant at 0.05.

Results

The socio-demographic characteristics of the participants in Table 1 show that over 69.8% of the participants belonged to the 18–24-year age group, with a mean of 23.60 (SD=+5.93). For education level, 4% had received a university level of education and around 30.8% could read and write without finishing formal school. In all, 50% of the participants lived in rural areas,

Table 5a. The association between the participant's satisfaction with the childbirth roadmap and the mode of delivery

	Delivery mode		P-value
	Normal	Assisted	
How would you evaluate this labor map			0.04*
Strongly satisfied	17	4	
Satisfied	39	3	
Neutral	74	30	
Unsatisfied	4	1	
Strongly unsatisfied	0	0	
Total	134	38	

Note: *p-value <0.05

and the majority of women were housewives, 85.5%. Regarding the participants' obstetric profiles, 75.5% were primigravida, and 22% had parity at least once. Only 5.8 % had a history of abortion. The majority of them had no history of neonatal deaths.

Table 2 indicates that more than 77.3% of the participants had previous information regarding childbirth, and nearly 38.3% and 22.5% received it from their mothers and relatives, respectively. A minority of the participants, 13.4%, reported that their previous information was adequate to release anxiety. Although the most significant proportion of participants, 97.7%, desired more information about childbirth for many reasons, the most common ones included decreasing anxiety (48.5%), followed by the ability to differentiate between normal and abnormal labor progress. Moreover, nearly 59.9% believed that the appropriate time to receive childbirth information was during labor, while 38.4% thought it was necessary in the last trimester of pregnancy.

The participants' childbirth information regarding the 1st, 2nd, 3rd, and 4th stages gained through the childbirth roadmap (Table 3) indicated that the majority's baseline information was significantly increased (P<0.001), excluding one item regarding the 2nd stage ("criteria of 2nd stage of labor"). Although using the roadmap increased their knowledge, the differences reported were not statistically significant (P=0.272).

Table 4 displays a statistically significant relationship between women's satisfaction regarding labor information before and after using the childbirth roadmap (P<0.001). Almost all the participants (92.5%) were either strongly satisfied or satisfied with their information regarding the 1st, 2nd, 3rd, and 4th stages of labor (66.3%, 69.2%, 100%, and 65.1%, respectively). It was found to increase after the implementation of the childbirth roadmap.

Table 5a shows a significant relationship between the mode of delivery and the participants' satisfaction with the childbirth roadmap tool, whereby the majority

Table 5c. Association between the neonatal outcomes assessed using the Apgar score and the participants' satisfaction with the childbirth roadmap

	What is the Apgar score?			*P-value*
	Severely depressed (0-3)	Moderate depressed (4-6)	Good /Normal (7-10)	
How would you evaluate this labor roadmap				
Strongly satisfied	1	1	19	0.03*
Satisfied	1	0	41	
Neutral	1	8	95	
Unsatisfied	1	1	3	
Strongly unsatisfied	0	0	0	
Total of 172	4	10	158	100%

Note: *p-value <0.05

of them (134; 77.0%) who delivered normally were either satisfied or strongly satisfied with the tool (P=0.04). Table 5b reveals no statistically significant relationship between the duration of the second stage of labor and the participants' satisfaction with the childbirth roadmap (P=0.63). However, most satisfied and strongly satisfied participants reported the least contentment with the second stage of labor. Table 5c displays a statistically significant relationship (P=0.03) between the neonatal conditions reported using the Apgar score, at 1 and 5 minutes immediately after the delivery, and the participants' satisfaction with the tool. The majority of them (90.1%) who were satisfied with the roadmap for their neonatal outcomes reported good conditions by the Apgar scores.

Table 6 shows a statistically significant relationship between the participants' satisfaction and their recommendation of using the childbirth roadmap as a guidance tool (P<0.001). The vast majority of the participants were satisfied either strongly (97.0%) or to some extent (96.5%) and recommended using a childbirth roadmap as a guidance tool.

Discussions

This study aimed to assess the improvements in women's knowledge, satisfaction, and experience of childbirth using a simple awareness program about stages of birth (SAWA) by employing a childbirth roadmap tool. Our study found that the women's knowledge about the labor stages improved dramatically, and both satisfaction with the childbearing outcomes and the roadmap increased significantly. These findings may indicate the way of providing the information integrated with an attractive illustration, the "childbirth roadmap," and its simple delivery by the healthcare providers, and the study's researchers.

Table 6. The association between the participants' satisfaction and the recommendation of using the childbirth roadmap as a guidance tool

Recommendation of childbirth roadmap as a guidance tool	Satisfaction with the childbirth roadmap				P-value
	Strongly satisfied	Satisfied	Neutral	Unsatisfied	
Strongly recommend	13	12	45	3	0.001*
Recommend	6	28	48	1	
Somewhat recommend	1	2	11	0	
Not recommend	1	0	0	1	
Total	21	42	104	5	172

Note: *p-value <0.001

The improvement of knowledge and satisfaction due to the use of a newly illustrated tool in the form of brief stories related to each labor stage provided women with an excellent example of self-guidance. Similarly, the studies conducted by Howarth et al. (2019), and Howarth and Swain (2019) regarding the low-cost, and self-paced educational programs and relation to birth satisfaction in new mothers as these studies reflected that skill-based childbirth preparation increases childbirth self-efficacy for first-time mothers, in which the user of an educational program imparted knowledge through birth stories and was a form of a role model for the participants, thus having a direct influence on their childbirth satisfaction. Consequently, women's knowledge improvement may have long-standing well-being for both themselves and their families (Maimburg et al., 2016).

The integration of information with the continuous support of healthcare providers (study researchers) was crucial. Similarly, previous studies (Hodnett et al., 2013; Iravani et al., 2015; Stark et al., 2016) reported that the presence of healthcare providers in the labor room was an essential element in parturient women's requirements during childbirth because it decreased their anxiety levels.

The World Health Organization recommends that laboring women be accompanied by trusted care providers, such as doulas, midwives, or family members (WHO, 2016). The participants in this study expressed a need for receiving information regarding the labor stages which was evidenced by the significant difference between their knowledge before and after using the SAWA program. Likewise, Malata and Chirwa (2011) and Iravani et al. (2015) reported that participants required information and were interested in the information received from healthcare providers during childbirth. Our findings reported a significant relationship between the mode of delivery and the participant satisfaction with the childbirth roadmap tool; the majority of those who underwent normal delivery were strongly satisfied with it. An unpredicted surgical intervention or instrumental delivery was experienced negatively by women (Martin et al., 2017). Therefore, previous studies reported lower satisfaction with induced labor and cesarean section (Howarth & Swain, 2019; Martin et al., 2017).

Normal childbirth without complications is the most expected by women; however, when the childbirth outcomes end with an unpredicted sequence, lower satisfaction may be experienced due to other factors associated with the cesarean method (Carquillat et al., 2017; Hutton and Hall, 2014). Regarding the duration of labor, our findings revealed that the majority of the participants who were either satisfied or strongly satisfied with the childbirth roadmap tool reported the second stage as having the least duration, with no statistically significant association between its duration and satisfaction with the childbirth roadmap.

There is a partially, convenience with studies by Khresheh (2010); Wang et al. (2021), who reported a significantly shorter duration among primiparous women with the support of both a family member and hospital professional staff. The partial congruence in our study referred that the majority of women's satisfaction with the least duration of the second stage of labor.

However, the inconsistency may be because our study did not measure the complete duration of labor. Nevertheless, in our study, the researcher guided the parturient step-by-step during the first stage and the outcomes of the second stage were based on what the women followed during the initial stage-besides, a comparison between primiparous and multiparous participants was not performed as most of them in the present study were primiparous.

Table 5b. The association between the duration of the second stage of labor and the participants' satisfaction with the childbirth roadmap

How would you evaluate this labor roadmap	Duration of the second stage of labor										P-value
	Strongly satisfied		Satisfied		Neutral		Unsatisfied		*Strongly unsatisfied*		*P-value*
	.10 min		.15 min		.20 min		.25-30 min		>30 min		
	119	69.2	22	12.8	22	12.8	9	5.2	0		0.63
Total	172				100%						

Note: *p-value <0.05

Moreover, previous study by Kashanian et al. (2010) demonstrated a shorter duration of the first and second stages of labor; however, the third stage among women did not receive continuous support. This study calculated the duration of all the stages, while ours focused only on the second stage. The study's strengths and limitations: This is a pioneering study to test the childbirth roadmap tool in Egypt. The sample size is representative of the total cohort over the period of time. However, the application of road mapping needs further training for the childbirth team to be implemented in the future.

Conclusion

This study highlighted the benefits of using a simple, attractively illustrated tool, the "childbirth roadmap," to achieve the meaning of support through the SAWA program during the stages of labor. The findings revealed a statistically significant difference between the pre/post knowledge of women regarding each stage. In addition, a statistically significant association was found between the application of the SAWA program and women's satisfaction with the tool.

This study applied a new program, SAWA, using newly illustrated guidance material that can be employed in the labor wards of hospitals and other private facilities to guide the parturient woman through her journey of childbirth. Furthermore, our research encourages using the childbirth roadmap in the initial phase of the last trimester during antenatal visits or classes, to familiarize pregnant women with it. Moreover, it could be used by nursing students during their clinical training in the antenatal and labor wards to increase mothers' awareness regarding their labor process and progress. This study recommends to use the childbirth roadmap to facilitate the birth journey for women during labor and increase the active support role by the midwife and maternity nurse to apply holistic care during childbirth.

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The predictors need for complementary interventions using mobile application technology in women with breast cancer

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ABSTRACT

Introduction: Some women with breast cancer tend to have psycho-social stress, embarrassment from the disease's treatment, and difficulty asking for help. Furthermore, several studies indicate limited use of complementary online intervention in mental and spiritual health care, particularly when using mobile-based technologies. This study identifies the key factors that affect the need for mobile-app complementary interventions and the variables affecting them among Indonesian breast cancer patients

Methods: A cross-sectional survey study with a simple random sampling technique included 112 patients between May and July 2022. The research instrument used is The Quality of Life-Breast Cancer questionnaire, Functional Assessment of Chronic Illness Therapy–Spiritual Well-Being (FACIT-Sp), Palliative Performa Scale Version 2, and The Need for Complementary Interventions using mobile-app technology (NCIM) to measure Predictors of The Need for Complementary Interventions. Meanwhile, multiple linear stepwise regression was used, and the potential multicollinearity effects among NCIM predictive variables were assessed through the collinearity analysis of variable inflation factors

Results: The psychological-social dimension of quality of life and the faith–peace dimension of FACIT-Sp ($F = 11.255$; $p = 0.001$). The most strongly correlated variable is the psychological dimension ($t = -3.35$, $p < 0.001$).

Conclusions: The key factors that affect the need for mobile-app complementary interventions and the variables affecting them among Indonesian breast cancer patients are psychological and social dimensions of quality of life and faith and peace in the spiritual dimension. This study can provide the development of complementary intervention using mobile application technology.

Keywords: breast cancer, complementary intervention, mobile-app technology

Introduction

Women are having high risk to develop breast, colorectal, lung, cervical, and thyroid cancer (WHO, 2022). The prevalence has risen from 1.40/00 to 1.490/00 between 2013 and 2018. Globocan data for 2020, the number of new cases of breast cancer reached 68,858 cases (16.6%) of a total of 396,914 new cases of cancer in Indonesia. Meanwhile, the number of deaths reached more than 22 thousand cases. West Java is the 25th-ranking province, with 202 and 594 cervical and breast cancer cases reported in 2019 (Center for Data and Information Ministry of Health Republic Indonesia, 2019).

The breasts are a woman's second sexual organ that enhances physical beauty. Furthermore, breast cancer impacts self-image and produces psycho-social stress, including melancholy, inadequacy, sorrow, and embarrassment from the disease's treatment (Zhang et

al., 2019). Many women with breast cancer isolate themselves because they feel ashamed and cannot form meaningful relationships with others (Najmabadi et al., 2014). Therefore, sufferers tend to have difficulty asking for help, disrupting their quality of life.

One of the objectives of healthcare providers is to actively manage patients' disease and treatment-related health issues (Santos et al., 2021). Nurses need to think of holistic intervention strategies, including complementary interventions ones that safeguard their privacy (Galutira, 2018). Nurses and other healthcare professionals have thought about incorporating complementary interventions, such as acupuncture, music therapy, hypnosis, and massage therapy, into clinical practice to give their patients a more holistic treatment and care (Anisa, Erika and Rachmawaty, 2018). The theory of unity by Martha E. Rogers stated that humans are open systems. They can be influenced by external factors (Berman, Snyder and Frandsen, 2016), hence the role of nurses in influencing illness individuals with appropriate interventions is very important, because they value a holistic approach to health, nurses often have a positive attitude toward complementary and alternative medicine (Elfaki, 2022).

The discipline of eHealth (Health Informatics/Medical Informatics) is expanding globally as a result of recognition from renowned organizations like the World Health Organization, Institute of Medicine in the USA, and many others (Qureshi, Farooq and Qureshi, 2021). Mobile technology in nursing and e-health has revolutionized how nurses execute interventions and interact with patients and other medical professionals (Silva et al., 2018). It allows nurses to improve relationships with patients and families, systematize their job, and give advice on treatment. Participation in health care positions nurses as consultants. and advisors, improving results, particularly in managing chronic diseases (Nezamdoust, Abdekhoda and Rahmani, 2022).

There are reports of considerable outcomes from several online therapies. Meanwhile, people with PTSD and co-occurring depressive symptoms can benefit from internet CBT (Sijbrandij, Kunovski and Cuijpers, 2016). Numerous apps have beneficial, evidence-based components such as high-quality data, reliable measurements, and practical meditation techniques. Mobile-app significantly improve mental health treatment in China (Yin et al., 2020).

Indonesia has a very high need for mental health treatments due to a 500% growth in the internet between 2001 and 2015, 95% of whom are active smartphone users. Mental health services might be employed for this issue (Sukmawati et al., 2019). The Indonesian government issued a decree of the Minister of Health regarding the policy of using e-health, where e-health is very supportive from planning, implementing, and evaluating health programs in Indonesia (Ministry of Health of the Republic of Indonesia, 2022). Several studies indicate that there is still limited use of complementary intervention in health care, particularly when using mobile-app technologies (Gijsberts et al., 2019). This concerns the requirements for getting this intervention, which is unclear. Predictors and status of the need for mobile-app complementary interventions should be determined first, referring to the quality of life and the functional assessment of chronic illness therapy.

This cross-sectional descriptive study was created with the goals of (a) assessing the status of the need for mobile-app complementary interventions in Indonesian women with breast cancer and (b) identifying the key factors affecting the status of needs in this population. This study aimed to examine the need for mobile-app complementary interventions and the variables affecting the concept among Indonesian breast cancer patients. To aid in the development of complementary types of mobile-app interventions, it is critical to identify the key factors relating to the state of this demand. For nurses, this study provides information about the needs of women with breast cancer for complementary interventions utilizing technology, which focus on the Quality of Life domain.

Materials and Methods

Research design

The study design used a cross-sectional study to identify the predictors of the need for complementary interventions for mobile-app technology.

Setting and samples

The outpatient and inpatient oncology department of a teaching hospital in Bandung served as the recruitment site for this cross-sectional survey. The populations consist of 1,433 women who had breast cancer at Al-Ihsan Hospital Bandung in the last 6 months. Sample calculation was obtained using the Slovin formula $n = N / (1 + (N \times e^2))$, with a tolerance degree of 10% (Sugiyono, 2017). About 112 participants were selected by simple random sampling, N (Number of population): n (sample). The interval is 1433 people: 112 people = 13, then the member of the population affected by the sample is every person's name that has a multiple of 13 serial number who met the inclusion

Table 1. Distribution frequencies characteristics of participants (N=112)

Characteristics	N
Age	
early adult (26 – 35 years)	3
late adult (>35-45 years)	30
early elderly (>45-55 years)	51
late elderly (>55 years)	28
Work	
employee	19
unemployed	93
Education	
Elementary	41
Junior High School	27
Senior High School	33
University	11
Cancer Stadium	
I	4
II	54
III	44
IV	10
Comorbid	
present	13
absent	99
Illness period	
< 1 year	35
≥ 1 s.d 2 year	13
> 2 year	64
Therapy	
Surgery	17
Chemotherapy	30
Surgery and Chemotherapy	53
Surgery, radiation, and chemotherapy	9
Surgery and radiation	3

**Spearmen Correlation*

criteria, were at least 18 years old, with a minimum Palliative Performa Scale version 2 (PPSv2) score of 60%, and could give a signed agreement. Breast cancer recurrence history, severe organ dysfunction, and inability to read or write Indonesian were all grounds for exclusion criteria.

