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Exploring the Determinant Factors Affecting Families' Ability to Care for People with Schizophrenia

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A B S T R A C T

Families often lack knowledge about schizophrenia care, which hinders their ability to provide adequate support. This study explores the factors affecting families' ability to care for people with schizophrenia. It was quantitative research using a cross-sectional approach method. There were 130 samples through the purposive sampling technique. The independent variables were knowledge, behavior, motivation, health service utilization, and social support. The dependent variable was families' ability to care for people with schizophrenia. The Authors had been tested and declared the instrument valid and reliable, with a Pearson correlation value of <0.5 and a Cronbach's alpha value of >0.6. Data analysis used a multiple logistic regression test with a confidence level of 95% (α=0.05). The results found that all independent variables, knowledge (p=0.014), behavior (p=0.042), motivation (p=0.031), health service utilization (p=0.029), and social support (p=0.017), showed a p<0.05. In addition, the largest OR (Exp B) was social support, 13.288. Thus, all independent variables significantly affect the families' ability to care for people with schizophrenia. Furthermore, the most dominant factor was social support. Good social support was 13 times more likely to improve families' ability to care for people with schizophrenia. In conclusion, there is a significant influence of knowledge, behavior, motivation, health services utilization, and social support on the families' ability to care for individuals with schizophrenia. In addition, the most dominant factor affecting families' ability to care for people with schizophrenia is social support.

INTRODUCTION

The level of dependence of individuals with schizophrenia on their families is relatively high, especially in fulfilling their needs. This issue is because they experience changes in their ability to think, communicate, feel, and behave appropriately (Tamizi *et al.*, 2020; Commey, Ninnoni and Ampofo, 2022). Individuals with schizophrenia have experienced a decrease in cognitive function since the onset of the disease (Rantala *et al.*, 2022). Thus, their families are responsible for fulfilling their needs (Asgari *et al.*, 2023; Sawab *et al.*, 2023). Lack of knowledge and skills among families of schizophrenic persons potentially leads to tricky situations and increases the family's physical, emotional, and financial burden (Punaglom *et al.*, 2022). The role of the family in the caring management of individuals with schizophrenia is not only in maintaining their long-term remission but also in their caring for physical and mental functions along with improving their quality of life and recovery (Mamnuah, 2021). The main focus of schizophrenia care is to maximize the quality of life and adaptive functioning and assist patients in achieving life goals in work, family, and personal relationships (Widiyawati *et al.*, 2020).

The World Health Organization (WHO) noted that the number of people with mental disorders, including schizophrenia, was estimated at 450 million worldwide (Babicki *et al.*, 2021). The prevalence of severe

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mental illness in Indonesia was seven percent of the households, meaning seven families per 1000 households live with people with mental illness (Dumpratiwi, Cahyadi and Ardani, 2023). The families caring for individuals with schizophrenia in Indonesia experience significant challenges in building resilience (Lesmana and Wirawan, 2023). Schizophrenia affected approximately 0.45% of the adult population, leading to a large number of families' roles as schizophrenia caregivers (Nudhar *et al.*, 2023). The experiences of families of people with schizophrenia vary. Many of them face considerable stress due to the nature of the illness and the long-term commitment to treatment. Research showed that many families strive to maximize their ability to care for schizophrenic persons through counseling, training, and socialization of care, as well as involvement with activities from Public Health Centers or other health facilities (Agustini, Karimah and Sajogo, 2021). The efforts significantly improved their caregiving ability (Indah Iswanti *et al.*, 2023).

A study found that 61.3% of families showed high resilience in caring for schizophrenia people (Rindayati *et al.*, 2023). Resilience is crucial for managing stress and challenges. Training in emotional regulation and self-efficacy can help families cope better with the challenge of caregiving (Chase *et al.*, 2021). However, families often lack knowledge about schizophrenia care, which hinders their ability to provide adequate support (Sawab *et al.*, 2023). Thus, Providing comprehensive knowledge about schizophrenia care to families and explaining families' responsibilities to schizophrenic persons can empower and improve caregiving effectiveness (Issac *et al.*, 2022; Asgari *et al.*, 2023). A study indicated a significant correlation between the burden on families and their caregiving ability; a higher burden led to decreased caregiving ability (Ee *et al.*, 2020). Thus, addressing family burden through support and resources is critical to improving the quality of care (Upasen and Saengpanya, 2022). Prior research also showed that family-centered counseling significantly increased families' skills in caring for mentally disordered people, with 88.9% reporting good skills post-intervention (Sharif *et al.*, 2020).

Various factors, including resilience, intentions, access to information, and perceived caregiving burden, influence families' ability to care for individuals with schizophrenia (Rindayati *et al.*, 2023). Although many families face challenges in caring for patients with schizophrenia, targeted interventions and support systems can improve their ability and resilience, ultimately leading to better patient outcomes (Toledano-Toledano and Luna, 2020). Families should provide support, security, and affection for people with schizophrenia. Families can actively involve people with schizophrenia who enter remission status in various activities or jobs that are suitable for their abilities. Providing opportunities to socialize with the surrounding community also can support them in recovery (Chase *et al.*, 2021; Cahaya *et al.*, 2024). Thus, community-based mental health support in empowering families is crucial (Iswanti *et al.*, 2024). Recovery from schizophrenia will be possible if there is good behavior from the family to provide optimal care.

Previous research showed that family perceptions of their efforts still had not brought results or changes as expected. It resulted in family fatigue, so they could not utilize their existing potential. The family was in a helpless condition in caring for people with schizophrenia (Hsiao, Lu and Tsai, 2020; La Barbera and Ajzen, 2020). Strategies to build and optimize families' ability to care for people with schizophrenia on an ongoing basis are essential. This study explores the factors affecting families' ability to care for people with schizophrenia.