Measurement and data collection

The demographic questionnaire includes age (early adult (26 – 35 years), late adult (>35-45 years), early elderly (>45-55 years) and late elderly (>55 years)), occupation (employee and unemployed), education (Elementary, Junior High School, Senior High School and University), co-morbidities (present and absent), illness period (<1 year, >1 – 2 year, >2 year) , type of therapy (Surgery; Chemotherapy; Surgery and Chemotherapy; Surgery, radiation, and chemotherapy; Surgery and radiation), the habit of taking herbal supplements (yes or no), and cancer stage (I, II, III and IV).

The Quality of life (QoL) has been recognized as a subjective measurement reported by patients of the health status of breast cancer women. This instrument is adapted from The Quality of Life-Breast Cancer questionnaire (Ferrell, Dow and Grant, 2012) with Indonesian language adjustment and has 38 statement items covering the physical, psychological, social, and spiritual domains. The spiritual domain leads to the participants's spiritual position based on beliefs. The questionnaire's validity test produced the results of r = 0.361 and 0.938 for Cronbach's alpha, and the instrument uses a scale of 1 to 10. Score calculation was obtained by adding all items in the subscale and making an average score. Each Quality of Life domain will also be calculated separately. Subsequently, the total score is categorized based on the calculation of the predetermined category. Quality of life score categories is 0 – 19% (very poor), 20 – 39% (p,oor) 40 – 59% (enough), 60 – 79% (good) and 80 – 100% (very good).

The 12-item Spiritual Wellbeing Scale (FACIT-Sp-12) is the most widely used tool for measuring spiritual well-being among those with cancer. The FACIT-Sp distinguishes between meaning, peace, and faith (Arnold, Bredle and Lent, 2021). The version's construct validity and reliability (α Cronbach = 0.931) consist of 10 statements with a Likert scale. The lowest and highest scores are 0 and 48. Meanwhile, FACIT-Sp categories are low < mean score and high ≥ mean score.

Palliative Performance Scale version 2 an instrument for swiftly communicating individuals' present functional level is the Palliative Performance Scale (PPSv2) Version 2, which provides more common terminology to describe the status. The PPSv2 measures ambulation, activity and signs of disease, self-care, intake, and conscious level using five observer-rated dimensions. Dependability for the PPS between the two groups with an absolute intraclass correlation coefficient of 0.959 (Society, 2009; Cleary, 2015).

Questionnaire was made referring to the Supportive Care Needs Survey (SCNS) (Macleduff *et al.*, 2004) and the Acceptability of Mental Health Mobile App Survey (AMMS) (Sukmawati *et al.*, 2019), which has 10 statement items covering the physical, social, psychological and spiritual dimension. The validity instrument is 0.377, with a Cronbach Alpha score of 0.836. The instrument uses a Likert scale, and the status of the need categories are low < mean score and high ≥ mean score.

The efforts to minimize bias are to make the questionnaire short and easy to understand and set the time for the survey. Therefore, filling out the questionnaire is only about 10-15 minutes, informing participants that the survey is short. The participants should be informed that the poll is anonymous and responses will not have any consequences for the continuity of treatment

Data collection

Data collection was done through 1) Sample selection, using samples from teaching hospitals in Bandung, the PPSv2 observation sheet identified eligible

Table 2. Variables scores and categories

Variables	mean	SD	min	max
NCIM	25,17	8,57	10	40
SubScales NCIM				
Physical dimension	5.10	1.97	2	8
Social dimension	4.47	1.64	2	8
Spiritual dimension	10.34	3.76	4	16
Psychological dimension	5.26	2.08	2	8
NCIM Categories	**n**	**%**		
Low	49	44		
High	63	56		
QoL Categories	**n**	**%**		
Very poor	28	25		
Poor	36	32		
Enough	25	22		
Good	22	20		
Very good	1	1		
Facit-Sp Categories	**n**	**%**		
Low	55	49		
High	57	51		

participants. 2) Provide informed consent for all participants after the study's objectives and the confidentiality principle are stated. 3) Meanwhile, enumerators followed the standard instructions, assisting with item-by-item questioning and objectively documenting answers. There were 112 individuals recruited, and the participants' completed questionnaire has no missing data.

Data analysis

Data analysis was conducted using IBM SPSS Statistics, version 22.0 (IBM, Armonk, NY, USA). Descriptive analysis was performed using mean, standard deviation, and distribution statistics for the survey's participant characteristics and each subscale. Furthermore, Pearson correlation analysis was used to determine the impact of patient factors on NCIM scores. Multiple linear stepwise regression was used to identify the variables affecting NCIM in breast cancer patients. The potential multicollinearity effects among predictive variables were assessed using the collinearity analysis of variable inflation factors.

Ethical consideration

The ethical test is performed with the letter number 123/KEP. 01/UNISA-BANDUNG/III/2022. Patients who agreed to take part signed written consent papers and received guarantees of their confidentiality and anonymity

Table 3. Correlation between continuous variables and Need Complementary Interventions using Mobil Application (NCIM) (N = 112)

Variables	mean	SD	r	p
Age	50	10.04	0,129	0,175
Quality of Life				
Physical dimension	29.57	14.75	-0.168	0.077
Social dimension	47.63	18.43	-2.42	0.010
Spiritual dimension	38.91	8.64	-0.246	0.009
Psychological dimension	97.89	32.66	-3.05	0.001
Facit-Sp				
Meaning	8.92	2.28	0.021	0.830
Faith	10.29	3.75	0.066	0.489
Peace	8.50	2.48	0.065	0.049
PPSv$_2$	74.82	13.01	0.108	0.256

Pearson Correlation, Correlation is significant at the 0.05 level (2-tailed)

Results

Participant characteristics

Table 1 shows that the average age of the participants was 50 years (SD = 10.4), more at stage II (n = 54.48%), received types of surgery and radiation therapy (n = 53.47%) and a period of cancer more than 2 years (n=64.57%). About 83% or 93 individuals unemployed, with the highest education level being elementary at 37%.

The correlation between continuous variables and the need for complementary interventions using mobil application (NCIM)

Table 2 shows the mean score NCIM 25.17 at an SD of 8.57. About 56% or 63 participants have high needs for Complementary Interventions using mobel application. Meanwhile, 57% or 64 had a poorer quality of life than other categories, but 51% or 57 had high spiritual well-being.

Based on Table 3 below, social (r = -2.42, p = 0.010) and psychological dimensions (r = -3.05, p = 0.001) of the quality of life of cancer patients have a significant relationship with NCIM. The Facit-Sp dimension faith (r = 0.066, p = 0.489) and peace (r = 0.065, p = 0.049) have a relationship with NCIM, while age and PPSv2 were not associated with NCIM.

According to Table 4, the F value 11.255 with a probability of 0.001 (<0.05) shows that the regression coefficient of the quality of life and the Facit-Sp dimension simultaneously affect the NCIM. Psychological dimensions (t = -3.35 p = < 0.001) of life have a very significant influence on participants in their needs for Complementary Interventions using mobile app technology (NCIM). Furthermore, there is no linear relationship between the independent variables influenced by the dependent variable (VIF<10).

Table 4. Multivariate regression analysis predicting NCIM scores (N = 112)

Model		B	β	t	p	VIF
Step 1	(Constant)	31.69		8.10	0.00	
	QoL_psychologis	-0.07	-0.265	-2.21	0.03	1.714
	QoL_social	-0.03	-0.064	-0.52	0.60	1.778
	FacitSp_Faith	0.10	0.043	0.33	0.74	2.007
	FacitSp_Peace	0.08	0.024	0.19	0.85	1.930
Step 2	(Constant)	32.01		9.16	0.00	
	QoL_psychologis	-0.07	-0.266	-2.23	0.03	1.713
	QoL_social	-0.03	-0.063	-0.52	0.60	1.778
	FacitSp_Faith	0.14	0.059	0.63	0.53	1.075
Step 3	(Constant)	31.33		9.69	0.00	
	QoL_psychologis	-0.08	-0.306	-3.36	0.00	1.000
	FacitSp_Faith	0.17	0.072	0.79	0.43	1.000
Step 4	(Constant)	33.00		13.42	0.00	
	QoL_psychologis	-0.08	-0.305	-3.35	<0.001	1.000

Dependent Variable: NCIM (Need Complementary Interventions using Moble Application), VIF = variable inflation factor. R2 = .093, Adjusted R2 = .085 F = 11,255 (p = 0,001)

Discussions

The key factors that affect the need for mobile-app complementary interventions and the variables affecting them among Indonesian breast cancer patients are psychological and social dimensions of quality of life and faith and peace in the spiritual dimension. This study can provide the development of complementary intervention using mobile application technology. Breast cancer causes psycho-social stress, which includes depression, a sense of inadequacy, sorrow, and shame due to the disease's treatment. Previous studies show that cancer mortality was predicted by psychological discomfort. Community-based cohorts, including participants with a history of cancer, may exaggerate the relationship between psychological distress and subsequent mortality (Hamer, Chida and Molloy, 2009). Socioeconomic challenges, limited access to supportive treatment, late breast cancer diagnosis, self-perception of the disease, social restraints, and other religious/cultural restrictions are potential factors contributing to the projected discrepancy (Haidari et al., 2020). Health professionals can use technology to provide complementary interventions for patients because of face-to-face limitations with health workers.

Most women with breast cancer need complementary interventions based on mobile technology, which has no relationship with the characteristics, as shown in Table 1. The NMCI questionnaire is an instrument created to identify the need for complementary therapies based on mobile technology to support cancer patient's physical, psychological, spiritual, and social health.

Similar studies include internet technology in providing interventions to improve the life of cancer patients, such as research about telehealth medicine. A telemedicine intervention was linked to improved self-efficacy and decreased depression (Chen et al., 2018). Other studies stated that web-based psycho-social oncology programs successfully lowered stress and depression (Leslie et al., 2022).

Psycho-social problems of breast cancer patients tend to be depressive symptoms such as being down, empty, dismal, and gloomy (Velosa, Caldeira and Capelas, 2017). In addition to being irritated or moody, they may find it difficult to cry or weep without severe precipitation and emotional distress (Veeraiah, Kayser and Sudhakar, 2022). According to previous research, fear of the sickness progressing, inability to engage in one's interests, and having to revisit the hospital are the three most common causes of psycho-social problems in breast cancer patients (Herschbach et al., 2004). Poor mental health can affect the immune system and cause the manifestation of distressing somatic symptoms (Zapała et al., 2022).

A major component of spiritual suffering is a lack of meaning in life, which appears to be connected to depression. Spirituality significantly impacts the quality of life and psychological well-being after accounting for a health state. Most spirituality assessments include the religious and existential components (Levine and Targ, 2003). However, faith and peace affect the need for mobile-app complementary interventions, but most participants always worship as their religious activity.

The possible reason for the correlation between faith and peace with NCIM is that it encourages patients to seek support through complementary interventions. This is based on mobile app in accepting the possibility of physical disability and other negative effects of breast cancer.

A similar study stated that the positive influence on breast cancer patient's quality of life (QoL) is spiritual well-being (SpWB). SpWB is not always limited to a particular type of behavior or idea. The meaning, purpose, fulfillment, and peace experienced in life stem largely from their faith in themselves, others, and God (Yilmaz and Cengiz, 2020). Furthermore, spiritual well-

being is linked to lower anxiety and sadness and a higher quality of life (Chen et al., 2021).

Nurses need to consider complementary interventions based on the mobile app to support the psychosocial dimension and also spiritual well-being, especially faith and peace, in women with breast cancer. Therefore, breast cancer patients have a good quality of life characterized by good mental and social health.

Conclusion

Women with breast cancer who participated in this study had a need for NCIM. Furthermore, predictors that were found to affect the level of need are the psychological-social dimension of quality of life and faith-peace FACIt-Sp. The results suggest that an effective mobile-app-based complementary intervention model should be developed based on these dimensions.

In clinical practice, the nurse team should pay special attention to patients with low quality-of-life scores and poor spiritual well-being. They should organize support activities, including family members, patient colleagues, friends, and clinical staff. Furthermore, nurses should provide various complementary therapies to help patients develop healthy coping mechanisms. The findings also point out a positive direction, recommending that research nurses collaborate closely with information technology specialists to create complementary therapies appropriate for mobile-app. Complementary interventions that might be developed are guided spiritual mindfulness through mobile applications. The technology used needs to be considered in patients who are often senile.

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Conflict of interest

The absence of any conflicts of interest between the subjects and the researcher is ensured by this study. No ties to family, relatives, or other relationships will have an impact on the study's outcomes.

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ORIGINAL ARTICLE

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Experiences of professional nurses regarding shortage of resources at a tertiary hospital in Gauteng Province, South Africa: qualitative study

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ABSTRACT

Introduction: The shortage of resources in hospitals is a global problem that includes South Africa. This leads to a situation where most healthcare facilities are unable to perform adequately in their provision of quality patient care. The study aimed to explore and describe Professional Nurses' (PNs) experiences concerning the shortage of resources at a tertiary hospital in Gauteng Province, South Africa.

Methods: An Exploratory-Descriptive Qualitative design was used on a sample of 16 PNs, who have worked for two or more years in selected units. To enhance optimum variation and obtain a diverse sample concerning participants' experiences, the study was conducted in various units at the tertiary hospital under study. Unstructured individual conversation with a grand tour question was used. Tesch's method was employed to analyse data.

Results: The study revealed both negative and positive experiences regarding the deficiency of resources. PNs experienced the following under these four themes: 1) Experiences about lack of material resources; 2) Negative impact of the shortage of resources for patients; 3) Experiences on inadequate number of nurses and support staff; 4) Dealing with the shortage of resources.

Conclusions: Appropriate measures should be put in place to ensure that resources are adequate at this tertiary hospital. Medical machinery should be audited monthly and a daily checklist used to document available stock. Appropriate recruitment and retention policies must be implemented by the Human Resource Department to ensure that vacant posts are filled timeously and reduce high staff turnover. Perceptions of patients could be explored related to the unavailability of medicine in healthcare facilities.

Keywords: nurses, health resources shortage, hospital, experience, human resources, material resources

Introduction

Insufficiency of health resources is a global concern (WHO, 2013). It is predicted that, by 2035, there will be a loss of 12.9 million healthcare professionals internationally (WHO, 2013). Yang et al. (2017) state that 97,221 registered nurses are expected to provide services to a population of 37 million in Shaanxi Province, China. Sub-Saharan Africa (SSA) has a deficiency of healthcare workers (WHO, 2013), with over 60% of African countries having a diminished number of health personnel. The WHO (2017) indicated that 22.8 skilled healthcare workers are expected per 10,000 people, nonetheless, 83 countries remain below this level. The scarceness of medical professionals in SSA is attributed to international migration due to unfavourable working conditions (Department of Health, 2017). SSA is comprised of several different countries and regions lying south of the Sahara from East, Central, Western, and Southern Africa. These countries are predominantly less developed with half of

their population living below the poverty line. Furthermore, SSA countries are faced with challenges related to conflicts and infectious diseases (World Bank, 2021).

The South African media have reported medico-legal hazards as being attributable to a lack of resources (Rispel et al., 2018). Several factors contribute to the shortage of fundamental health resources. According to Mammbona and Mavhandu-Mudzusi (2019), inadequacy of health resources contributes to a decline in treatment standard and well-being of patients. Yang et al. (2017) indicated that the human resources for health (HRH) shortage was because of high staff turnover. Phuong et al. (2019) revealed that nurses postponed treatment due to unavailability of prescribed medication. In South Africa, the Department of Health introduced the National Core Standard as a strategy to increase availability of resources at all levels of hospitals (Department of Health, 2011). Domain seven deals with facilities and infrastructure and the requirements for a clean, safe and secure physical infrastructure (Department of Health, 2011). In accordance with this domain, medical machinery should be regularly serviced to keep them safe for use (Department of Health, 2011).