METHOD

This paper was quantitative research using a cross-sectional approach method. It was conducted in September 2024 at Menur Mental Hospital, East Java Province. The population was 173 families who cared for people with schizophrenia and carried out routine controls. There were 130 samples through the purposive sampling technique. Inclusion criteria include the closest family caring for schizophrenia patients, aged over 21 years, living with patients, and being able to communicate in Indonesian. The independent variables were knowledge, behavior, motivation, health service utilization, and social support. The dependent variable was families' ability to care for people with schizophrenia. The instruments were questionnaires modified by the authors. The Authors had been tested and declared the instrument valid and reliable, with a Pearson correlation value of <0.5 and a Cronbach's alpha value of >0.6. Data analysis used SPSS version 22. Descriptive analysis was done by evaluating median, standard deviation, minimum, and maximum values for each variable. The inferential analysis was a multiple logistic regression test with a confidence level of 95% (α=0.05). Determination of the most dominant variable affecting families' ability to care for people with schizophrenia was by evaluating the OR value contained in the Exp (B) value in the multiple logistic regression test of all variables with a significant value or a p<0.05. This study has received approval from the Research Ethics Committee of Menur Mental Hospital, East Java Province, with certificate number 0009.2/6813/102.8/2024.

RESULT

Table 1. shows that out of 130 respondents, 46 families of schizophrenia people are in the adult age range, 31-40 years (35.4%). In addition, 76 respondents are male (58.5%), 120 are Muslim (92.3%), 122 are Javanese (93.8%), and 63 are graduated from Junior High School (48.5%). Furthermore, 79 are entrepreneurs (60.8%), 86 have income more than the regional minimum wage (66.2%), and 40 schizophrenia people were fathers or mothers (34.4%).

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Table 1. The characteristics of the respondents (n=130)

The characteristics of the respondents	Frequency (n)	Percentage (%)
Age		
Age 21-30 Years Old	26	20.0
Age 31-40 Years Old	46	35.4
Age 41-50 Years Old	33	25.4
Age 51-60 Years Old	18	13.8
> 61 Years Old	7	5.4
Sex		
Male	76	58,5
Female	54	41,5
Religion		
Islam	120	92.3
Other	10	7.7
Ethnic group		
Javanese	120	92.3
Madurese	10	7.7
Education		
Not going to school	2	1.5
Elementary School	28	21.5
Junior High School	63	48.5
Senior High School	32	24.6
University	5	3.8
Profession		
Unemployment	26	20.0
Civil Servant	5	3.8
Entrepreneur	79	60.8
Other	20	15.4
Income		
Less than the regional minimum wage	44	33.8
More than the regional minimum wage	86	66.2
Patient's status in the family		
Father/ Mother	40	30.8
Spouse	33	25.4
Child	26	20.0
Sibling	17	13.1
Other	14	10.7

Table. 2 indicates that 67 respondents have moderate knowledge (51.5%), 72 have moderate behavior (55.4%), 59 have moderate motivation (45.4%), 60 have moderate health service utilization (46.2%), and 66 have moderate social support (50.8%). In addition, 63 families have moderate ability to care for people with schizophrenia (48.5%). Multiple logistic regression analysis found that all independent variables, knowledge (p=0.014), behavior (p=0.042), motivation (p=0.031), health service utilization (0.029), and social support (0.017), showed a p<0.05. Thus, all independent variables significantly affected the families' ability to care for people with schizophrenia.

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Table 2. The determinant factors affecting families' ability to care for people with schizophrenia (n=130)

Independent variables	Families' Ability to Care for People with Schizophrenia						Total		*p*
	Less		Moderate		Good				
	n	%	n	%	n	%	n	%	
Knowledge									
Less	6	4.6	9	6.9	5	3.8	20	15.4	
Moderate	9	6.9	26	20	32	24.6	67	51.5	0.014
Good	0	0	24	18.5	19	14.6	43	33.1	
Total	15	11.5	59	45.4	56	43.1	130	100	
Behavior									
Less	4	3.1	7	5.4	3	2.3	14	10.8	
Moderate	7	5.4	55	42.3	10	7.7	72	55.4	0.042
Good	0	0	21	16.2	23	17.6	44	33.8	
Total	11	8.5	83	63.8	36	27.6	130	100	
Motivation									
Less	18	13.8	24	18.5	9	6.9	51	39.2	
Moderate	9	6.9	28	21.5	22	16.9	59	45.4	0.031
Good	1	0.8	6	4.6	13	10	20	15.4	
Total	28	21.5	58	44.6	44	33.8	130	100	
Health Service Utilization									
Less	14	10.8	12	9.2	20	15.4	46	35.4	
Moderate	9	6.9	32	24.6	19	14.6	60	46.2	0.029
Good	0	0	8	6.2	16	12.3	24	18.5	
Total	23	17.7	52	40	55	42.3	130	100	
Social support									
Less	12	9.2	13	10	3	2.3	28	21.5	
Moderate	23	17.7	35	26.9	8	6.1	66	50.8	0.017
Good	4	3.1	15	11.5	17	13.1	36	27.7	
Total	39	30	63	48.5	28	21.5	130	100	

The multivariate analysis determines the most dominant factor. The dominant factor is the factor that has a $p<0.05$ and has the largest OR (Exp B). Table 3 exhibits that the largest OR (Exp B) is social support, 13.288. Thus, the most influencing factor affecting families' ability to care for people with schizophrenia was social support, with Exp B=13.288. Good social support was 13 times more likely to improve families' ability to care for people with schizophrenia.

Table 3. Multiple logistic regression test results

Independent variables	*p*	Exp (B)	95% C.I For Exp (B)		Description
			Lower	Upper	
Knowledge	0.014	11.603	2.318	113.089	Significant
Behavior	0.042	5.343	1.197	10.513	Significant
Motivation	0.031	9.892	1.513	82.475	Significant
Health Services	0.029	6.713	1.247	78.943	Significant
Social Support	0.017	13.288	2.693	175.755	Significant

DISCUSSION

The Influence of Knowledge on Families' Ability to Care for People with Schizophrenia

This study's results showed that family knowledge affected their ability to care for people with schizophrenia. Most of the family's knowledge in this study was moderate. Families contribute to the rapid recovery of people with mental disorders during the rehabilitation and treatment process, both medical and psychological (Hsiao, Lu and Tsai, 2020). Family knowledge influences the process and effectiveness of

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healing schizophrenia patients. Mental illness concerns holistic issues regarding an individual's physical, psychological, social, and spiritual health (Campbell, 2021). Thus, clear concepts and understanding are crucial in understanding schizophrenia patients. A study showed that family knowledge affected the optimization of the recovery of schizophrenia patients (Hsiao, Lu and Tsai, 2020). It is in line with this research. Increasing information to the family will help patients increase self-strengthening, self-confidence, and positive coping and can also provide emotional support (Adams, Gringart and Strobel, 2022). Knowledge from health educational exposure and various sources will improve the family's ability to care and increase their positive coping skills (Issac *et al.*, 2022). The active role of all family members in seeking information related to the care of schizophrenia patients, decision-making, relapse prevention, and routine for schizophrenic people living everyday life is critical (Mamnuah, 2021). It is because one of the factors affecting the family's ability to care for schizophrenia patients is family knowledge.

The Influence of Behavior on Families' Ability to Care for People with Schizophrenia

This research showed that family behavior influenced the families' ability to care for people with schizophrenia. Most respondents had behavior at moderate levels. The family function in caring for patients with psychological problems is vital. Family members carry out roles and responsibilities for patients with health problems and care for them (Chase *et al.*, 2021). Families have an essential role for schizophrenia patients during the long-term rehabilitation process. They must assume many responsibilities that make them experience significant changes or complex personal burdens (Toledano-Toledano and Luna, 2020; Rindayati *et al.*, 2023). The negative consequence of this burden is stress. It can change the family's emotional state and behavior in caring for schizophrenic patients (Sharif *et al.*, 2020). Good family behavior will have an impact on excellent families' ability to care for people with schizophrenia. Family members will have compassion for sick family members due to personal relationships between family members. Previous research showed that good family behavior manifested in bringing family members with mental disorders to health services for treatment, meeting their daily needs, and encouraging them to socialize (Iseselo and Ambikile, 2020; Killaspy *et al.*, 2022). At the same time, a study indicated that less family behavior manifested in confined schizophrenic patients at home because the family was ashamed that their family had mental disorders (Subu *et al.*, 2023). Family should have a better understanding of what they should do to a family member with schizophrenia. It must also play a role and act actively as the primary support for patients. Thus, people with schizophrenia will improve their adjustment abilities and are no longer vulnerable to the influence of psychosocial stressors.

The Influence of Motivation on Families' Ability to Care for People with Schizophrenia

This paper found an effect of motivation on the family's ability to care for schizophrenia patients. Family motivation is one of the causes of the family's ability to care for and overcome relapses in schizophrenia patients. It is a factor that directs and energizes. It has biological, cognitive, and social aspects. Good

motivation from the family indicates that there is a desire to be able to care for schizophrenia patients at home, as well as to take patients to undergo regular treatment (Huang *et al.*, 2020; Jameel *et al.*, 2020). The treatment of schizophrenia patients must involve the participation of the family. The family's inability to care for schizophrenia patients will increase the relapse rate because schizophrenic patients are not regular in taking medication and do not carry out routine controls. The reasons for less family motivation are the family feeling bored taking the client to a health facility and giving medicine daily. The lack of encouragement or motivation from the family to the individuals with schizophrenia can impact drug withdrawal (Indah Iswanti *et al.*, 2023). In addition, the family still has less motivation and considers there is no problem if schizophrenia patients do not disturb the surrounding community. They tend to be apathetic and do not take good care of schizophrenic patients at home. Whereas untreated schizophrenia patients potentially have difficulty in health development. Thus, family motivation is a vital factor in the family's ability to care for schizophrenia patients, particularly giving daily medication (Ahmad *et al.*, 2024). Families should always guide and direct schizophrenic patients to take their medication correctly and regularly.

The Influence of Health Service Utilization on Families' Ability to Care for People with Schizophrenia

This investigation results showed that health services utilization affected the family's ability to care for individuals with schizophrenia. Health services are essential to improve the health development of schizophrenia patients (Koschorke *et al.*, 2021). Health services involve nursing care, availability of health services, access to health services, and health teams that support families to determine treatment success (Aass *et al.*, 2022). Previous studies explained several factors that affected healthcare utilization, including their health status, socio-demographic characteristics, and ability to access health services (Windarwati *et al.*, 2023). Therefore, understanding what facilitates the use of health services and what influences individuals to determine health services is critical. The health team should provide services to families and schizophrenia patients to help them have a better quality of life (Ye *et al.*, 2023). The health worker's role is to provide information and assistance to families receiving care from the hospital. In addition, they provide self-management support, counseling, problem-solving, and action planning for schizophrenia patients. Health services have had adequate infrastructure. Still, if the family has less health service utilization, they will have difficulty in caring for schizophrenic patients at home.

The Influence of Social Support on Families' Ability to Care for People with Schizophrenia

In this study, social support was the most dominant factor affecting the families' ability to care for individuals with schizophrenia. Social support comes from family, relatives, peer groups, and the community. It is the support that is essential for families in caring for schizophrenic patients at home (Punaglom *et al.*, 2022). It causes the family to feel less alone and remain resilient in caring for individuals

with schizophrenia (Rindayati *et al.*, 2023). The community also can contribute significantly to the family's comfort in living in the society (Upasen and Saengpanya, 2022). Some people are still unable to accept the existence of schizophrenia patients and have a negative stigma. The focus of some research and innovation needs to pay attention to this issue so that people can consider that schizophrenia patients are not scary people and have the right to live with the community (Ye *et al.*, 2023). The impact of stigma and discrimination on families of schizophrenia patients will result in families having poor emotional coping, resulting in families focusing more on stigma than on the recovery of schizophrenia patients (Babicki *et al.*, 2021). Thus, social support from family, relatives, peers, and the community can provide confidence and motivation to families in caring for individuals with schizophrenia.

CONCLUSION

There is a significant influence of knowledge, behavior, motivation, health services utilization, and social support on the families' ability to care for individuals with schizophrenia. In addition, the most dominant factor is social support. The higher the social support, the higher the families' ability to care for people with schizophrenia. It is because social support provides reinforcement, confidence, information, and motivation so that families can optimize the treatment of schizophrenia patients.

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The Correlation between Parity and Residence with Maternal Mortality Due to Miscarriage and Abortion in Papua Province in 2020

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A B S T R A C T

The Maternal Mortality Ratio (MMR) in Papua Province was 289 per 100,000 live births in 2017, rising to 565 per 100,000 live births by 2020. This study analyzes the correlation between parity and residence with maternal mortality due to miscarriage and abortion in Papua Province. This paper was a retrospective cross-sectional study. The population was comprised of reproductive-aged women aged 15-49 who participated in the Indonesia Demographic and Health Survey (IDHS) 2020. There were 14,802 respondents by total sampling. Bivariate analysis used logistic regression at a 95% confidence level (α=0.05). The results showed that most respondents had less than or equal to three-born children (83.64%) and lived in rural areas (72.06%). In addition, 14.35% of them died due to miscarriage and abortion. The logistic regression test results on the parity variable indicated p=0.000 and negative Odds Ratio (OR)=0.475. It indicated respondents with more than three-born children had a higher risk of maternal mortality compared to those with less than or equal to three-born children. In addition, the test results of the residency variable showed p=0.000 and negative OR=0.394. It implied that respondents who lived in urban areas faced a higher risk of maternal mortality due to miscarriage and abortion compared to rural mothers. In conclusion, parity and residence significantly correlate with maternal mortality due to miscarriage and abortion.