Patients from Tshwane District Health Care facilities and other provinces are referred to the hospital. As one of the biggest academic and referral hospitals in South Africa, it needs adequate allocation of resources for quality service delivery. During clinical accompaniment, the researcher observed conditions amounting to a precarious deficiency of resources. Overcrowding of patients, lack of medicines, and few nurses were noted. While several studies have been conducted on the shortage of resources there is diminished literature on the experiences of PNs about these shortages at the tertiary hospital, hence a need for this study.

Although prevailing studies have described shortage of resources in diverse contexts, surprisingly, those conducted in the tertiary hospital and focusing on both human and non-human resources were limited. Furthermore, in Gauteng province, South Africa, studies exploring the experiences of professional nurses regarding shortage of resources at tertiary hospital are scarce. The results of reviewed literature revealed only one qualitative study focusing on the perceptions of professional on the impact of shortage of resources on the quality patient care at Limpopo province, not on the more in-depth experiences. In addition, Mokoena (2017) reveals that one of the causes of staff shortages is absenteeism in the workplace, which contributes to understaffing in the unit and increases workload on the remaining staff. Importantly, professional nurses are responsible for managing both human and non-human resources, ensuring smooth running of the unit and ensuring quality patient care. Therefore, the purpose of the study was to explore and describe the experiences of professional nurses regarding the shortage of resources in a tertiary hospital in Tshwane District.

Materials and Methods

Research design

This study employed a qualitative, explorative, descriptive research design (Polit and Beck, 2017). This research design was selected to explore and understand the participants' experiences of working in a hospital with a shortage of resources. With this design, it was envisaged that diverse themes, subthemes and categories would be generated about these experiences.

Participants

This study was conducted in the tertiary hospital from June 2019 until September 2019. The sample size was determined by data saturation at which point new themes were no longer emerging. The inclusion criteria included PNs with more than two years' experience at the selected tertiary hospital, and who were willing and gave their consent to participate in the study. Participants were purposively chosen to provide rich information about their experiences regarding the shortage of resources at the tertiary hospital. This resulted in sixteen participants.

Research instruments

The study data collection instruments included demographic data questionnaires, field notes for capturing non-verbal responses, interview guides, and audio tape recorders. The researcher conducted in-depth interviews to explore the experiences of PNs regarding the shortage of resources. The demographic questionnaires were used to obtain the participants' age, gender, work experience and qualifications. In addition, the researcher also used an interview guide during the data collection process. The interview guide had a broad opening question which is: "What are your experiences regarding shortage of resources in this hospital?" Several probing follow-up questions were used to gain greater clarity and more in-depth information from the participants. Field notes, a written record of observed or heard gestures from participants, were kept by the researchers. Further, the researcher made use of an audio tape recorder to capture

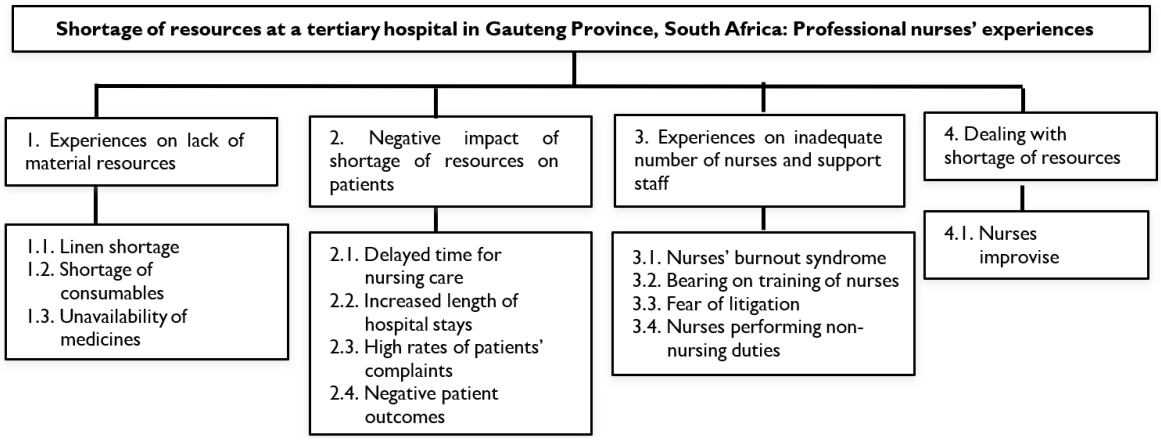

Figure 1. The four themes and twelve categories that emerged from the study

deliberations during the interview and later typed these up verbatim in the form of a transcript.

Ethical clearance

Ethical clearance was obtained from the University of South Africa's Higher Degree Ethics Committee (Reference number: HSHDC /801/2017). Permission was also sought from the District Ethics Committee in Gauteng Province. The rights of the participants were ensured by obtaining both written and verbal consent prior to data collection. Privacy and secrecy were safeguarded by using pseudonyms. Confidentiality was ascertained by reassuring the study participants that facts and information shared would be unreachable by any other persons except those involved in the study. Anonymity was ensured by using the pseudonyms instead of the participants' real identities.

Data collection

The individual interviews were conducted in a private secluded office in the hospital under study. The door of the interview office was identified with a "no disturbance identifier" to prevent interruptions. The main researcher collected data through the administration of unstructured face-to-face individual interviews which took 25 to 40 minutes to complete. Follow-up questions were asked according to individual participants' responses. Probing was done in order to obtain in-depth clarification from participants. Gestures and non-verbal communication were adequately documented with the use of pen and paper, while the participants' voices were recorded using the audiotape recorder. The researcher provided ample freedom and time for the study participants to freely express their experiences and views regarding their experiences about shortage of resources.

Data analysis

Tesch's approach was implemented to analyse the data obtained from PNs (Polit and Beck, 2017). In step one, the researcher got a sense of the whole findings by reading all transcripts and noting the ideas which emerged. Subsequently, in step two, transcripts were read one at a time for emerging topics. Step three entailed recording all the topics in one document. All topics were compared, and similar ones were grouped, with the main topics highlighted. In step four, the broad topics were highlighted and abridged as codes. The fifth step included assigning descriptive words to the identified topics and grouping them into categories. Consecutively in step six, the researcher abridged these categories by deciding on the final abbreviation, labelling each category and code to avoid duplication. The seventh step involved alignment of the data appropriate to each category. The eighth step included data recording to get the whole sense and significance of the data.

Trustworthiness

Trustworthiness is described as grade of assurance and realism that researchers have in their qualitative results (Polit and Beck, 2017). Prolonged engagement was achieved by remaining in the field until data saturation was achieved. The researcher kept an audit trail of the audiotapes and verbatim transcripts. Raw data were validated together with an independent coder.

Results

Characteristics of participants

A total of sixteen PNs participated in the study. The age of the participants ranged between 28 and 64 (Mean = 41.12 years). The majority of the participants were female (n = 15; 94%). Four participants (25%) had between seventeen to twenty years of experience in their current position. Thirteen (81.3%) had a Diploma in Nursing Science and Midwifery, followed by a Bachelor of Science in Nursing (n = 3; 18.7%).

In-depth analysis of data that emerged from the study allowed for greater comprehension of the experiences of these PNs on the resource shortages at the tertiary hospital. To that effect, four themes supported by twelve categories emerged from the study (Figure 1). These themes and categories are described and elaborated on through direct quotes from the study participants.

Theme 1: Experiences pertaining to lack of material resources

Category 1.1: Linen shortages

Participants indicated a deficiency of linen, despite several requests from laundry. Participants cited the following:

"*Today we don't have linen to change the beds. So, I phoned laundry yesterday and today, they still don't have linen. If you can check now, patients are sleeping on top of mattresses without linen*" (Participant 10; F; 42 years old).

Category 1.2: Lack of consumables

It was reported that wound dressing was not done due to a lack of sterile packs:

"Now recently we did not have dressing material, gauze, and crepe bandage" (Participant 7; F; 35 years old)

Category 1.3: Unavailability of medicines

The absence of medicines was reported as follows:

"*Currently we don't have Vitamin Bco, we used to struggle with Epilim but at least we will give an alternative of Phenytoin… Two months ago, we were out of Lignocaine … It was difficult to suture patients without Lignocaine*" (Participant 3; M; 38 years old)

Theme 2: Negative impact of the shortage of resources on patients

Participants narrated their experiences concerning the negative impact of the shortage of resources on patients. To that effect, the following impacts were highlighted: Delayed time for nursing care; Increased length of hospital stays; High rates of patients' complaints; Negative patient outcomes.

Category 2.1. Delayed time for nursing care

Due to the scarcity of resources, participants had to delay time for nursing care. Participants mentioned:

"*It makes our work very difficult and is time-consuming, because every time when you have to use resources that are not available, you have to ask in other wards*" (Participant 1; F; 40 years old)

Category 2.2. A high volume of patients' complaints

In this study, participants reported that patients' relatives complained of inadequate nursing care because of the shortage of resources. Sad-looking participant 12 had this to say:

"*The other thing is when parents come and find their kids lying on linen with just a drop of blood, they complain*" (Sad looking participant 12; F; 41 years old)

Category 2.3 Increased length of hospitalization

Participants elaborated that patients were not seen on time and care was compromised. With a worrisome look, a participant expressed the following:

"*Patients are not monitored the way it is supposed to be., because a machine is not ours … These means if it is four hourly, is going to be six hourly…So patient's stay is going to be long in our ward*" (Participant 13; F; 29 years old)

Category 2.4 Negative patient outcomes

Participants attributed lack of resources to negative patient outcomes such as death. One participant said:

"*Patients come here but there are no nurses to nurse them. Beds might be available but there are no nurses...They end up dying instead of being helped …*" (Participant 9; F; 33 years old)

Theme 3: Experiences with the shortage of nursing and support staff

Four categories emerged from this theme, namely: Nurse burnout syndrome; impact on the training of nurses; Fear of litigation; Nurses having to perform non-nursing duties.

Category 3.1: Nurses' burnout syndrome

An overwhelming number of the participants experienced an enormous amount of stress. Sad-looking participant 4 said:

"*We experience burnout, because we cannot achieve our objective of quality care, … because of the stress for*

being sick, strained emotionally because of not having enough resources" (Participant 6; F; 64 years old)

Category 3.2: Impact on the training of nurses

Participants testified that they did not have an opportunity to advance their development due to nurse shortages. This is evident in this narration:

"*Due to shortage of PNs, everyone is minding, checking their own patients, so we end up lacking information like in-service training*". (Participant 7; F; 28 years old)

Category 3.3: Fear of litigation

In this study, participants reported that they fear litigation. This is apparent from the following:

"*We are scared of litigations in our unit, because if you are working alone and you have so many patients, you tend to overlook certain patients and if something happens, it is on your shoulder"* (Participant 11; F; 51 years old)

Category 3.4: Nurses performing non-nursing duties

Nurses performed non-nursing duties to cover up for lack of support staff. One participant narrated:

"*There are no clerks, so our statistics is very wrong. Sometimes we are even forced to do clerical work so that we can have statistics, especially for patients who are going out of the unit"* (Participant 15; F; 31years old)

Theme 4: Dealing with a shortage of resources

Various coping mechanisms were employed to deal with the scarcity of resources.

Category 4.1 Nurses improvise

Participants had to improvise to deal with the shortage of resources. Nurses had to come up with creative ways of dealing with diminished resources. One participant had this to say:

"*Sometimes we augment the gauze with crepe bandage during dressings...Some of items are out of stock, so we have to ask from other wards because central sterilising department have nothing*" Participant 14; F; 29 years old)

Discussions

The purpose of the study was to explore and describe the experiences of PNs concerning the shortage of resources at a tertiary hospital in Gauteng province. The study revealed four themes: Experiences pertaining to lack of material resources; The negative impact of these resource shortages on patients; Experiences on the inadequate number of nurses and support staff; and Dealing with the shortage of resources. These themes are discussed in relation to the supportive literature.

Experiences pertaining to lack of material resources

The majority of participants revealed an inadequate supply of linen such as sheets, blankets and pillow slips, despite several requests from laundry. It is apparent that, under these circumstances, patients' dirty bed linen was not changed, thus predisposing them to hospital infections and bedsores. Young (2016) also made a disturbing observation, whereby blood stains in unchanged linen were concealed with a paper towel. This is in contradiction of the infection control domain that highlights the necessity of a clean environment (Department of Health, 2011). Therefore, negligence in hospital linen supplies undercuts the values of quality care and patients' dignity. It is imperative that hospital managers should ensure that the nurses have adequate bedlinen to preserve patients' dignity and prevent nosocomial infections.

The participants experienced shortages of consumables such as dressing packs, gloves, masks and sanitisers. An overwhelming number of participants reported that wound dressing was not done due to lack of sterile packs. Consistently, Mammbona and Mavhandu-Mudzusi (2019) identified lack of gloves and masks, which put PNs at risk of contracting infectious diseases. According to Liu et al. (2020), adequate PPE is needed to protect both healthcare workers and patients from acquiring hospital infections. It is of great concern that, in this era of infectious diseases such HIV/AIDS and Covid-19, nurses still have to work without PPEs such as gloves and masks.

Participants experienced the unavailability of medicine. The assertion is that the nurses are likely to replace the unavailable medication with the other options, which might contribute to more complications. Additionally, Hodes et al. (2017) argue that this practice might affect chronic patients by delaying healing and promoting drug resistance. Lack of drugs, such as oxytocin, contributes to mishandling of emergencies such as post-partum haemorrhage (Mkoka et al., 2014). Unavailability of medicine affects both nurses and patients negatively. Thus, leading to compromised patient care, non-adherence and noncompliance to guidelines and protocols.

Negative impact of the shortage of resources on patients

Participants unanimously linked the shortage of resources to delayed time for nursing care. Consistently, Mokoena (2017) emphasised that shortage of equipment delays patients' diagnosis and care.

Unavailability of prescribed medication means that the hospital has to outsource from another, thus contributing to more complications (Mokoena, 2017). Matinhure et al. (2018) found that a lack of obstetric resuscitation equipment delayed essential care for women in labour. Malelelo-Ndou et al. (2019) revealed that certain drugs were requested from other hospitals which resulted in late administration. According to Malelelo-Ndou et al. (2019), delayed treatment has a negative impact on patients' prognoses. It is apparent that shortage of resources has a negative impact on quality patient care

Most of the participants reiterated experiences regarding the myriad of complaints from patients and their families. It is apparent that this dissatisfaction could be related to sub-standard nursing care. Mkoka et al. (2014) highlighted that the shortage of drugs creates mistrust whereby clients had a misconception that healthcare workers were selling medicines. According to Mkoka et al. (2014), allegations from patients and relatives are concerning, hence it is important to ascertain the reasons behind it.

Participants in this study experienced that patients' stay in the hospital was prolonged. Sub-standard care could be contributory to a prolonged length of stay. It is a clear that patients were not recuperating as expected because of the lack of medication. Shortage of equipment and drugs contribute to postponement of operations, which further delays healing and increased hospital stay.

The participants blamed unavailability of resource to poor patient outcomes. This could be related to the fact that the quality of care was compromised due to lack of resources. The notion is that effective management of patients' illnesses requires prompt care with adequate uptake of treatment. Consistently, Gebrehiwot et al. (2014) associated maternal mortality rates with the inadequate number of midwifery experts and paediatric resuscitation material. Mtega et al. (2017) linked shortage of nurses to destructive events such as pressure sores, and nosocomial infections. The assertion is that, with few nurses, it would be difficult to perform procedures such as pressure part care. Shortage of drugs has been attributed to deterioration of patients' condition and deaths (Phuong et al., 2019). Malatji et al. (2017), admit that staff shortage affect healthcare delivery negatively which, in turn, contributes to poor patient outcomes.

Experiences with inadequate number of nurses and support staff

Participants narrated that they experienced burnout and stress due to a shortage of resources. This is relatable because the PNs were expected to provide quality patient care amidst this lack of resources. At the same time, they had to deal with patients' complaints and all other problems related to a lack of resources. Malatji et al. (2017) correlated staff shortage to anger, the feeling of inadequacy, burnout and emotional exhaustion.

Participants attested that lack of resources impeded nurses' self-development. Evidently, given few nurses, they had no option but to prioritize and cover up for this shortage. The same sentiments were shared by Malatji et al. (2017) in that midwives did not attend workshops due to the continuing scarcity of nurses. Furthermore, supervision and mentoring of novice nurses could also be challenging in light of the shortage of nurses (Khunou, 2018). Evidently, amidst the shortage of experienced nurses, the novices are likely to be left alone to tend the wards. Yang et al. (2017) agreed that lack of career guidance and development from the employer was one of the causes of staff turnover.

Significantly, the PNs in this study feared litigations. This could be ascribed to poor working conditions exacerbated by lack of resources and sub-standard nursing care and increased patient complaints. Fear of litigation amongst PNs could be attributed to the fact that they could not provide quality patient care. Consistently, Matlala and Lumadi (2019), found that midwives feared litigation as a result of delays in patient care, and poor record keeping. The allocation of unqualified professionals can result in litigation due to poor decision-making.

The current study revealed that nurses had no option but to perform non-nursing duties to compensate for the shortage of other healthcare workers. This action is likely to contribute to further nurse shortages, thus exacerbating the entire problem of resource shortages. Similarly, Bekker et al. (2015) found that, in most cases, nurses had to carry out clerical duties while neglecting core duties such as health education. Lack of accomplishment of nursing duties contributes to increased job dissatisfaction (Bekker *et al.*, 2015).

Dealing with resource shortages

Participants had to improvise to deal with the shortage of resources and come up with creative ways of dealing with diminished resources. In agreement, Mutshatshi et al. (2018) revealed lack of notepads for

recording patients' observations. In this regard, nurses had to spend a lot of time making copies in order to document the nursing care rendered (Mutshatshi *et al.*, 2018). In addition, Mammbona and Mavhandu-Mudzusi (2019) found that, due to a shortage of gloves, nurses had to use their bare hands when taking care of HIV/AIDS patients. It is apparent that even though improvisation can be done to ensure continuity of care, it also has negative effects which has the potential to compromise quality care and put the nurses at risk of infection.

Limitations

The study used a qualitative design and purposive sample, which limits the representation of the population. The study was restricted to one tertiary hospital in one district with selected units and a small number of professional nurses. Therefore, the findings cannot be generalized to other hospitals. Since some participants might not have freely disclosed relevant information, it might hinder the generalisation of results. Interviews were conducted in English with approval of the participants.

Conclusions

Inadequacy of health resources leads to a deterioration in nursing standards and compromises the welfare of patients in hospitals and clinics. This study was essential to explore and describe the experiences of PNs regarding this phenomenon. The study revealed negative and positive experiences regarding the shortage of resources. Appropriate measures should be put in place to ensure that resources are adequate at this tertiary hospital.

Recommendations

Medical machinery should be audited monthly and a daily checklist used to document available stock. Appropriate recruitment and retention policies must be implemented by the HR department to ensure that vacant posts are filled timely and high staff turnover is reduced. Debriefing programmes should be established in units such as labour wards, and accident and emergency and intensive care units to provide psychological support to affected staff. Sufficient support staff should be hired to free nurses from performing non-nursing duties. The perceptions of patients could also be explored with respect to the unavailability of medicine in healthcare facilities.

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Predictive factors of family health management for caring toddlers with acute respiratory infections

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ABSTRACT

Introduction: Poor air quality due to air pollution, unhealthy lifestyle, and easily transmittable viruses further increases the incidence of acute respiratory infections, especially in toddlers. This study aimed to determine the predictive factors, namely knowledge, attitude, and anxiety, of family health management in preventive and curative areas for caring toddlers with acute respiratory infections.

Methods: This type of research is correlational predictive. The sample was mothers who have toddler with a history of ARI. A total of 392 mothers were involved and selected using purposive sampling. The instrument used was a questionnaire of knowledge, attitudes, anxiety, and family health management. Bivariate data analysis used the chi-square test and multivariate analysis used the logistic regression test.

Results: Bivariate analysis showed that there was a relationship between knowledge, attitudes, and anxiety with family health management (p-value=0.000). Multivariate analysis showed that variables significantly related to family health management were knowledge (OR=19.791; 95% CI=10.349 to 37.847), attitude (OR=9.265; 95% CI = 3.969 to 21.628), and anxiety (OR=0.137; 95% CI = 0.066 to 0.285).

Conclusions: Good knowledge and positive attitudes were related to effective family health management in the care of toddlers with acute respiratory infections. Furthermore, an increase in anxiety will reduce the effectiveness of family health management in the care of toddlers with ARI. Nurses need to optimize the role of the family through health education that focuses on increasing the mother's knowledge and attitudes in family health management, as well as managing anxiety in caring for children with ARI.

Keywords: family health management, toddler, acute respiratory infection

Introduction

The World Health Organization (WHO) states that acute respiratory infections are the main cause of morbidity and mortality from infectious diseases in the world. Nearly 4 million people die from acute respiratory infections each year. The death rate is very high in children and is one of the most common causes of consultation or treatment in healthcare facilities (WHO, 2020). Globally, Southeast Asia has the highest incidence of ARI and is the third leading cause of individual death in both developed and developing countries. It was reported that Bangladesh, India, Indonesia, and Nepal together accounted for 40% of global ARI deaths. It was recorded that the prevalence of ARI was 50.4% and caused 20% of deaths of under-five children (Murarkar et al., 2021).

The WHO and UNICEF designed the Integrated Management of Childhood Illness (IMCI) strategy which aims to reduce preventable mortality, minimize illness and disability, and promote healthy growth and development of children under five years of age. This strategy includes both preventive and curative elements

that can be implemented by families. This strategy was noted to have contributed to 15% reduction in child mortality due to infectious diseases (WHO, 2023). Therefore, efforts to overcome health problems in preventive and curative areas should be handled early and independently by the family. Moreover, this disease is closely related to changes in environmental conditions, human behavior and environmental factors (Sinulingga, 2017). These factors can be controlled through the right lifestyle. A meta-analysis study on treatment of children with upper respiratory tract infections stated that most mild cases will recover with conservative treatment alone (Panda et al., 2021).

Family health management is a pattern of managing and integrating health programs into daily life sufficient to meet health goals (PPNI, 2017). Family health management cannot be separated from family health tasks, namely the family's ability to recognize health problems, to make the right decisions, to care for sick family members, to modify the environment, and to access health services (Clara & Wardani, 2020). This form of family empowerment is a process of enabling families to improve or control their health status (Nies & McEwen, 2015). Indonesia is a maritime country that has many islands; however, not all islands have health service centers even though these islands are in the same district. This causes difficulties in accessing health services. Thus, the urgency for optimizing family health management, especially for Pangkajene and Island District, which have 117 islands.

The government of Pangkajene and Islands Regency (2022) recorded 21,482 toddlers and in the last year 686 new ARI cases appeared. This district location is an area with two different geographical dimensions, mainland and islands. This factor allows for independence and access to health information that people receive differently. The high number of cases of transmission which are disseminated through the information media causes parents to panic more quickly when their children experience symptoms of ARI. Exposure to invalid sources of information makes parents even more confused about differentiating the symptoms of respiratory infections experienced by toddlers. In addition, the increase in the number of cases and the easier transmission of the omicron has affected the psychology of parents. Parents are worried about the stigma of being confirmed positive for COVID-19 in toddlers. On the other hand, environmental factors and parents' experiences regarding health problems experienced by toddler will be interpreted into parents' attitudes, whereby these attitudes can be positive or negative. The purpose of this study was to analyze the factors of knowledge, attitudes and anxiety in regard to family health management in caring for toddlers with ARI.

Materials and Methods

Research design

This type of research is correlative predictive, namely discriminant predictive analytical research. This research was conducted between July and September 2022 at Pangkajene and Island District.

Participants

Participants of this study were mothers who had toddlers with a history of or currently experiencing ARI, which were obtained using purposive sampling of 392 mothers. The sample size in this study was obtained using Slovin's formula (Firdaus, 2021). The exclusion criterion was mothers who had toddler with confirmed COVID-19. This is because COVID-19 has similar symptoms to ARI, while this research focuses on the independence of mothers in caring of toddlers with ARI. Recruitment and identification of participants was carried out in two ways: first by participating in integrated service post (Posyandu) activities and looking for samples that match the inclusion criteria. Second, by seeking health data for toddlers with a history of ARI at the community health centers and visiting the participant's house directly.

Research variables

The variables of this study were factors that were reviewed from mother's knowledge, attitude, and anxiety. Knowledge was a collection of health information owned by mothers regarding ARI and was divided into two categories, namely good and less. The attitude variable was the mother's perception in treating ARI in toddlers which was divided into two categories, namely positive and negative attitudes. Anxiety was a set of symptoms experienced by mothers in caring for toddlers with ARI where anxiety was divided into two categories, namely anxious and not anxious.

The dependent variable was family health management in the care of toddler with ARI. Family health management was the efforts and behavior of mothers in caring for toddlers with ARI where this variable was divided into two categories, namely effective and ineffective

Data collection and research instrument

Data collection began with informed consent and using three questionnaires, namely knowledge, attitude, and the Depression Anxiety Stress Scales (DASS). This questionnaire on knowledge, attitudes, and family health management was adopted and translated into Indonesian from previous research (Prakash et al., 2020). Anxiety was measured using the Depression, Anxiety Stress Scales (DASS) questionnaire. The attitude questionnaire contained 16 questions, the reliability value of Cronbach's alpha was 0.818 and the value of Sig. (2-tailed) = 0.000 and the Pearson correlation was 0.656 (r>0.4973), which means the questionnaire used was valid and reliable. Meanwhile, the family health management questionnaire contained 15 questions with a reliability value of Cronbach's alpha 0.659 and a value of Sig. (2-tailed) = 0.000 and a Pearson correlation of 0.564 (r>0.5140), which means the questionnaire used was valid and reliable.

Data analysis

Bivariate analysis to see the relationship between variables was carried out using the chi-square test while multivariate analysis was using the logistic regression test. The Hosmer and Lemeshow Test showed a Sig value of 0.603, which means the model is feasible to use. Logistic regression test analysis was used in assessing the predictive factors.

Ethical consideration

Ethical clearance and approval was obtained from the health research ethics committee of Nani Hasanuddin Makassar Health Science Institute (No.664/STIKES-NH/KEPK/VIII/2022). Before conducting the research, we explained the purpose of the research, the type of data to be collected and the benefits to be obtained by the participants. After that, we gave consent forms to be signed by willing participants.

Table 2. Frequency distribution factors of family health management for caring for toddlers with acute respiratory infections (n=392)

Variable	Demography				Amount	
	Mainland		Island			
	n	%	n	%	n	%
Knowledge						
Less	82	33.9	32	21.3	114	29.1
Good	160	66.1	118	78.7	278	70.9
Attitude						
Negative	29	12	28	18.7	242	14.5
Positive	213	88	122	81.3	150	85.5
Anxiety						
Anxious	69	28.5	111	74	180	45.9
No Worries	173	71.5	39	26	212	54.1
Family Health Management						
Ineffective	89	36.8	15	10	104	26.5
Effective	153	63.2	135	90	288	73.5

Table 1. Participants' characteristics (n=392)

Participants' characteristics	Demography				Amount	
	Mainland		Island			
	n	%	n	%	n	%
Mother's age (years old)						
17-30	126	52	80	53.3	206	52.6
31-43	116	48	70	46.7	186	47.4
Mother's education						
No school	2	0.8	12	8	14	3.6
Elementary school	82	33.8	10	6.7	92	23.5
Junior high school	53	22	52	34.7	105	26.8
Senior high school	64	26.4	49	32.6	113	28.8
Bachelor	41	17	27	18	68	17.3
Mother's job						
Housewife	206	85.1	118	78.7	324	82.7
Employee	10	4.1	10	6.7	20	5.1
Home	9	3.8	6	4	15	3.8
entrepreneur	2	0.8	0	0	2	0.5
Farmer	15	6.2	16	10.6	31	7.9
Part time worker						

Results

Table 1 shows that participants who were in the mainland area were 242 (61.7%) mothers and in the island area were 150 (38.3%) mothers. The participants in this study were dominated by 324 (82.7%) housewives with a 17-30 years age group of 206 (52.6%) mothers. Mother's level of education was dominated by senior high school as many as 113 (28.8%) mothers.

Table 2 shows that the dominant participants have good knowledge (70.9%), positive attitude (85.5%), no worries (54.1%), and effective family health management (73.5%). However, based on demographic location, the dominant problems that occur in mainland areas are lack of knowledge (33.9%) and ineffective family health management (36.8%), whereas, in island areas, the dominant problems that occur are negative attitudes (18.7) and anxiety in caring for toddlers (74%).

Cross-tabulation results in Table 3 show that effective family health management is contributed by good knowledge (87.5%) and positive attitude (93.4%). Meanwhile, non-anxiety conditions contribute to the ineffectiveness of family health management, in other words, anxiety is needed to stimulate participants (mothers) so that health management in the care of toddlers with ARI runs effectively. The results of statistical tests showed that there was a relationship between knowledge and family health management (p-value=0.000), attitudes and family health management (p-value=0.000), and anxiety and family health management (p-value=0.000).

Table 4 show the results of the logistic regression test in which the variables significantly related to family health management were knowledge (OR=19.791; 95% CI=10.349 to 37.847), attitude (OR=9.265; 95% CI =

Table 3. Factors of Family Health Management for Caring for Toddlers with Acute Respiratory Infections (n=392)

Variable	Family Health Management				p-value
	Ineffective		Effective		
	n	%	n	%	
Knowledge					
Less	78	75	36	12.5	0.000
Good	26	25	252	87.5	
Attitude					
Negative	38	36.5	19	6.6	0.000
Positive	66	63.5	269	93.4	
Anxiety					
Anxious	20	19.2	160	55.6	0.000
No Worries	84	80.8	128	44.4	

3.969 to 21.628), and anxiety (OR=0.137; 95% CI = 0.066 to 0.285). These results also show that knowledge and attitude have a positive coefficient value where each increase of 1 point of knowledge will improve family health management in the care of toddlers with ARI by 2.985 point and each increase of 1 point of attitude will increase family health management in the care of toddlers with ARI by 2.226 point. Meanwhile, every 1 point increase in anxiety will reduce the effectiveness of family health management in the care of toddlers with ARI by 1.989 point.

Table 5 shows that the Negelkerke R Square value shows that knowledge, attitudes and anxiety have a 58.6% influence on family health management in the care of toddlers with ARI.

Discussions

This study aims to determine the predictive factors, namely knowledge, attitude, and anxiety, of family health management for caring for toddlers with ARI. The initial symptoms of acute respiratory infection that occurs in the upper respiratory tract are such as congestion, fever, difficulty sleeping, and fussiness, sometimes accompanied by vomiting and diarrhea. Other visible symptoms are a red nose, runny nose, itchy throat, watery eyes, cough, headache and lethargy (Hulu et al., 2020). The general symptoms of sufferers make everyone feel the same worries, especially mothers with toddlers. The average number of patients in the United Arab Emirates is mostly children, with the most common initial symptom being an upper respiratory tract infection (Al Mansoori et al., 2021). Parents are now more inclined not to take their toddler to healthcare facilities for fear of contracting various diseases in the hospital. In addition, the coverage of health services following the emergence of COVID-19 has minimal

Table 5. Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	252.155[a]	.402	.586

Table 4. Logistic regression test

Variable	B	df	Odds Ratio	95% CI		p-value
				Lower	Upper	
Knowledge	2.985	1	19.791	10.349	37.847	0.000
Attitude	2.226	1	9.265	3.969	21.628	0.000
Anxiety	-1.989	1	0.137	0.066	0.285	0.000

accessibility because health service providers will be very dependent on the availability of human and logistical resources (Kumar et al., 2020). Therefore, health promotion and disease prevention are fundamental in the current situation, where most diseases originate from lifestyles that are not in accordance with health protocols. New strategies to deal with health problems need to be developed toward self-sufficiency (Salamung et al., 2021).

Before deciding to seek a healthcare center, the community can manage family health in the form of first aid for ARI toddlers. The intervention of choice is in the form of fever management by providing thin clothing and minimizing contact with cigarette smoke, which can trigger ARI. These results are in line with previous research (Sari et al., 2021) which shows that there is a relationship between parental health management and the incidence of ARI, in which parents had good behavior in preventing ARI. Family health management can be in the form of first aid to sick family members. Through appropriate assessments and interventions, families will be able to alleviate suffering, promote healing, and reduce injury. So that in the end it can improve the health and safety of family members who experience health problems (Habeeb & Alarfaj, 2020). The family health management process can be influenced by several factors including knowledge, anxiety, and attitudes of the family. Knowledge, emotional control, and awareness reflected through a positive attitude are needed to support safe family health management. Appropriate care and preventing contact other than with health workers can reduce the possibility of complications due to wrong health management in children (Bhalla et al., 2019). Knowledge is related to risk factors for disease in children; good knowledge has an impact on parents' awareness of the conditions experienced by children and they will tend to take preventive measures so that their children do not contract the disease and they are able to provide good treatment (Saputra et al., 2020).