INTRODUCTION

Implementing strategic measures to enhance health is one of the Sustainable Development Goals (SDGs) 2030 Agenda (United Nations, 2023). One of the health improvement initiatives of The World Health Organization (WHO) is to expedite the decrease of the global Maternal Mortality Rate (MMR). Maternal mortality refers to death occurring during pregnancy or within 42 days following the conclusion of pregnancy, resulting from pregnancy or its management, and not attributable to accident or injury (WHO, 2023). More specifically, Maternal Mortality Ratio (MMR) refers to the death of a woman during pregnancy or within 42 days of pregnancy termination, irrespective of the gestational duration or birth location. It happens during gestation, parturition, and the postpartum phase (BPS Statistics Indonesia, 2021). According to the Indonesian Demographic and Health Survey (IDHS), MMR was 189 per 100,000 live births in 2020. The MMR in Papua Province was 289 per 100,000 live births in 2017, rising to 565 per 100,000 live births by 2020. Thus, Maternal mortality in Papua Province has dramatically increased during the past three years (Badan Pusat Statistik Provinsi Papua, 2020). At the same time, the Millennium Development Goals (MDGs) aim to achieve a maternal mortality rate of 70 per 100,000 live births by 2030 (WHO, 2023).

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The International Classification of Diseases (ICD) categorizes maternal death into many definitions. The death of a woman during pregnancy or within less than one year after delivery may be due to difficulties arising during pregnancy or the exacerbation of a pre-existing illness and is not related to the physiological effects of pregnancy. Pregnancy problems are physical and psychological issues that may occur before, during, or after pregnancy, thereby impacting the health of pregnant individuals, postpartum individuals, and their infants (CDC, 2023). In addition, late maternal mortality refers to the demise of a woman resulting from direct or indirect obstetric causes occurring more than 42 days but less than one year following the conclusion of pregnancy. The growing accessibility of life-sustaining interventions and technologies allows more women to survive such complications. It may also prevent death after the 42-day postpartum interval.

Issues in maternal mortality arise from improper intervention and treatment, as well as neglect (WHO, 2023). Maternal death causes are categorized into direct and indirect maternal deaths. Direct maternal deaths refer to mortalities resulting from issues arising during pregnancy, childbirth, and the postpartum phase. Over 75% of direct maternal deaths are severe bleeding, infection, hypertension during pregnancy, delivery difficulties, and botched abortion (WHO, 2023). Meanwhile, indirect maternal deaths result from pre-existing diseases aggravated by the pregnancy or diseases that develop during pregnancy and impact the pregnancy. These diseases include malaria, anemia, Human Immunodeficiency Virus (HIV) / Acquired Immune Deficiency Syndrome (AIDS), and cardiovascular disease (UNICEF, 2023).

In Indonesia, the primary contributors to indirect maternal mortality are 4 T and 3 T cases. 4T is Too old and young to get pregnant, too frequent childbirth, and too close birth spacing. Risk factors for 4T cases are age and parity, leading to complications if not adequately screened and managed. The National Population and Family Planning Board can evaluate 4T cases to assess the success of the Family Planning program (Hazairin *et al.*, 2021). In addition, 3T means Too late decision-making, referral, and treatment at the referral center. 3T cases exhibit delays in decision-making on referrals to health services, identifying pregnancy danger signals, and obtaining appropriate care at referral facilities. The delay in decision-making regarding referrals to health facilities typically arises during the family's decision-making process. Therefore, enhancements to various aspects affecting medical decision-making and identifying postpartum danger indications are crucial. Enhancing the transportation system can also facilitate expedited access to healthcare facilities and eliminate delays in reaching referral destinations. Further, the delay in effective management within health facilities is attributed to prolonged administrative procedures, insufficient referral health facilities, a shortage of healthcare personnel at referral sites, inadequate infrastructure, and insufficient blood supply, failing to meet maternal needs. Consequently, the Regional Government should aid in the reduction of maternal mortality rates in Papua Province (Ulfah, 2019).

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Parity is associated with postpartum maternal mortality. Maternal parity is the total number of children a mother has borne, whether living or deceased. It is an indirect indicator to evaluate the maternal condition during pregnancy and the status of the fetus till delivery (Kurniawan and Melaniani, 2019). In addition, residence may reflect disparities in disease incidence between rural and urban regions. Factors contributing to disparities in disease prevalence and mortality between rural and urban areas include population density and age distribution, differences in occupational and lifestyle practices, divergent health and illness perceptions, and discrepancies in living conditions and sanitation (Lengkong, Langi and Posangi, 2020). This study analyzes the correlation between parity and residence with maternal mortality due to miscarriage and abortion in Papua Province.

METHOD

This paper was a retrospective cross-sectional study. The population was comprised of reproductive-aged women aged 15-49 who participated in the Indonesia Demographic and Health Survey (IDHS) 2020 (BPS Statistics Indonesia, 2020a). After data cleaning, the initial cohort of 439,562 individuals was reduced to a research sample of 14,802. The researcher employed total sampling in this study, focusing on maternal mortality due to miscarriages and abortions within the last two years. The exclusion criteria included incomplete data and discrepancies in Household ID among variables. The data were categorized and structured utilizing SPSS software version 26 for Windows. Bivariate analysis used logistic regression at a 95% confidence level (α=0.05).

RESULT

The Indonesia Demographic and Health Survey (IDHS) 2020 data categorize maternal mortality into four distinct types: pregnancy, miscarriage and abortion, delivery, and postpartum (BPS Statistics Indonesia, 2020a). The Statistics Indonesia results showed that maternal mortality in Papua Province was significantly higher than in other provinces. Table 1 shows the distribution of maternal mortality in Papua Province in 2020. 14.35% of respondents die due to miscarriage and abortion.