Prevention is a pillar of the health strategy so that, to reduce the incidence of disease and minimize its impact, a greater focus is needed, especially on precautionary measures and knowledge about disease management. Currently, we generally know that

prevention is better than cure so further efforts are needed to optimize effective disease prevention, especially in the family sphere. Mother's knowledge in this study was in the good category. Even so, some mothers who still have less knowledge should be of concern given the importance of mothers in family health management. The lack of knowledge of the mother in this study is related to the pathophysiological concept of the cause of the disease and prevention efforts which are still considered wrong by the mother. The results of the statistical tests of this study also show that there is a relationship between good mother's knowledge and the effectiveness of family health management in the care of toddlers with ARI.

The concept of the pathophysiology of a disease that is not understood by mothers is in line with research (Basiouny & Hamad, 2019) which states that about two-thirds of them gave incomplete answers regarding causes, signs and symptoms of ARI. Whereas prevention efforts that are still considered wrong by mothers are in line with research (Akteruzzaman et al., 2018) which states that only 19% of mothers' knowledge in preventing ARI is related to cough ethics and 32% related to knowledge of hand washing with soap. Efforts are needed to increase knowledge so that mothers have better performance in caring for ARI children. Other studies also state that, as the main care provider at home, mother's knowledge of disease conditions can reduce mortality and morbidity if caught early (Kumar et al., 2022).

Mother's knowledge needs to be increased because mothers play an important role in the process of caring for children (Momoh et al., 2022). Previous research shows parents with higher education have better first aid knowledge than those with less education (Al-Johani et al., 2018). Therefore, the right and maximum investment of knowledge in mothers can maximize the child's recovery time. Previous research also shows that there is an effect of health education on the level of mother's knowledge in preventing ARI in toddler, where health education can increase mother's knowledge so as to encourage self-efficacy, self-management and increase awareness in disease prevention (Tunny et al., 2020).

In addition, the increasing number of hospitalized patients has prompted the health system to make efforts to prevent patients with mild to moderate symptoms coming to the hospital, so that home healthcare becomes important and can help solve problems such as a shortage of hospital beds and health workers. Home care can be made easier and safer for patients. This home health management scheme can provide a good alternative to doing home-based care for low income patients (Hussein et al., 2021).

Attitudes in managing family health problems are inseparable from the mother's knowledge. As previously explained, the mother's poor knowledge about prevention efforts was also reflected in her attitude. The results of this study indicate that the mother's attitude is dominated by a positive attitude. This positive attitude includes things that can cause children to have difficulty breathing when experiencing ARI, such as the influence of cigarettes smoked by family members who live at home with the sufferer. Meanwhile, a negative attitude is reflected in an inaccurate understanding of how immunization can make children sick and the importance of ventilation to maximize circulation. In addition, the results of statistical tests showed that there was a positive relationship between mother's attitude and the effectiveness of family health management in the care of toddlers with ARI.

Demographically, mothers in the island region in this study had a greater percentage of negative attitudes than those in the mainland. This is due to access to information that cannot be obtained independently due to network limitations so that the transfer of information is also hampered. In addition, it is also due to the strong culture associated with the myths and beliefs of previous generations in managing health problems. The results of this study are in line with previous research (Handayuni et al., 2019) which states that there are misperceptions of mothers in interpreting healthy and sick life according to their views, which are influenced by life experiences or values passed down from previous generations. When ARI is perceived as a disease that is not serious and not life threatening, then prevention of ARI will not be optimal. Conversely, if the mother of the toddler perceives ARI as a health problem that needs to be watched out for, then automatically the mother of the toddler will take this disease seriously by developing preventive behavior. This is in line with research (Barni & Mardiah, 2022) which states that a person's attitude will influence health behavior. A positive attitude or attitude that is in accordance with one's health values will result in positive health behavior. Meanwhile, a negative attitude that is contrary to health values will result in negative health behavior as well.

Efforts to promote health and prevent disease are fundamental today, when most of the potential for disease can originate from inappropriate lifestyles. Previous research explains that health education and information dissemination must be given as early as

possible to create positive attitudes and practices in disease prevention and management efforts (Workie et al., 2018). The capacity of the family to nurture, care for, protect, teach and influence throughout life makes it an effective entry point in the promotion and maintenance of individual health (Hanson et al., 2019). Apart from the mother's side, several family characteristics are also related to good and bad health outcomes. Family closeness, skills in care, mutually supportive relationships, flexibility and adaptability, and good communication can lead to better treatment outcomes. The role of the family in optimizing health through promoting healthy choices and changing behavior makes the family an important basis for supporting public health (Crandall et al., 2019).

Health management that is oriented toward family independence has the potential for efficiency in terms of financing because it does not require the use of sophisticated technology. Family health can be mediated through increased awareness and reflection and adaptation (Smith et al., 2017). Because the family is where health behaviors emerge, using this approach in clinical preventive care can significantly improve people's health. The effectiveness of family-oriented care has advantages, especially in the health problems of children, the elderly and mental health. Nursing interventions can be maximized by improving relationships within the family and increasing knowledge and skills in disease management (Barnes et al., 2020).

Mental health problems are common, yet often overlooked in the treatment process. These problems can greatly affect the quality of care leading to a state of physical health and eventual well-being (Abu-Ghname et al., 2019). When one family member has a health problem, the whole family environment is involved. However, the role of parents has an important meaning in efforts to cure children with ARI because, if the health management is carried out badly, it will affect the course of the disease from mild to severe, which will interfere with the child's development in the future (Angelina, 2022). The importance of the role of parents can be achieved through family-centered health education so they are more active in providing a safe home without infection.

Nonetheless, the mother as the executor of the nurturing, caring, and caring functions within the family has a greater obligation to manage family health problems. However, in carrying out this role, events that have never been experienced before can make the mother experience anxiety. Psychologically, research (Chandra et al., 2022) shows that women show greater increases in anxiety, depression, and stress than men. The results of this study were that the mother's anxiety was in the category of not worrying when her toddler has an ARI. It is known that the results of the regression analysis show that every 1 increase in anxiety will reduce the effectiveness of family health management in the care of toddlers with ARI. Some mothers who experience anxiety describe several behaviors such as how easily mothers become angry and annoyed over small things when their child is sick. In addition, excessive anxiety in dealing with these situations makes mothers experience fatigue more quickly. In providing care to sick children, mothers often experience fatigue. Therefore, there is a need for support for mothers in maximizing their parenting functions (Rakhmani et al., 2020). If this prolonged fatigue is not resolved, it will cause the mother to not be optimal in providing care. Some important points in the process of caring for families with health problems are concern for the physical and mental well-being of caregivers, including rest periods (Holliday et al., 2022).

The psychological reactions of family members are very vulnerable to problems related to a toddler's health. This condition will naturally form a family coping mechanism. However, conflicts with healthcare providers should be avoided as they can cause stress. A pattern of long-term support and care that can lighten the burden on family members is urgently needed. In addition, systems theory in the family looks at problems in a circular way, where each individual in the family will influence each other. Understanding family health problems requires an assessment of several patterns of interaction such as emphasizing more on what happened, not why the problem occurred. This is seen as effective in avoiding dysfunctional dynamics of one of the family members and is the best solution in solving health problems in the family (Al Ubaidi, 2017).

The limitations of this research are, first, this study has not examined family composition; in this study, several families still live in the same place, while ARI is a disease that is easily transmitted and can be inherited from lifestyle. Second, cultural factors related to myths and beliefs of mothers in managing health problems. This factor cannot be ruled out because some families live with the extended family which makes the nuclear family dependent on the extended family culture. Therefore, researchers need to identify these two factors in the future.

Conclusions

The role of the mother in a family is important, especially in terms of family health management. Good mother's knowledge, positive mother's attitude, and mother's anxiety are closely related to health management in the care of toddlers with ARI. Good mother's knowledge can maximize the care of toddlers with ARI at home, which is also a form of family empowerment, especially for the low-income family category. A positive mother's attitude can maximize skills in disease management in the family. The new finding in this study was that an increase in anxiety will reduce the effectiveness of family health management in the care of toddlers with ARI. Therefore, family health management should be a shared responsibility and not only be borne by the mother because it will have an impact on the fatigue that the mother feels, both physically and mentally. Support from all family members is highly expected so that family health management can run effectively. Researchers strongly suggest that the focus of services can be maximized on family independence in health management. In addition, it is hoped that health providers will pay more attention to increasing knowledge as well as patterns of managing anxiety related to the treatment process in the context of family health management.

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How to live longer: lived experience of older adults in Thailand

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ABSTRACT

Introduction: Thai population data across the country have revealed an increase in the number of older adults aged over 80 years. The data indicate that individuals exhibit good self-care practices in terms of lifestyle, effective emotional coping, and strong social support, which contributes to their ability to live longer than the average life expectancy. The primary objective of this study was to explore the experiences of older people regarding self-care practices aimed at surpassing the average life expectancy of Thai individuals.

Methods: This phenomenological descriptive qualitative research utilized a purposive sampling method to select ten participants who were aged 80 years and above and residing in five villages. The inclusion criteria required individuals to be able to communicate in the Thai language and express their agreement to participate in the research project. In-depth interviews utilizing open-ended questionnaires were conducted to explore the perspectives of older people on self-care practices that contribute to longevity among this population. Data were analyzed thematically using descriptive phenomenological analysis.

Results: This study identified four themes related to longevity in older adults as follows: food type choices, exercise as part of daily life, reduction of stress exposure, and dealing with illness.

Conclusions: The findings of the study can serve as guidelines for managing the healthcare system at the sub-district level. This can be achieved through a project that focuses on developing self-care practices to promote longevity among older adults in a community. Successful management of the health system can contribute to the sustainability of healthcare management at the sub-district level.

Keywords: food type choices, exercise as part of daily life, reduction of stress exposure, dealing with illness, life long

Introduction

Nowadays, advanced medical knowledge and modern technology are factors that effectively contribute to increasing the longevity of the population. Therefore, it is important to promote health among older adults, enabling them to remain self-reliant for as long as possible. This includes promoting physical and mental well-being, teaching them how to utilize technology for independent living, fostering happiness in their solitary lives, and facilitating communication with other community members (Chanburee et al., 2020). The worldwide life expectancy for men is 68.9 years, while, for women, it averages at 73.9 years (World Data, 2021). In terms of neighboring countries with direct national borders with Thailand, including Myanmar, Cambodia, Laos, and Malaysia, the life expectancy for men is 62.5, 66.8,

66.2, and 72.7 years, respectively. For women, the figures are 69, 72.3, 70.1, and 77.4 years, respectively (World Data, 2021). The life expectancy for Thai people is approximately 71.8 years for men and 78.6 years for women. On average, individuals aged 60 can expect to live an additional 20.1 years for men and 23.4 years for women. For those aged 65, the expected additional years of life are about 16.4 for men and 19.3 for women (Institute for Population and Social Research, Mahidol University, 2016). Consequently, when comparing with the Thai population, it becomes evident that the life expectancy of Thai people is higher than that of three-quarters of neighboring countries for men and higher than that of all countries for women.

In 2017, the National Statistical Office conducted a survey on the Thai population nationwide and discovered that the number of individuals aged 60 years and above was 10,225,322, accounting for 15.45 percent of the population by age (National Statistical Office Thailand, 2017). The northern region had the highest number of older adults, with 2,093,071 individuals, representing 20.47 percent of the population by age, surpassing all other regions (National Statistical Office Thailand, 2017). The top five provinces with the highest proportion of older people are Chai Nat, Phrae, Uttaradit, Phichit, and Sing Buri provinces (National Statistical Office Thailand, 2014). In Nong Muang Khai District, Phrae Province, the population is 17,803, consisting of 8,376 men and 9,427 women. Within Tamnak Tham Subdistrict, Nong Muang Khai District, the population is 3,336, and the number of older adults is 845 (25.52 percent of the population), with 350 men and 495 women (Tamnak Tham Subdistrict Development Project Report, 2017). These figures indicate that Tamnak Tham Subdistrict has an older population of over 20 percent, classifying it as an aging society (Pho-Yen, 2019).

In addition, various factors contribute to increased life expectancy in different countries, among them lifestyle, traditions, culture, genetics, education, the quality of public health, and medical services available (Piensriwatchara, 2010). A study conducted on 100-year-old Japanese individuals identified nine factors associated with longevity: maintaining good chewing ability, consuming protein-rich foods, engaging in regular exercise, maintaining normal vision, getting sufficient sleep, waking up early, avoiding any history of injury, abstaining from alcohol consumption, and not smoking tobacco. When combined with positive perception and psychosocial conditions, these factors contribute to a valuable life for older adults (Siriwanarangsan, 2014).

Four main factors are associated with enabling older adults to be healthy and strong, live life in society, and have a long life: firstly, food is a big issue in our daily lives, eating foods that are natural and have no toxins will help in longevity (Chernoff, 2001). Secondly, the exercise factor is the body's movement which helps relax muscles, prevents joint stiffness, and stimulates the circulatory system so appropriate exercise will help longevity (Piercy et al., 2018). Thirdly, the stress reduction factor is an important factor related to physical and emotional well-being. Older adults who are aged 80 years old and above who spend time close to nature, enjoy growing vegetables, living together as a large family, and eating with family regularly has a positive effect on mental health and reduces stress (Krajangchom et al., 2014). Fourthly and very important, the healing factor is that when older adults are having health problems they should seek medical consultation, self-practice by following their doctor's advice, take their prescription medication, follow up on time to see a doctor, and have access to public health services easily. These factors allow an older adult with diseases to be able to reduce suffering (Hao et al., 2020).

These are the main factors that influence older people's longevity. Therefore, it is crucial to establish a community health promotion system that encourages individuals to adopt healthy behaviors and self-care practices. This can lead to increased longevity and improved quality of life as individuals transition into older adulthood. Health promotion is an essential role for nurses, encompassing various aspects: 1) physical health promotion focuses on adequate hydration, consumption of all five food groups, engaging in aerobic exercise for 15-30 minutes or more, practicing deep breathing exercises, and ensuring 6-8 hours of sleep per day. 2) Mental health promotion aims to enhance psychological well-being by fostering a positive mindset, emotional stability, maintaining a bright mood, practicing mindfulness, and developing stress management techniques such as optimism and positive thinking. 3) Social health promotion involves encouraging individuals to actively participate in creating suitable physical and social environments that support their well-being, both physically and mentally., and 4) Intellectual or spiritual health promotion can be achieved by adhering to religious and cultural principles that promote well-being, as well as reducing and avoiding risky behaviors that could negatively impact

health (Pattarateeranon et al., 2021). The researcher is interested in studying the care of older adults, focusing on their lifestyle, self-care practices, and social support, as these factors contribute to increased longevity and the potential to surpass the average life expectancy. Nurses can utilize this information to provide appropriate health promotion strategies for individuals transitioning into older adulthood, ultimately enhancing their quality of life and life expectancy. The primary objective of this study was to explore the experiences of older people regarding self-care practices aimed at surpassing the average life expectancy of Thai individuals.

Materials and Methods

Study design

This qualitative research with descriptive phenomenology (Wojnar & Swanson, 2007) and by in-depth interview method. The participants were older males and females living in Phrae province aged 80 years old and above who were not suffering from serious illnesses such as paralysis, were independent, being fully conscious, can communicate by speaking, reading, and writing in Thai, and willing to participate in this research. The researcher selected 1-2 older adults who fulfilled the inclusion criteria in five villages from Tamnak Tham Subdistrict, Nong Muang District, Phrae Province. The total participants in this research was 10 older people.

Instrument

The instruments in this study consisted of general information forms, semi-structured interview guidelines, a voice recorder, and field notes. The interview used open questions and consisted of 10 questions that aim to explore the factors that contribute to longevity in older people. The questions were based on Kiatisevi's (2013) conceptual framework of the main factors that contribute to the health and longevity. The instrument has been verified for content validity by three experts including two geriatric nursing instructors and a geriatric doctor. The created open-ended questionnaire was examined for content coverage, checked for language clarity, and improved according to suggestions from experts. After that, an experiment was conducted with 10 similar older adults who were used in the study to test their understanding of the meaning and clarity of the language. Questions were revised before applying to the actual in-depth interview.

Data collection

The in-depth interview process in the study lasted 60–90 minutes for each participant and ended when the data were saturated. The researcher used field notes and observation methods in a notebook according to the structured interview form, documented the atmosphere, facial expressions, behavior, and non-verbal responses of participants during the interview process and a voice recorder was used for the whole duration of the interview. After all the interviews were completed, the researcher made an appointment with the participants for the next meeting for data validation.

In addition, the researcher applied epoche or bracketing by ignoring all personal assumptions related to the phenomenon under study when digging research data, putting aside his personal knowledge, understanding, and trying fully to position himself as a participant and see things from the participant's perspective.

Data analysis

Statistical analyses for this study were conducted the data were analyzed using descriptive phenomenological analysis by Wojnar and Swanson (2007), which consists of four steps. First, bracketing involves field recording and conducting a critical review from the perspective of an experienced person in the subject matter. Second, the analysis involves seven steps (Colaizzi): transcribing, extracting important text, determining the meaning of the text, grouping the meaning of the text, collecting duplicate findings, annotating, coding the information, and linking issues. A triangular review is conducted to confirm their reliability and consistency. Third, intuiting is the researchers' insight, which is enhanced by a substantial amount of information obtained through attentive listening. In-depth critiques are used to foster mutual understanding. Finally, describing involves presenting the findings to everyone and writing about the experience for a wider audience.

Ethical consideration

This study has been approved by the Human Ethics Committee Naresuan University COA No.355 / 2019, IRB No. 0105/62, dated 7 August 2019 - 7 August 2020.

Results

Participants in this study were two males and eight females; there were five people aged between 80-84 years old, three people aged between 85-90 years old, and two people aged above 90 years old; most of them

were educated at primary school level, most of them do not work, and have an income from subsistence allowance (government), most of them do not have enough income to spend so must rely on children, all of them have chronic diseases that require continuous medication such as dyslipidemia, hypertension, and diabetes mellitus. All of them do not engage in alcohol drinking and smoking. Findings from this study revealed four essential themes from the interviews as follows:

Theme 1: Food type choices

From the interview, the older adults had cooking styles that focus on preparing their food by mainly boiling, currying, and steaming. They avoid cooking with frying, stir-frying, grilling, and broiling. If they bought food that was cooked by grilling or broiling, they will cook them again by boiling it. The ingredients used for cooking were mostly vegetables that are grown by themselves without the use of pesticides, chemical fertilizers, or other toxins, such as lettuce, morning glory, Chinese broccoli, horse tamarind, ivy gourd, acacia, sponge gourd, eggplant, long beans, pumpkin, etc. They also eat fish, eggs, and local fruits such as bananas, papaya, and ripe mangoes. They avoid ingredients such as meat, coconut milk, and monosodium glutamate (MSG). Some desserts are eaten infrequently such as banana in coconut milk, pumpkin in coconut milk, green beans in syrup, etc. Their eating pattern is eating all three meals a day. Most of the older adults' eating patterns in the past up to the present day are eating vegetable curries such as lettuce curry, jackfruit curry, and mixed vegetable curry. In addition, chili paste with fresh or boiled vegetables is a menu that everyone likes to eat the most. Chili paste is an easy menu with herbal ingredients such as chilies, garlic, onions, basil leaves, lemon, or tamarind. Most of them like to eat fruit in the evening. Some elderly will increase protein by adding one boiled egg or drinking one cup of fresh milk after a meal. Most of them will drink one cup of water immediately after waking up in the morning before washing their face, brushing their teeth, or showering, which makes defecation easier and feels comfortable.

As P1 (female, 82 years old) said, "*I have eaten three meals for a long time. I focus on eating vegetables, eating fish, and not buying cooked food. Most of the time I cook at home by boiling, steaming, not deep frying or stir-frying*."

In a similar manner, P2 (female, 90 years old) said, "*I eat one egg every day, I only eat egg whites, I do not eat egg yolk. Since childhood, I have regularly eaten chili paste, boiled vegetables, and vegetable curry with fish, if have bananas, eat another one banana (Nam Wa bananas). I cook at home, focus on boiling and steaming, do not use MSG at all, for dessert such as banana or pumpkin in coconut milk sometimes*."

In a similar manner, P9 (male, 92 years old) said, "*Since I was 40 years old, I have practiced by focusing on boiled vegetables and chili paste in the evening. After I wake up in the morning without having to brush my teeth to drink one cup of water. I feel that it will be easy to defecate, I feel comfortable*."

In a similar manner, P10 (female, 91 years old) said, "*Today, we must try to control which diet is good and which is not good. I will choose what to eat and eat three full meals, focusing on eating a lot of vegetables. To help with bowel movement. I eat desserts occasionally like banana or pumpkin in coconut milk*."

Theme 2: Exercise as part of daily life

The older adults in Tamnak Tham Subdistrict exercise regularly, consistently, and done together in the older adults' school. Wherein the Tamnak Tham Subdistrict Administration Organization has the policy to carry out training activities to promote knowledge and exercise for the older adults such as retro dance and Kongka dance. The older adults exercised with Kongka dance every Wednesday, for approximately 10 - 15 minutes. Exercising at home by themselves was an uncertain practice, which depends on their convenience and the situation of each person. If they exercised at home, it would take about 20-30 minutes including walking, swinging arms, dancing, weaving bamboo baskets, pulling out the grass in the garden, planting vegetables, and gardening. The feeling an older adult mostly agreed with was that, after exercise, the body will be able to move better, and sweating will feel comfortable. Most of the older adults were interested in exercising together at the older adults' school very much because it enabled them to meet with the people in the village where by they can socialize with each other.

As P3 (female, 80 years old) said, "*I exercised at home by swinging my arms for 20-30 minutes and every Wednesday by doing a Kongka dance with three songs. I think exercise makes me sweat and makes the body comfortable*."

In a similar manner, P5 (male, 86 years old) said, "*Some days, I pull the grass in the garden at home which is like exercising. Some days, I walk for about 20-30 minutes. Every Wednesday, when I come to the*

elderly school, I can do Kongka dance with three songs. After exercising I can sweat, it makes me feel comfortable."

In a similar manner, P7 (male, 83 years old) said, "*I will weave bamboo baskets in my free time. Every Wednesday when I go to the elderly school, I do Kongka dance with three songs which allow my body to move, have good mobility, and feel comfortable because I sweat*."

Theme 3: Reduction of stress exposure

From the interview, it was found that the stress reduction of the older people consisted of letting things go, resting, waiting for stress or other issues to pass, and go-to stress relief activities by themselves such as reading books, reading Dharma books, watching television, singing, or dancing alone. In addition, when stress occurs, they will go out to meet with trusted neighbors or will go to school for older adults every Wednesday to talk with other people to relieve stress. The Kongka dance also helps relieve stress and participating in various product creation activities such as basking weaving helps to enjoy the activities and make them forget the stress that occurs.

As P1 (female, 82 years old) said, "*I'm not stressed often but sometimes I think about my disease. If stress occurs, I will relax by reading the book. Some days, I just rest and relax, I do not think about anything, or I go to the elderly school to meet with friends and talk to each other.*"

In a similar manner, P5 (male, 86 years old) said, "*I sometimes think about my children, I am worried about money is not enough, since I have income only from subsistence allowance (government). But it's ok, I just sleep and relax, let it go. Every Wednesday I go to the elderly school to meet and talk with other elderly and will forget about stress.*"

In a similar manner, P10 (female, 91 years old) said, "*I will read Dharma books. Sometimes let the uncomfortable things pass by themselves without doing anything*."

Theme 4: Dealing with illness

When the older people in Tamnak Tham Subdistrict have little illnesses such as headaches, stomachaches, or muscle pain, they will take care of themselves by buying and using medication by themselves. If the symptoms do not improve, they will go for treatment in the hospital. Those older adults who have chronic diseases, regularly take medication, and even sometimes forget to take medication but there was appropriate management. They regularly visit a doctor for an appointment to follow up on symptoms.

As P1 (female, 82 years old) said, "*I go to the doctor. The doctor makes an appointment whenever I go to the hospital. Taking medicine as the doctor said can't be absent*."

In a similar manner, P4 (female, 85 years old) said, "*I don't have any diseases, no diabetes mellitus, hypertension, or dyslipidemia at all. Therefore, I do not need to see a doctor. Whenever I have a little pain in the body just take paracetamol*"

In a similar manner, P6 (female, 85 years old) said, "*If I am ill but not serious, I take care of myself first. If it is not better, I will go to see the doctor*. "

In a similar manner, P9 (female, 92 years old) said, "*I often forget to take the medicine. Therefore, I have prepared the medicine before meals so I will not forget to take it; after eating I will take my medicine immediately. I always go to see the doctor for an appointment*."

Discussions

The self-care experiences of older people aged 80 and over begin with a crucial factor of food type choices, which plays a vital role in promoting growth and strength. Older adults predominantly consume foods derived from nature, with a focus on vegetables containing non-toxic substances, as well as fish, eggs, and milk. When it comes to cooking, they primarily utilize homegrown vegetables, avoiding the use of pesticides, chemical fertilizers, and other toxins. Commonly used vegetables include lettuce, morning glory, Chinese broccoli, eggplant, long beans, and pumpkin. These ingredients are safe, devoid of chemicals, and abundant in protein and vitamins. Protein, as a significant nutrient, aids in repairing the body's wear and tear, while the vitamins present in vegetables contribute to strengthening the immune system (Plodpluang et al., 2017). In addition, most older people prefer boiling as the cooking method over frying, grilling, or stir-frying. This choice is made because frying or grilling can result in pollution from incomplete combustion, leading to the formation of Polycyclic Aromatic Hydrocarbons (PAHs). Prolonged exposure to PAHs during cooking can have adverse health effects, including an increased risk of cancer (Chaiklieng et al., 2021). According to studies conducted by Krajangchom and Champawan (2014) and Supma and Sakdiworaphong (2014), older adults aged 80 and above traditionally adopt a simple lifestyle

when it comes to their eating habits. They prioritize easily accessible vegetables, often found in dishes like mixed vegetable curry or chili paste with boiled vegetables. These specific menus are highly favored by the elderly as they offer a low-fat diet that has been passed down through generations. Food plays a significant role in their daily lives and contributes to their longevity. Similarly, Japanese individuals who live longer tend to avoid high-fat foods and instead focus on obtaining protein from fish, while maintaining a diet rich in fruits and vegetables. They adhere to consuming three balanced meals in moderation. The food they consume should be fresh, clean, non-toxic, and free from chemical processes. These dietary choices are believed to contribute to a longer life (Chernoff, 2001; Piensriwatchara, 2010; Bootsri1 et al., 2017).

In addition, older adults are aware of the importance of exercise. They incorporate physical activity into their daily lives through various activities like weaving bamboo baskets, tending to the garden by pulling out grass, and planting vegetables. Furthermore, they regularly engage in exercise at home, which includes activities such as walking, swinging their arms, or dancing for about 20-30 minutes per day, 2-3 times per week. Older adults are recommended to participate in a minimum of 150 to 300 minutes per week of moderate exercise, or 75 to 150 minutes per week of vigorous activity, or a combination of both intensities. Moderate physical activities include walking, weightlifting, and lower-intensity exercises, while vigorous exercises encompass activities like running, cycling, and swimming. Research has found that surpassing the recommended amount of exercise can contribute to a longer life span. (Piercy et al., 2018) Moreover, the Tamnak Tham Subdistrict Administration Organization has developed a system of care for older people since 2010. This system is called the "older adult school" and it encompasses concrete development and actions such as promoting exercise, providing knowledge about healthcare, and organizing various activities for the participants' well-being. There is a coordination mechanism between the subdistrict older adult club, the subdistrict administration organization, the primary healthcare center, and the village headman. They work together to promote exercise by organizing retro dance sessions once a month and Kongka dance sessions that last 10 to 15 minutes every Wednesday at the school (Tamnak Tham Subdistrict Development Project Report, 2017). This system enables older individuals to engage in regular exercise that harmonizes with their lifestyle. According to Kassis et al. (2023), longevity in humans can be attributed to genetics by only 20–30 percent, while the remaining 70–80 percent is influenced by the environment. Physical activity has age-appropriate effects that lead to improvements in body structure and muscle function among older adults. Additionally, exercise promotes muscle and bone mass, increases bone density, and, when performed moderately and consistently, it enhances immunity, reduces illness rates, and decreases body inflammation (Kassis et al., 2023). Furthermore, aerobic exercises, such as dancing accompanied by music and involving multiple participants, have been shown to increase cognitive performance, stimulate memory, enhance attention, and facilitate cognitive learning (Klimova et al., 2020).

In the context of older individuals, the accumulation of stress throughout life contributes to a weakened immune system and the development of chronic diseases (Renzaho et al., 2014). Furthermore, stress can have an impact on colonic motility and the composition of intestinal microbes, leading to a reduction in lactobacillus levels and an increase in the adhesion of pathogenic bacteria (Conlon et al., 2014). Therefore, stress management is crucial to mitigate the detrimental effects of stress and promote the overall physical and mental well-being of older adults. Given that older people have experienced stress throughout their lives, it becomes especially important to minimize stress exposure in this population (Kassis et al., 2023). The reduction of stress exposure for older adults consists of conversations with friends, dancing in older adults' school every Wednesday, letting things go, reading Dhamma books as well as exercising. According to Supma and Sakdiworaphong (2014), the importance of positive emotions, stress avoidance, and engaging in enjoyable activities for older adults is related to longevity. Regular participation in community events and cultivating a positive attitude, self-esteem, and adaptability are key factors in maintaining a positive mental state. For those who don't participate in community activities, finding relaxation at home through activities like watching TV or reading is suggested. Positive emotions and mental well-being not only benefit their psychological health but also have a positive impact on their physical health.

Effectively managing illnesses is crucial for older individuals to achieve a long life. This involves dealing with chronic diseases that require ongoing medication, such as dyslipidemia, hypertension, and diabetes mellitus. When older people experience mild illness, they typically prioritize self-care. However, if symptoms

persist without improvement, they go to a hospital for examination and treatment by healthcare professionals. Additionally, they can take care of themselves by consistently adhering to medication for chronic diseases, regularly monitoring their bodies for any abnormal symptoms, and scheduling regular check-ups with their doctors for continuous follow-up. According to Han et al. (2022), self-management significantly enhances the quality of life and longevity of older individuals with chronic diseases. This includes self-monitoring of symptoms, adherence to medication plans, regular professional follow-ups, and the development and adherence to a lifestyle aimed at maintaining their overall health. In addition, all older adults who participated in the interview do not smoke or drink alcohol. Older adults who do not smoke or drink alcohol can have a longer life as they avoid the harmful chemicals found in tobacco and alcohol. Smoking and drinking alcohol contribute to a decline in the energy production process and cause severe damage to brain cells. Smoking accelerates the aging process by increasing the number of free radicals in the body. Additionally, smoking raises the risk of emphysema, lung cancer, hypertension, and heart disease. On the other hand, alcohol consumption increases the chances of developing cirrhosis and liver cancer (Piensriwatchara, 2010). Furthermore, accessing public health services is crucial for older adults. When facing health problems, they consult a doctor promptly, follow the doctor's instructions, take prescribed medications, and regularly visit the doctor to monitor chronic diseases. By doing so, they can effectively control and reduce the impact of chronic diseases. In terms of life expectancy, women experience an increase of 6 percent and 8 percent at ages 65 and 85, respectively, due to adequate access to healthcare. In comparison, men generally experience even greater increases in life expectancy, with a rise of 10 percent and 14 percent at the same age ranges (Hao et al., 2020).

The results of this study were based on a one-sided perspective of older adults. It is important to acknowledge that the longevity of older individuals is influenced by various environmental factors. This limitation highlights the need for further studies to explore the viewpoints of individuals involved in the development of care systems for older adults, including community leaders, healthcare professionals, village health volunteers, and families of older people.