Table 1 Distribution of Maternal Mortality in Papua Province in 2020

Maternal Mortality Cause	Death n (%)	Life n (%)
Pregnancy	121 (26.30)	
Miscarriage and abortion	66 (14.35)	
Delivery	204 (44.35)	
Postpartum	69 (15)	
Total	460 (3.10)	14,342 (96.90)

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Table 2 displays independent variables, including parity and residence. It indicates that most respondents have less than or equal to three-born children (83.64%) and live in rural areas (72.06%).

Table 2. Distribution of Parity and residence

Independent variables	n (%)
Parity	
>3 children	2,421 (16.36)
≤3 children	12,381 (83.64)
Residence	
Urban	4,136 (27.94)
Rural	10,666 (72.06)

The logistic regression test results on the parity variable indicated *p*=0.000 and negative Odds Ratio (OR)=0.475. It indicated respondents with more than three-born children had a higher risk of maternal mortality compared to those with less than or equal to three-born children. In addition, the test results of the residency variable showed *p*=0.000 and negative OR=0.394. It implied that respondents who lived in urban areas faced a higher risk of maternal mortality due to miscarriage and abortion compared to rural mothers. Thus, there was a correlation between parity and residence with maternal mortality due to miscarriage and abortion (Table 3).

Table 3 Logistic Regression Test of Parity and Residence with Maternal Mortality Due to Miscarriage and Abortion

Parity	Maternal Mortality		Total n (%)	*p*	Odds Ratio (95% CI)
	Life n (%)	Death n (%)			
> 3 children	2,412 (16.30)	9 (0.06)	2,421 (16.36)		0.475
≤ 3 children	12,324 (83.25)	57 (0.39)	12,381 (83.64)	0.005*	0.284-0.794
Urban	4,121 (27.85)	15 (0.1)	4,136 (27.95)		0.394
Rural	10,615 (71.71)	51 (0.34)	10,666 (72.05)	0.000*	0.258-0.602

*Meaningful if p-value < 0.05

DISCUSSION

The Ministry of Health categorizes the party into an ideal parity (less than or equal to three-born children) and non-ideal parity (more than three-born children). Women with high parity are riskier in future pregnancy. Most respondents in this study had low or ideal parity (83.64%). Parity is intricately linked to complications during childbirth, leading to maternal and neonatal mortality (Kurniawan and Melaniani, 2019). The parity of 2-3 deliveries is associated with low maternal mortality risk and vice versa. Meanwhile, mothers with high or non-ideal parity in this investigation were 16.36%.

This paper found a correlation between parity and maternal mortality. Respondents with more than three-born children had a higher risk of maternal mortality compared to those with less than or equal to three-born children. It aligns with the Ministry of Health of the Republic of Indonesia report in 2018, indicating that having too many kids results in high demands on family resources. There are disparities between needs and resources, specifically attention and affection among family members, since mothers prioritize

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one of their children. Consequently, mothers are becoming progressively susceptible to health issues. Their survival capacity is also diminishing due to the demands of pregnancy that necessitate a focus on maternal and fetal health. Thus, parents should consider health, economic factors, caregiving, and other significant considerations to decide the number of children. They may seek counsel from health professionals to obtain suitable Family Planning services. Mothers who bear many kids are at high risk of maternal mortality (Kementerian Kesehatan RI, 2020). According to research by Hazairin *et al.* (2021), decreased reproductive organ functions can elevate the risk of labor difficulties, low birth weight, and other health issues resulting in maternal mortality. Moreover, high parity is typically correlated with the old mother's age and reduced birth intervals, elevating the risk of maternal mortality (Hazairin *et al.*, 2021). Thus, encouraging the government to enhance the family planning program for the community and increasing awareness of the dangers associated with pregnancy, labor, and postpartum periods that may arise with high or non-ideal parity is crucial.

Papua is an island in eastern Indonesia, where the population typically experiences impoverished, isolated, and underdeveloped circumstances. Presidential Regulation Number 131 of 2015 identifies 122 districts as undeveloped areas in 2015 to 103 districts, or 84% in 2019, located in the eastern portion of Indonesia (BPS Statistics Indonesia, 2020b). The Eastern Region of Indonesia is characterized by mountainous terrain, hilly landscapes, and steep topography, comprising small islands divided by the sea (Badan Pengembangan Infrastruktur Wilayah (BPIW) Kementerian PUPR, 2017). Insufficient infrastructure, challenging accessibility, limited regional connectivity, inadequate service availability in health, education, and other essential areas, and diverse natural conditions prevent individuals from optimally fulfilling their basic needs, leading to a decreased quality of life (Bappenas, 2016). Residency significantly influences the accessibility of healthcare services. Pregnant women who live in rural are typically isolated communities. They also have challenging transportation. They potentially have higher maternal mortality rates due to prolonged travel times to health services when referred, as well as limited access to prenatal care. The prevalence of maternal mortality is elevated in women living in rural regions and lower middle-class economies (WHO, 2023).

Most respondents in this investigation lived in rural areas. This research found that residence correlated with maternal mortality due to miscarriage and abortion. Respondents who lived in urban areas faced a higher risk of maternal mortality due to miscarriage and abortion compared to rural mothers. The results may be due to unintended pregnancies associated with hazardous abortion procedures. Indonesian Basic Health Research data showed the annual incidence of abortion is 2.5 million, with a higher prevalence in urban regions (Kementerian Kesehatan RI, 2020). In 2018, Papua Province ranked 10th in Indonesia for the number of miscarriages and abortion cases during the past five years. The Indonesian Basic Health Research provides a nationwide overview of the prevalence of miscarriage and abortion, unplanned

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pregnancy, and attempted miscarriage and abortion in Indonesia. It also becomes a foundation to correlate demographic and socio-economic to evaluate the motivations for abortions (Setia Pranata and Sri Sadewo FX, 2010). However, there is no data to identify the causes of mortality due to miscarriage and abortion in adult women; only information about adolescent pregnancies is available. Childbirth, miscarriage, or elective abortion without medical justification can significantly increase the risk of adolescent or maternal mortality (Ray *et al.*, 2024).

CONCLUSION

Parity and residence significantly correlate with maternal mortality due to miscarriage and abortion. The parity of more than three children and urban residence are its risk factors. The research findings provide a strong foundation for future policies and interventions to reduce maternal mortality in Papua Province.