Exceeding the average life expectancy is a frequent occurrence; however, attaining a lengthy and healthy life necessitates careful planning prior to reaching old age. The findings of this study can serve as guidelines for managing the healthcare system at the sub-district level. This can be accomplished through a project that emphasizes the development of self-care practices aimed at promoting longevity among older adults within the community. Successful management of the healthcare system can contribute to the sustainability of healthcare services at the sub-district level.

Conclusions

The research findings indicate that food, exercise, reduction of stress exposure, and dealing with illness are key factors contributing to the long lives of older adults in Phrae Province, Thailand. Consequently, it is crucial for the families and healthcare providers of older adults to support them in adopting healthy eating habits, engaging in regular exercise, volunteering in activities that benefit the community, practicing meditation for mental calmness, effectively managing illnesses, and ensuring swift access to healthcare services. Therefore, those responsible for the well-being of older individuals including family members, government agencies, and healthcare professionals, should promote these factors to enhance the older adults' quality of life and longevity. Family members should encourage older adults to embrace healthy eating, engage in suitable exercise, actively participate in community activities, and receive appropriate medical care.

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ORIGINAL ARTICLE

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Effectiveness of m-health based self-management on self-efficacy in patients with cancer: A systematic review and meta-analysis

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ABSTRACT

Introduction: M-health has been developed and tested through studies in various settings and found useful for providing knowledge and experience for nurses in cancer care settings. However, none has synthesized the effectiveness of m-health on self-management of patients with cancer. To evaluate the effect of interventions using mobile-based application on patient's self-management, outcome measures were patients' medical adherence, self-efficacy and self-management level and health literacy.

Methods: This is a systematic review and meta-analysis that is reported in accordance with the guidelines of the PRISMA statement. A systematic review was conducted in five databases. Randomized controlled trials and quasi-experimental trials evaluating self-efficacy in patients with cancer were included. Critical appraisal was performed using the Critical Appraisal Checklist from the Joanna Briggs Institute. Data were synthesized using Review Manager version 4.5.

Results: Eight studies were included. There was a significant effect on self-efficacy after interventions using mobile-based applications (SMD = 0.36, CI 95%, [0.16, 0.56], p < 0.00006). Qualitative synthesis shows that the use of m-health can improve changes in health behavior, health literacy and physical activity.

Conclusions: M-health-based self-management interventions may improve self-efficacy in cancer patients. Meanwhile, changes in health behavior in patients can be significantly improved using m-health-based self-management. M-health can be integrated into health services for the management of patients with cancer.

Keywords: cancer, m-health, self-management, systematic review

Introduction

Cancer increases every year, with the Global Cancer Observatory data stating that there are 19.2 million new cases annually (IARC, 2020). Patients with cancer experience suffering, physical, psychological and spiritual, that arises due to disease processes and treatment (Iskandar et al., 2021). Chemotherapy is one of the treatments for patients with cancer that results in the onset of significant side effects such as nausea, vomiting, and weakness (Carnio et al., 2018; Romero et al., 2018). In addition to the physical, patients may experience psychological effects including anxiety, fear, confusion, and distress (Pitman et al., 2018; Wang et al., 2020). These side effects could leads to a decrease in patients' quality of life (Guan et al., 2020).

Standard medical care is provided to minimize the side effects of the treatment. In providing services to patients with cancer, nurses play an important role in improving self-management and empowering patients so that they will be able to address the symptoms and side effects caused and this further could improve their quality of life (Sedhom, 2020). Self-management

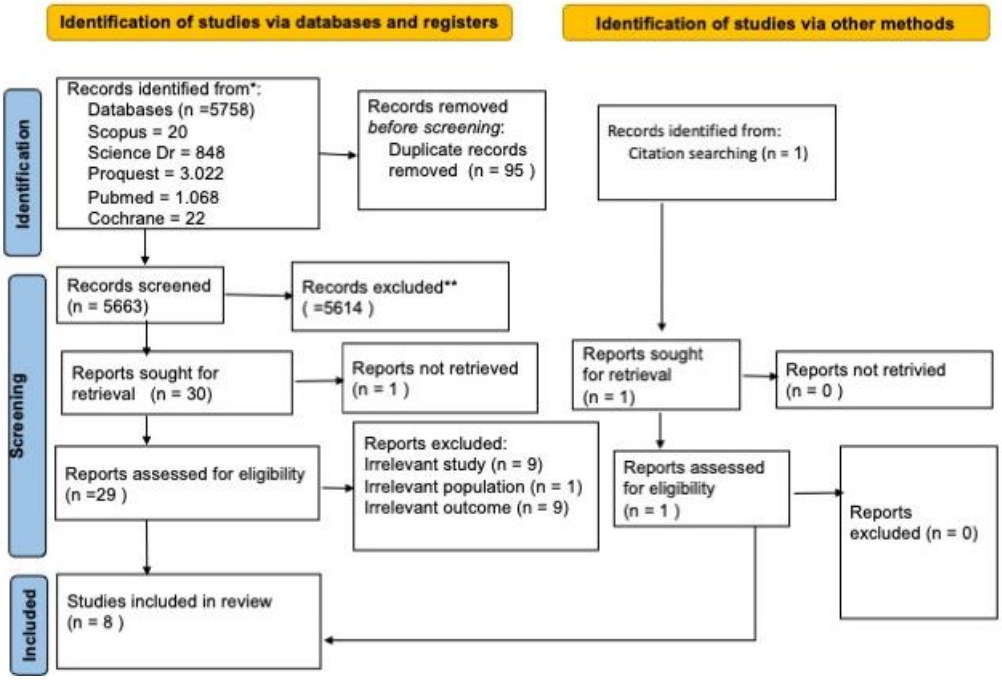

Figure 1. PRISMA Flow diagram

particularly is defined as one's intrinsic motivation and ability to live with a chronic condition and its consequences and consists of the intrinsically controlled ability of being active, responsible, informed and autonomous (Van de Velde et al., 2019). According to Bandura, self-efficacy is an important aspect in improving motivation which could lead to better self-management (Tan et al., 2021). In addition, one desired outcome of a self-management program is an improved self-efficacy (Peters et al., 2019).

Ineffective self-management will affect a patient's quality of life (Kalemikerakis et al., 2021). Previous studies demonstrate self-management interventions could improve a patient's self-efficacy, behavior and knowledge (Hanlon et al., 2017; Papadakos et al., 2018; Budhwani et al., 2019). Patients' self-management capability can be improved with various media, including the use of a mobile phone (Ni et al., 2022).

M-health is a provision of health services and information via mobile computing, mobile phones and communication technologies that aim to implement health programs for the community (Istepanian et al., 2004; Hallberg and Salimi, 2020). M-health features information, photos and videos that can effectively help patients in self-management through changing attitudes and behaviors. This leads to the improvement of the patient's quality of life. Such effects could be strengthened with the rapid development of digital technology (Armbruster et al., 2022).

Over the last five years, m-health has been developed and tested through studies in various settings (Du et al., 2020; Abasi et al., 2021; Sunjaya et al., 2022). A systematic review of m-health-based self-management among patients with cancer is useful for providing knowledge and experience for nurses in cancer care settings. Available reviews analyzed the effectiveness of m-health on the delivery of care and psychological effect (Escriva Boulley et al., 2018; Taylor et al., 2020). However, evidence on the efficacy of m-health-based self-management among patients with cancer is still lacking. Therefore, a systematic review study that aims to explore the effectiveness of m-health-based self-management on patient's behavior is needed.

Materials and Methods

Research design

This is a systematic review and meta-analysis. The review process was guided and reported by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. The study protocol was registered to the International Prospective Register of Systematic Review (PROSPERO) with registration number CRD42022376972.

Search method and study selection

We conducted a literature search from November-December 2022 in the following databases: PubMed, Scopus, ProQuest, ScienceDirect, and Cochrane. Several keywords were used: m-health; self-management; self-

Table 1. Quality assessment for RCTs

	RCT	Baik et al., 2020	Ormel et al.,2018	Kim et al., 2018	Wang et al., 2018	Vandehout et al., 2020	Xhu et al., 2018
Q1	Was true randomization used for assignment of participants to treatment groups?	Y	Y	Y	Y	Y	Y
Q2	Was allocation to treatment groups concealed?	N	N	N	N	N	Y
Q3	Were treatment groups similar at the baseline?	Y	Y	Y	Y	Y	Y
Q4	Were participants blind to treatment assignment?	N	N	Y	Y	N	N
Q5	Were those delivering treatment blind to treatment assignment?	N	N	N	N	N	N
Q6	Were outcomes assessors blind to treatment assignment?	N	N	N	N	N	N
Q7	Were treatment groups treated identically other than the intervention of interest?	Y	Y	Y	Y	Y	Y
Q8	Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	Y	Y	N	Y	N	Y
Q9	Were participants analyzed in the groups to which they were randomized?	Y	Y	Y	Y	N	Y
Q10	Were outcomes measured in the same way for treatment groups?	Y	Y	Y	Y	N	Y
Q11	Were outcomes measured in a reliable way?	Y	Y	Y	Y	N	Y
Q12	Was appropriate statistical analysis used?	Y	Y	Y	Y	N	Y
Q13	Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	Y	Y	Y	Y	Y	Y
Percentage		69%	69%	61%	76%	30%	62%
Category		Medium	Medium	Medium	M	M	M

efficacy and self-ability using Boolean OR and AND. Relevant studies were imported to Mendeley 1.19.4. The uploaded articles were then independently screened by two reviewers based on title and abstract using Rayyan's blind mode. Following that, the two reviewers discussed studies against study eligibility.

Inclusion and exclusion criteria

The inclusion criteria in this review are research articles that use quasi-experimental design and randomized controlled trials (RCTs), adult research participants suffering from cancer aged >18 years, and the language used is English. The target objectives in the study are m-health, self-management, self-efficacy, and self-ability. The exclusion criteria are studies that measure the use of m-health apps in non-cancer care and non-experimental studies.

Data extraction

The extracted data are created to determine the variables needed to answer the review question. The data are divided into several parts, namely study characteristics (author, year of publication, country of study), study design, number of participants during the study, type of cancer, interventions, outcome measurement and findings of the study.

Quality appraisal

Eight articles were independently assessed for their quality by two reviewers using Joanna Briggs Institute critical appraisal tools namely RCT and quasi-experiment. Discussions were made between the reviewers if there were disagreements. The total score was then categorized as moderate to high quality (Mostafaei et al., 2020). Table 1 and 2 show the quality of the included studies.

Data synthesis

To characterize the included studies, a narrative synthesis was performed. Due to the heterogeneity of the publications' parameters, it was unable to include all of them in the meta-analysis. Studies that could be further analyzed were synthesized using meta-analysis, with results reported as the mean value and standard deviation of post-intervention results.

As the studies utilized different outcome measures, the standardized mean difference (SMD) was calculated to estimate the impact of the intervention on the experimental group vs the control group. Review Manager Software (version 5.4.1) was used to perform statistical analysis. The effects of m-health-based self-management on self-management behavior were assessed. The heterogeneity of the included studies was determined statistically by examining forest plots and computing I2 tests. A value of 0% implies that no heterogeneity has been observed; increasing values indicate greater heterogeneity (Higgins et al., 2003). Studies were homogeneous, as I2 was 50%. Random

Table 2. Quality assessment for quasi-experiment

Quasi-Experiment	Q1 Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	Q2 Were the participants included in any comparisons similar?	Q3 Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Q4 Was there a control group?	Q5 Were there multiple measurements of the outcome both pre and post the intervention/exposure?	Q6 Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?	Q7 Were the outcomes of participants included in any comparisons measured in the same way?	Q8 Were outcomes measured in a reliable way?	Q9 Was appropriate statistical analysis used?	Percentage	Category
Park et al., 2022	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%	High
Sundberg et al., 2021	Y	Y	Y	Y	Y	N	Y	Y	Y	88%	High

Table 3. Data extraction

No	Author - Year	Setting	Design	Participant	Disease types	Intervention	Outcomes and outcome measurement	Outcome
1	Park et al., 2022	University Medical Centre, South Korea	Quasi-Exp	60 Enrolled and completed baseline assessment (T1). 30 Assigned to intervention group, 30 Assigned to control group	Breast Cancer	Mobile web-based self-management program	Outcome: Self-efficacy Instrument: The Self-Efficacy Scale for Self-Management of Breast Cancer (SESSM-B)	**Self-efficacy** (Self-efficacy scores did not show a significant difference by time point (F = 0.94, p = .386), nor did they show a significant difference by group (F = 0.33, p = .569)), **QOL improvement** (QOL scores differed significantly by time point (F = 4.19, p = .018) and by group (F = 7.42, p = .009))
2	Baik et al., 2020	Hospital, Italia	RCT	78 Latina breast cancer survivors analyzed; Inter 39 Control 39	Breast Cancer	Patterns of Use of Smartphone-Based Interventions	Outcome: self-efficacy and knowledge Instrument: The 12-item Communication and Attitudinal Self-Efficacy scale for cancer (CASE-cancer). The 16-item Knowledge about Breast Cancer questionnaire	The patterns of use of the My Guide intervention app and My Health attention-control app (HRQoL, symptom burden, cancer-specific distress, cancer-relevant self-efficacy, and breast cancer knowledge)
3	Ormel et al., 2018	Medical Oncology department of the UMCG, Netherland	RCT	Adult patients (n = 32). Usual care (n = 16) with RunKeeper (n = 16)	Testicular Cancer (14), Breast cancer (2)	Physical activity with a smartphone application	Outcome: physical activity Instrument: Physical Activity Scale for the Elderly (PASE) questionnaire	self-monitoring PA with RunKeeper is safe and feasible in cancer patients
4	Kim et al., 2018	Chung-Ang University Hospital, Korea	RCT	76 patients with metastatic breast cancer, mobile game play group (game group, n=36) or a conventional education group (control group, n=40)	Breast Cancer	Mobile game for self-management	Outcome: Medication adherence Instrument: The Korean version of the Medication Adherence Rating Scale (K-MARS)	The mobile game group in this study showed a higher QoL in various domains, including total health, physical health, psychological health, and environmental areas (The patients in the study group used approximately 40% of the game contents, and the overall satisfaction was acceptable. The game group also showed improved compliance to medications

Table 3. Data extraction

No	Author - Year	Setting	Design	Participant	Disease types	Intervention	Outcomes and outcome measurement	Outcome
4								compared with the control group (K-MARS score, 7.6, SD 0.7 vs 6.5, SD 0.5; P<.001). The patients in the study group reported lower rates of physically adverse events, such as nausea (P=.02), fatigue (P=.02), and numbness in the hand or foot (P=.02).Clinically significant adverse events, defined by grade ≥3 of Common Terminology Criteria for Adverse Events 3.0, including nausea (P=.02), fatigue (P=.002), and hair loss (P=.01) was shown to be lower in the game group.
5	Sundberg et al.., 2021	University hospitals in Sweden	Quasi-Exp	130 agreed to participate; 66 patients were assigned to the intervention group and 64 patients were assigned to the control group.	Prostate Cancer	Interactive app for symptom management	Outcome: Health literacy Instrument: The Swedish Functional Health Literacy Scale (FHL), and the Swedish Communicative and Critical Health Literacy Scale (CCHL)	Patients using an app for reporting and managing symptoms improved certain advanced skills of cognitive and critical health literacy (The intervention group had completed higher 188 levels of education compared to the control group (p =0.017). The 189 multinomial logistic regression showed no probability for higher 190 levels of education to result in a higher level of CCHL (model $\chi 2$ 191 =10.17, df 6, p = 0.118))
6	Wang et al, 2018	General hospitals in Nanjing, China	RCT	212 patients; intervention group (n=106) or a control group (n=106)	Stoma	Home care mobile app on the outcomes of discharged patients	Outcome: Self-efficacy Instrument: Stoma Self-Efficacy Scale (SSES)	Ostomy psychosocial adjustment = the intervention and control groups (t=0.20, P=0.06), Stoma self-efficacy = The intervention group had significantly higher SSES scores when compared with the control group, respectively at 1 month (t=2.81, P=0.01), 3 months (t=6.72, P<0.001) and 6 months (t=10.84, P<0.001) after discharge, Stoma complication = The intervention group had a lower incidence rate of stoma complications than the control group at 1-month ($\chi 2$=0.39, P=0.53)
7	Van der hout et al., 2020	Hospital, Netherland	RCT	Cancer survivors (n=625); intervention group (access to Oncokompas, n= 320) or control group (6months waiting list, n= 305)	Breast Cancer (66), Colorectal cancer (80), Head and neck Cancer (99), lymphoma (75)	eHealth self-management	Outcome: health literacy Instrument: The Patient Activation Measure (PAM)	Cancer survivors with low to moderate self-efficacy, those with higher personal control, and those with higher health literacy showed larger HRQOL benefits of Oncokompas. (Personal control also moderated the effect of Oncokompas on HRQOL (measurement group personal control, F(3,1481)=3.478, p =.015), health literacy moderated the effect of

Table 3. Data extraction

No	Author - Year	Setting	Design	Participant	Disease types	Intervention	Outcomes and outcome measurement	Outcome
								Oncokompas on HRQOL (measurement group health literacy, F(3,1478)=2.869, p = .035)
8	Zhu et al., 2018	Hunan Cancer Hospital, Xiangya School of Medicine, Central South University, Changsha, China	RCT	114 women with breast cancer; intervention group (n=57) receiving breast cancer e-support plus care as usual or the control group (n=57)	Breast Cancer	Mobile Breast Cancer e-Support Program	Outcome: Self-efficacy Instrument: The Chinese version of the Stanford Inventory of Cancer Patient Adjustment (SICPA)	The BCS program demonstrates its potential for dissemination globally to support women with breast cancer during chemotherapy

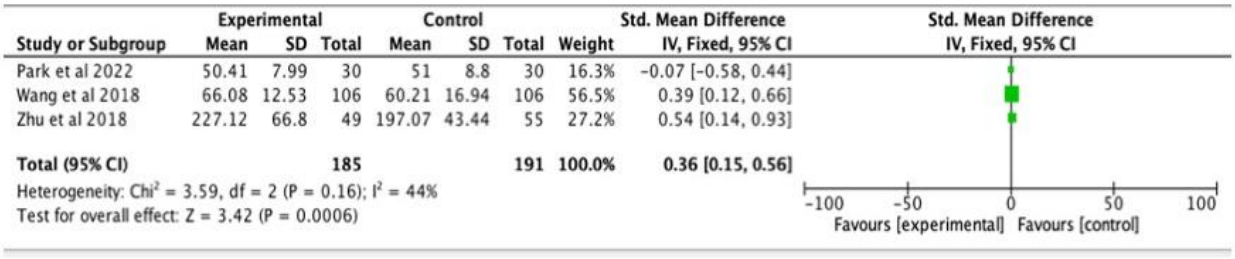

Figure 2. Meta-analysis on the effect of m-health based self-management of patient's self-efficacy

effects and fixed effects were used in the analysis. P 0.05 was chosen as the criteria for statistical significance in the systematic review.

Results

Search results

Figure 1 shows the study selection process. A total of 5758 studies were included during the literature search. After removing 95 duplicates, 5663 studies were screened through titles and abstracts. Thirty full texts were eligible for screening against inclusion criteria that resulted in eight included studies. Articles found were based on research protocols compiled to be used as a reference in conducting systematic reviews.

Study characteristics

Table 1 presents the characteristics of the eight included studies. The publication years range from 2018-2020. All the included studies were conducted in developed countries; China (n=2) Korea (n=2), Netherlands (n=2), Sweden (n=1) and Italy (n=1). The study designs used in the articles that have been analyzed are RCTs (n=6) and quasi-experiments (n=2). Table 2 and Table 3 show the quality of included studies.

Four studies focus on the application of m-health to the improvement of self-efficacy (Wang et al., 2018; Zhu et al., 2018; J.H.Park et al., 2022). Four studies investigate the application of mobile-based applications in improving, communication and health literacy (Kim et al., 2018; Ormel et al., 2018; Sundberg et al., 2021; van der Hout et al., 2021). The interventions in the included studies were conducted for four weeks (Baik et al., 2020) until six months (van der Hout et al., 2021). M-health-based self-management in the included studies provides education, hospital treatment and virtual support for physical activity and exercise.

M-health-based self-management

The features of m-health in the included studies involve; symptom management (Sundberg et al., 2021; van der Hout et al., 2021; Park et al., 2022), activity monitoring (Ormel et al., 2018), knowledge features about cancer through questionnaires (Baik et al., 2020), video games that provide education about cancer (Kim et al., 2018) and e-support (Zhu et al., 2018).

There are several outcomes of m-health based self-management interventions measured in the included studies: self-efficacy (Wang et al., 2018; Zhu et al., 2018; Baik et al., 2020; Y. Park et al., 2022); physical activity (Ormel et al., 2018), and health literacy (Baik et al., 2020; Sundberg et al., 2021; van der Hout et al., 2021).

The use of M-health for improving self-efficacy

Two RCTs (Wang et al., 2018) and one quasi-experiment study (Zhu et al., 2018; Y. Park et al., 2022) that included 376 patients with cancer evaluated the effectiveness of m-health-based self-management to improve self-efficacy. All these studies were synthesized for meta-analysis. Different measurement tools were used such as the self-efficacy scale for self-management of breast cancer, the Stoma self-efficacy scale and the Stanford Inventory cancer patient adjustment. The fixed effect model was conducted as the value of I2 is <50%. Our meta-analysis suggests there was a significant difference in self-efficacy after the provision of m-health-based self-management (SMD = 0.36 [0.16, 0.56], p < 0.00006) (Figure 2).

Use of M-health for improving health behavior, health literacy and communication

Three studies with a total of 831 participants investigated the effectiveness of m-health on the improvement of health literacy and knowledge of cancer (Baik et al., 2020; Sundberg et al., 2021; van der Hout et al., 2021). One study shows that the application of m-health can improve physical activity among patients with cancer (Ormel et al., 2018).

Discussions

This study was conducted to determine the effect of m-health-based self-management on self-management behavior including self-efficacy, health literacy and physical activity. Analysis and synthesis were carried out on three studies to see the effect of the application on self-efficacy. Our meta-analysis shows significant improvement in patients' self-efficacy after the

interventions. The finding is in line with the previous studies among patients with a life-limiting illness. For example, the use of m-health has a positive outcome on self-management (Delva et al., 2021). In addition, self-management among patients with chronic kidney disease increased in the intervention group after using m-health (Li et al., 2020; Markossian et al., 2021). Both studies provide virtual clinics, education related to diseases, and peer support. This shows that the use of the m-health app can increase self-management and self-efficacy in patients with a life-limiting illness.

Four included studies show a positive outcome in the improvement of health behavior after the intervention. The interventions provided are related to drug adherence, monitoring of patients' physical activity, and information to improve health literacy. For example, medication adherence increases in the intervention group by using mobile reminders (Kim et al., 2018). Self-monitoring can be linked to self-efficacy (Rabbani et al., 2022). Self-monitoring is carried out through an application so that it can be accessed by patients remotely. Regulated apps support changes in health efficacy and behavior and also through the m-health app can provide a better understanding of a patient's chronic condition.

Monitoring of patients' physical activity monitoring is increasing with the help of applications but further research is needed to determine the concentration of the patient's physical activity. Previous review on health apps shows that ab m-health app has the potential to increase physical activity (Yerrakalva et al., 2019). In addition, a study investigating the use of m-health on physical activity shows that the use of m-health can increase physical activity in adults through self-monitoring, social support, and behavior change techniques (McGarrigle and Todd, 2020).

Our reviews found that m-health has a positive outcome on patients' health behavior. One of the included studies shows that patients often access content with the theme of changing health behaviors (Baik et al., 2020). Improvement in health behaviors after using m-health is in line with findings of previous systematic reviews that show improvement in health behavior (Han and Lee, 2018; McKay et al., 2018). However, the use of m-health should be considered as a complementary intervention in addition to direct nursing intervention as suggested by Bonn et al. (2019).

Implication and limitations

This systematic review has a number of limitations. First, the quality of this review was compromised by the fact that no participant were blinded. Second, the included trials had varying characteristics, which could lead to heterogeneity and affect the pooled data. The included studies involved different types of cancer, and the frequency and content of the m-health interventions varied. Third, the exploration of the effect mechanism was constrained by the variety of available studies. Therefore, uniform m-health standards and high-quality randomized controlled trials and quasi-experiment are required to investigate the precise mechanism of m-health's effects.

Based on the results of a study of eight included studies, it was found that the provision of interventions for self-management in cancer patients can be done using m-health apps to improve patients' self-efficacy and health behaviors. The features provided can help patients improve self-management in undergoing cancer treatment. This intervention can be a collaborative option in implementing nursing care to help patients with cancer to meet their self-management behaviors

Conclusions

Our meta-analysis demonstrated statistically significant effects of m-health for patients with cancer patients on self-efficacy. Qualitative synthesis shows the positive outcome of m-health on patients' physical activity, health behavior and health literacy. Although, the quality of evidence range from moderate to high, the results should be considered cautiously as the standardization of m-health in term of frequency and content is still varied. Further standardization on m-health is warranted to investigate the effect of interventions.

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TITLE (Times New Roman 12)

The title of the paper should be concise and informative. Avoid abbreviations and formula wherepossible. It should be written clearly and concisely describing the contents of the research.

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ABSTRACT (Times New Roman 11)

The abstract comes after title page in the manuscript. Abstract must be integrated and independent which is consist of introduction and purpose, methods, results, conclusion and suggestion. However,the abstract should be written as a single paragraph without these headers. For this reason, references should be avoided. Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself. Abstract must be written using 150 until 250 words which has no reference and accompanied keywords.

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KEYWORDS (Times New Roman 11)

The keywords should be avoiding general and plural terms and multiple concepts. Do not use words or terms in the title as keywords. These keywords will be used for indexing purposes. Keywords shouldnot more than 5 words or phrases *in alphabetical order*.

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INTRODUCTION (Times New Roman 11)

State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results. Explain how you addressed the problem and clearly state the aims of your study. As you compose the introduction, think of readers who are not experts in this field.Please describe in narrative format and not using sub-chapter.

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MATERIALS AND METHODS (Times New Roman 11)

Explain in detail about the research design, settings, time frame, variables, population, samples,sampling, instruments, data analysis, and information of ethical clearance fit test.

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RESULTS (Times New Roman 11)

Result should be presented continuously start from main result until supporting results. Unit of measurement used should follow the prevailing international system. It also allowed to present diagram, table, picture, and graphic followed by narration of them.

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Equation:

$$\mathbf{H}' = -\Sigma^{s}_{i=1} (P_i)(\log_2 P_i) \quad \text{.....(1)}$$

Remarks: .....

Figures and Tables placed separated in last page of manuscript and must be as follow:
Figures, tables, and diagram should be editable ones.
Figures's remarks placed in bottom with before 4pt. The title of figures placed after the remarks with single space. The title of tables should be written first with Times New Roman 11, single space and after 6pt. Content of the tables should be written using Times New Roman 10 single space and the remarks oftables placed in the bottom with Times New Roman 10, single space and before 4pt.

Table 1. Effects of plant growth regulator types and concentrations on embryogenic callus induction from leaf tip explants of *D. lowii* cultured in ½ MS medium supplemented with 2.0 % (w/v) sucrose under continuous darkness at temperature of 25 ± 2 °C after 60 days of culture

Table 3. Maternal and child health care-seeking behaviour for the last pregnancy in women aged 15 – 45 years old

Type of care	Age Groups (Years)							
	<30		30 - 39		40 - 45		All Age	
	n	%	n	%	n	%	n	%
Place for antenatal care								
Village level service (Posyandu, Polindes or Poskesdes)	1	9.1	1	4.6	1	3.5	3	4.8
District Level service (Puskesmas/Pustu)	2	18.2	7	31.8	1	3.5	10	16.1
Hospital, Clinics, Private Doctor or OBGYN	1	9.1	4	18.2	2	6.9	7	11.3
Private Midwife	7	63.6	10	45.5	25	86.2	42	67.7
Place of Birth								
Hospital	5	50.0	5	22.7	4	13.8	14	23.0
Birth Clinic/Clinic/Private health professional	5	50.0	15	68.2	21	72.4	41	67.2
Puskesmas or Pustu	0	0.0	2	9.1	0	0	2	3.3
Home or other place	0	0.0	0	0	4	13.8	4	6.6
Ever breastmilk								
No	1	9.1	1	4.6	1	3.5	3	4.8
Yes	10	90.9	21	95.5	28	96.6	59	95.2
Exclusive breastfeeding								
No	4	36.4	10	45.5	18	62.1	32	51.6
Yes	7	63.6	12	54.6	11	37.9	30	48.4

DISCUSSION (Times New Roman 11)

Describe the significance of your findings. Consider the most important part of your paper. Do not beverbose or repetitive, be concise and make your points clearly. Follow a logical stream of thought; ingeneral, interpret and discuss the significance of your findings in the same sequence you described them in your results section. Use the present verb tense, especially for established facts; however, refer to specific works or prior studies in the past tense. If needed, use subheadings to help organizeyour discussion or to categorize your interpretations into themes. The content of the discussion section includes: the explanation of results, references to previous research, deduction, and hypothesis.

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CONCLUSIONS (Times New Roman 11)

Conclusion should be explained clearly related to hypothesis and new findings. Suggestion might be added contains a recommendation on the research done or an input that can be used directly by consumer.

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Acknowledgement (Times New Roman 11)

This section is compulsory. Grants, financial support and technical or other assistance are acknowledged at the end of the text before the references. All financial support for the project must be acknowledged. If there has been no financial assistance with the project, this must be clearly stated. The role(s) of the funding organisation, if any, in the collection of data, its analysis and interpretation, and in the right to approve or disapprove publication of the finished manuscript must be described in the Methods section of the text.

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Funding Source (Times New Roman 11)

You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s) in the whole research process.

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Conflict of Interest (Times New Roman 11)

when the proposed publication concerns any commercial product, either directly or indirectly, the author must include in the cover letter a statement (1) indicating that he or she has no financial or other interest in the product or distributor of the product or (2) explaining the nature of any relation between himself or herself and the manufacturer or distributor of the product. Other kinds of associations, such as consultancies, stock ownership, or other equity interests or patent licensing arrangements, also must be disclosed. If, in the Editor's judgment, the information disclosed represents a potential conflict of interest, it may be made available to reviewers and may be published at the Editor's discretion; authors will be informed of the decision before publication.

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REFERENCES (Times New Roman 11)

The author-year notation system is required and completed. All reference mentioned should be writtendown in reference using Harvard Cite Them Right 10th Edition style and arranged from A to Z. Articles have minimal 25 recentreferences (last10 years) and 80% is journal. References from journalpublication should be provided by DOI. All cited references must be mentioned in in-text citation. If you are Mendeley user, please download the reference style here https://www.mendeley.com/guides/harvard-citation-guide

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Citation Style:
(Nursalam et al., 2020)
(WHO, 2021)
(Pemerintan RI, 2014)

Reference to a Journal Publication:

Nursalam, N. *et al.* (2020) 'The effect of range of motion exercise on blood pressure, pulse and sleep quality among hypertensive patients', *International Journal of Innovation, Creativity and Change*. Faculty of Nursing, Universitas Airlangga, Mulyorejo Street, Campus C Unair, Surabaya, 60115, Indonesia: Primrose Hall Publishing Group, 13(6), pp. 220–234. Available at: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85087361125&partnerID=40&md5=b7318712857248d9ea896f85f82d69c9.

Reference to a Book:

de Virgilio, C. & Grigorian, A. 2019, 'Surgery: A case based clinical review' in Surgery: A Case Based Clinical Review, pp. 1-689.

Reference to a Book Section/Chapter:

Harper, M.S. 2021, 'Mental health and mental health services' in Services to the Aging and Aged: Public Policies and Programs, pp. 283-297.

Reference to a Website:

WHO (2021) *WHO Coronavirus Disease (COVID-19) Dashboard: Situation by Country, Territory & Area*.

Reference in Conference:

Yuarnistira, Nursalam, N., Rachmawati, P.D., Efendi, F., Pradanie, R. & Hidayati, L. 2019, 'Factors Influencing the Feeding Pattern of Under-Five Children in Coastal Areas', IOP Conference Series: Earth and Environmental Science.

Reference in Statute:

Pemerintah RI (2014) *Undang-Undang Republik Indonesia Nomor 38 Tahun 2014 Tentang Keperawatan*. Indonesia. Available at: https://peraturan.go.id/common/dokumen/ln/2014/uu38-2014bt.pdf.

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