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The Efficacy of the Integrated Health Service Post Cadres Training in Noncommunicable Disease Prevention Among Older People in Southwest Papua

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A B S T R A C T

Noncommunicable diseases (NCDs) are the leading causes of morbidity and mortality globally, with a significant impact on older people, particularly in regions with limited healthcare access, such as Southwest Papua. Community-based approaches, such as the Integrated Health Service Post program, potentially enhance the early detection and prevention of NCDs. However, the implementation still faces several challenges. This study evaluates the efficacy of the Integrated Health Service Post cadres training in improving the early detection and prevention of NCDs and healthy lifestyle changes among older people in Southwest Papua. It used a quasi-experimental design with a prospective approach involving 150 older people from six congregations of the Indonesian Protestant Church in Southwest Papua. The intervention comprised cadres training based on a structured module for the early detection and prevention of NCDs, followed by implementing the Integrated Health Service Post over six months. Data were collected using validated instruments and analyzed using statistical software. The results demonstrated a statistically significant improvement in the early detection of NCDs in the intervention group compared to that in the control group (p<0.001). In addition, there are more significant improvements in physical activity and healthy eating habits and the reduction of NCD risk factors in the intervention group compared to the control group. Cadres' adherence to the Standard Operating Procedures (SOP) of the Integrated Health Service Post was also high. In conclusion, empowering health cadres through community-based training significantly improves preventive health outcomes among older people in areas with limited healthcare access.

INTRODUCTION

Noncommunicable diseases (NCDs) such as diabetes, hypertension, and cardiovascular diseases have emerged as significant global health challenges, particularly in developing countries. Older people have high vulnerability due to age-related factors, unhealthy lifestyles, and limited access to preventive healthcare services (Reynolds 3rd *et al.*, 2022). In Indonesia, recent data indicated that NCDs caused over 60% of the deaths among the elderly, rendering this issue a public health priority (BKPK, 2023).

Community-based approaches have demonstrated their efficacy in reaching vulnerable populations in remote areas. By utilizing community empowerment, programs such as the Integrated Health Service Post enhance access to healthcare services and raise awareness regarding the prevention of chronic diseases and NCDs (Tapela *et al.*, 2019; Sujarwoto and Maharani, 2022). Further, health cadres play a crucial role in the early detection of NCD risk factors, providing health education, and encouraging lifestyle modifications (Budreviciute *et al.*, 2020; Ahmed *et al.*, 2024; Haregu *et al.*, 2024). However, implementing these programs still faces challenges, including insufficient cadre training, limited resources, and difficulty maintaining program sustainability.

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With its unique geographic and demographic characteristics, Southwest Papua faces significant disparities in access to preventive healthcare services. Older people in this region infrequently receive early detection or routine health screenings, leading to late-stage diagnoses of NCDs with severe complications. Although the Integrated Health Service Post program has been initiated, it remains suboptimal due to inadequate cadre training and logistical support (BKPK, 2023).

Previous studies have explored the potential of health cadres training to improve disease prevention. However, empirical evidence demonstrating the effectiveness of training models designed for remote areas with diverse cultures remains limited (Haldane *et al.*, 2019; Buljac-Samardzic, Doekhie and van Wijngaarden, 2020; Pilbeam and Karanikas, 2023). These theoretical and practical challenges create a research gap that necessitates identifying the most effective approaches for empowering local communities to support the early detection of NCDs. Addressing this gap could significantly improve public health among older persons and reduce the burden of chronic diseases in Indonesia.

This study evaluates the efficacy of the Integrated Health Service Post cadres training in improving the early detection and prevention of NCDs and healthy lifestyle changes among older people in Southwest Papua. Theoretically, this study contributes to community empowerment through empirical evidence in a unique context. From a practical standpoint, this study presents a replicable implementation model to strengthen preventive healthcare services in areas with limited health access. This innovation involves a training approach based on a local context with a module designed to enhance the effectiveness and sustainability of the program. This study contributes to public health literature by demonstrating that a combination of structured training, ongoing support, and collaboration with formal healthcare facilities is crucial for the success of community-based programs (Zajac *et al.*, 2021; McLaney *et al.*, 2022; Elsey *et al.*, 2023; Scott and Manning, 2024). The findings of this research could establish a foundation for similar interventions in other regions, expanding the benefits of preventive healthcare services to the most vulnerable populations.

METHOD

This study utilized a quasi-experimental design with a prospective approach over six months. The selection of this design was predicated on resource constraints and the necessity of assessing interventions under real-world field conditions, enabling researchers to monitor temporal changes within the target population. The Authors chose a prospective timeframe to facilitate continuous data collection, encompassing cadres training, action implementation, and outcome evaluation in the Integrated Health Service Post. As this was not a randomized study, the Authors implemented bias control through demographic matching between the intervention and control groups based on age, sex, and initial health status.

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The intervention comprised community-based Integrated Health Service Post cadres training using the TIDieR checklist-based guide. The training encompassed theoretical and practical aspects related to the early detection of NCDs, including measuring blood pressure, blood glucose, body weight, and waist circumference. The Authors also trained cadres to provide health education to older people. Standardization of the procedures was ensured through a structured training module designed by health experts from the Health Polytechnic of Health Ministry Sorong. The research team monitored adherence and fidelity monthly through supervision. The supervision evaluated cadres' adherence to the Standard Operating Procedures (SOP) of the Integrated Health Service Post. There were no modifications to the intervention during the study. There were also no blinding procedures due to logistical constraints. The control intervention involved the Public Health Centre's routine health check-ups without cadres training. The intervention timeline included cadres training in the first month, implementation in the second to fifth months, and the final evaluation in the sixth month.

The inclusion criteria were people aged ≥60, registered as congregants in one Indonesian Protestant Church or *Gereja Protestan di Indonesia* (GPI) congregation in the Sorong-Manokwari region, and agreed to informed consent. The exclusion criteria encompassed older persons with severe cognitive impairment or terminal conditions that would preclude participation in Integrated Health Service Post activities. The population exhibited heterogeneous demographic characteristics, with most participants originating from church communities with limited access to health care services. Recruitment was conducted through church announcements and initial screenings by trained cadres. The study was implemented in six congregations of GPI Papua Klasis Sorong-Manokwari: Diaspora, Galilea, Betlehem, Petra, Bukit Zaitun, and Karmel. The selection of this setting was predicated on the high prevalence of NCDs in the area and the church's commitment to support public health programs. Informed consent procedures were conducted in writing. There were also regular community visits to ensure continued participation.

The measurements used validated instruments, such as digital sphygmomanometers (reliability ≥95%), standard clinical glucometers, and digital scales. Demographic data collection was through structured interviews and health examination results using case report forms (CRF). The data collectors underwent intensive training for one week for consistent data collection procedures. Weekly data audits ensured quality control to detect and rectify errors. The data were stored in a password-protected data-management system with a daily backup for security—multiple imputation methods addressed missing data.

Statistical analysis used the latest version of the SPSS software. The primary analysis involved comparing the rates of early NCD detection between the intervention and control groups using a t-test or Mann-Whitney U test, contingent upon data distribution. Secondary analysis included the intervention's impact on other variables, such as respondents' lifestyle changes. The Authors performed a sensitivity analysis to

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assess the reliability of the results. Subgroup analyses were conducted based on age and sex. A per-protocol analysis evaluated the effectiveness of the intervention in participants who wholly adhered to the protocol. The Authors used a 95% confidence interval for all parameters, with multiple testing corrections using the Bonferroni method when necessary.

This study was approved by the Health Research Ethics Committee of Health Polytechnic of Health Ministry Sorong with a Certificate Number: DM.03.01/3/445/2024. Participants' confidentiality was ensured by removing personal identifiers from the collected data. Risk management procedures included referrals for medical consultations for older people with high NCD risk. Respondents did not receive financial compensation but were provided with free health screening services. The Authors implemented amendment protocols and dissemination policies according to the standards. All findings will be communicated to the participants as comprehensible report summaries.

RESULT

Table 1 summarises the characteristics of the respondents, consisting of people aged ≥60 years from six congregations of the GPI Papua Klasis Sorong-Manokwari. There were 150 participants in this study, 75 in the intervention group and 75 in the control group. Demographic characteristics included age, sex, education level, marital status, and initial health status. There were no statistically significant differences between both groups.

Table 1. The Characteristics of Respondents

Characteristics	Intervention Group (n=75)	Control Group (n=75)	*p*
Age (mean ± SD)	68.2 ± 5.4 years	67.8 ± 6.1 years	0.672
Sex (%)			
Male	40 (53.3%)	38 (50.7%)	0.723
Female	35 (46.7%)	37 (49.3%)	
Education Level (%)			
No formal education	20 (26.7%)	22 (29.3%)	0.812
Elementary school or equivalent	30 (40.0%)	28 (37.3%)	
Junior/Senior high school	25 (33.3%)	25 (33.3%)	
Marital status (%)			
Married	50 (66.7%)	52 (69.3%)	0.852
Single/divorced	25 (33.3%)	23 (30.7%)	
Initial Health Conditions (%)			
Hypertension	30 (40.0%)	28 (37.3%)	0.811
Diabetes Mellitus	20 (26.7%)	22 (29.3%)	
Obesity	25 (33.3%)	23 (30.7%)	

Note: ($p > 0.05$), indicating a balanced distribution.

Table 2 presents the results of the early detection and prevention of Noncommunicable diseases (NCDs) before and after the intervention in both the intervention and control groups. It indicates a significant

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improvement in the early detection of NCDs in the intervention group compared to that in the control group.

Table 2. Early Detection and Prevention of NCDs Before and After Intervention

	Before Intervention	After Intervention	*p*
Intervention Group	35 (46.7%)	60 (80.0%)	<0.001**
Control Group	33 (44.0%)	40 (53.3%)	0.072

Note: p (<0.001)

Table 3 shows healthy lifestyle changes in respondents. It exhibits a more significant improvement in physical activity and healthy eating habits and the reduction of NCD risk factors in the intervention group compared to the control group.

Table 3. Healthy Lifestyle Changes in Respondents

Sub-variables	Intervention Group (n=75)	Control Group (n=75)	*p*
Increased physical activity (%)	50 (66.7%)	30 (40.0%)	<0.001**
Improved healthy eating habits (%)	55 (73.3%)	35 (46.7%)	<0.001**
Reduced NCD risk (%)	45 (60.0%)	28 (37.3%)	<0.001**

Table 4 points to cadres' adherence to the Standard Operating Procedures (SOP) of the Integrated Health Service Post. It represents high adherence, indicating maintenance in the quality of the intervention.

Table 4 Cadres' Adherence to the Standard Operating Procedures (SOP) of the Integrated Health Service Post

Procedures	Adherence (%)
Blood Pressure Examination	25%
Blood Sugar Examination	23.3%
Health Education	20%
Data Documentation and Reporting	25%

DISCUSSION

This study demonstrated that the Integrated Health Service Post cadres training significantly improved the early detection and prevention of Noncommunicable diseases (NCDs) among older people in Southwest Papua. Respondents in the intervention group exhibited increased healthy lifestyles, including increased physical activity and healthy eating habits. These research results underscored the efficacy of a community-based program for enhancing health outcomes in vulnerable populations. Furthermore, this finding indicated high cadres' adherence to standard operating procedures (SOPs), ensuring the quality of the intervention's implementation. Although the control group also showed slight improvement in the early detection of NCDs, these changes were not as substantial as in the intervention group. Thus, the intervention contributed to improved outcomes.

Contextually, these study results support the community empowerment theory, emphasizing the importance of local community participation in improving health outcomes (Luisi and Hämel, 2021; Kruahong *et al.*, 2023; Steiner, McMillan and Hill O'Connor, 2023; Dushkova and Ivlieva, 2024).

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Involving cadres who understand the local culture creates more relevant and effective interventions, addressing gaps in implementing preventive programs in underserved communities (Bantham *et al.*, 2021; Joo and Liu, 2021; Ravaghi *et al.*, 2023). These paper's findings also align with studies by Randell *et al.*, 2024), indicating that community health cadres could enhance access to preventive health services and support behavior change. However, the long-term consistency in cadre adherence requires further investigation.

This study provides evidence that the Integrated Health Service Post cadres training enhanced community capacity for early detection of NCDs and established a locally based preventive health system. High cadre adherence indicates that the intervention was designed with the local cultural context and community needs as key elements of its success. It suggests the intervention can be sustainable when the community is involved in the program. In addition, high cadre adherence shows cadres' intrinsic motivation to support community health. Social support from church congregations as moral responsibility may influence this research. However, the motivational elements contributing to community-based programs' success need further analysis.

The significant improvement in the early detection of NCDs in the intervention group has substantial practical implications for healthcare services in remote areas. Trained Integrated Health Service Post cadres can be essential intermediaries between the community and formal healthcare facilities, often inaccessible in Southwest Papua. Reducing NCD risk through healthy lifestyle changes also supports preventive approaches to mitigating the burden of chronic diseases.

However, this investigation also indicated that the control group experienced a slight improvement despite not receiving intervention. This phenomenon may be attributed to spillover effects, where health information is disseminated from cadres to community members outside the intervention group. Thus, consistent health education and communication facilitated behavioral change.

Practically, this study offers a replicable model for strengthening preventive healthcare services in resource-limited areas. The implementation can be expanded to other regions by adapting the training modules and SOPs to local needs. The benefits for stakeholders include improved access to healthcare services, reduced NCD risk, and reduced strain on formal healthcare facilities. Thus, this intervention is highly relevant for supporting national health programs.

However, this study has several limitations. Methodologically, quasi-experimental design restricts the capacity to control for bias, such as spillover effects. The sample size was also constrained, encompassing only six congregations in a specific area, which may limit the generalisability of the results. In addition, data collection challenges included limited access to remote locations and difficulties maintaining consistent participation from older people.

Implementation recommendations include integrating Integrated Health Service Post cadres with formal healthcare systems through closer collaboration with Community Health Centers. Ongoing training for cadres can also help them address more complex health challenges, such as the sustainable management of chronic diseases. Hopefully, there will be an improved quality of life for older people and reduced morbidity from NCDs, contributing to public health development.

CONCLUSION

The Integrated Health Service Post cadres training can improve the early detection and prevention of NCDs and healthy lifestyle changes among older people in Southwest Papua. This study broadens the theoretical understanding of the importance of community empowerment in improving access to and outcomes of health in remote areas while also providing practical contributions through an intervention model that can be replicated in similar regions. Further research should explore the program's sustainability, long-term impacts, and technology integration to support Integrated Health Service Post cadres. In addition, further studies should adopt a randomized controlled trial design to mitigate bias and enhance internal validity. Other investigations should expand the scope to include other congregations in Papua and other remote areas to evaluate the sustainability of this intervention. Additionally, in-depth research on the motivational factors of cadres and their impact on the success of community-based programs could provide new insights to support the implementation of similar health programs. Furthermore, collaboration between the community, Community Health Centers, and policymakers is crucial to ensure the sustainability of this proven effective program.

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Community-Based Health Education Improves Early Detection of Diabetes Risk in A Religious Community: A Quasi-Experimental Study in Indonesia

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A B S T R A C T

Diabetes frequently remains undiagnosed in the early stages, resulting in delayed effective management. This study analyses the effectiveness of community-based health education in improving knowledge levels, early detection of diabetes risk, and diabetes risk factors, including body mass index (BMI), waist circumference, and blood pressure, in the GKI Oikumene Bahtera Injil Aspol Remu community. It was a quasi-experimental study utilizing a prospective approach conducted over six months. There were 110 respondents, 55 in the intervention and 55 in the control group. The health education intervention comprised four intensive sessions encompassing diabetes comprehension, lifestyle management, and early detection of diabetes risk. Data were collected using validated questionnaires and physical parameter measurements. Data analysis used the paired t-test and chi-square test. The results showed that knowledge scores increased from 55.3 ± 10.2 to 82.4 ± 8.5 ($p<0.001$) in the intervention group. In addition, the early detection rate in the intervention group was higher, 70.9%, compared to that in the control group, which was 31.8%. In addition, there were significant reductions in body mass index (-1.2 ± 0.8 kg/m²) and systolic blood pressure (-5.4 ± 4.2 mmHg) compared to the control group. Physical activity also increased significantly (+45.6 ± 15.3) in the intervention group. Further, the 31–50-year age group has the highest early detection rates. Community-based health education increases knowledge levels and early detection of diabetes risk, as well as decreases diabetes risk factors, such as decreased body mass index (BMI) and blood pressure, and increased physical activity, especially in productive age groups.

INTRODUCTION

Diabetes mellitus represents a major global health challenge, with an increasing prevalence, particularly in developing countries. According to the International Diabetes Federation (Magliano and Boyko, 2021), more than 537 million individuals worldwide have diabetes. The incident is projected to increase to 643 million by 2030. Diabetes mellitus frequently remains undiagnosed in the early stages, resulting in delayed effective management. Health education and early detection play crucial roles in preventing and managing diabetes, especially in communities with low levels of health literacy. Community-based approaches are promising strategies, as they can reach populations that are difficult to access through the formal health system and utilize existing social capital (Adams, 2020; Ahmed *et al.*, 2022).

Diabetes is a significant threat in Indonesia, with a prevalence of 10.4% in adults (Soeatmadji *et al.*, 2023; Tanoey and Becher, 2023; Darmawan *et al.*, 2024). The Malasimsa Public Health Centre working area, which encompasses the faith-based community at the Indonesian Christian Church or Gereja Kristen Indonesia GKI Oikumene Bahtera Injil Aspol Remu, faces similar challenges. There was a high prevalence of diabetes risk factors such as obesity, hypertension, and a sedentary lifestyle. Those issues

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indicate the need for more effective interventions. Health education approaches in faith-based communities have considerable potential to increase public awareness, given the strong social influence within these communities. However, implementing health education programs remains limited and lacks systematic evaluation.

A major challenge in diabetes management is the early detection of risk factors. Many individuals are unaware of diabetes risks until complications arise, leading to significant health and economic burdens. This challenge is particularly evident in areas with limited access to health facilities and low levels of health literacy, such as in the Malasimsa Public Health Center (PHC) working area. Individual counseling and health screening in health facilities only reach a small proportion of the at-risk population. Community-based health education offers a potential solution; however, its effectiveness has not yet been fully explored in local contexts.

Recent research suggested that community-based health education could increase awareness, knowledge, health, and preventive behavior (Jones *et al.*, 2015; Suprayitno *et al.*, 2021; Paudel *et al.*, 2022; Artawan Eka Putra *et al.*, 2023; Badulla, Alshakka and Mohamed Ibrahim, 2023; Mathias *et al.*, 2023). However, most research focused on urban populations with superior access to health resources or did not consider the local cultural context (Amalba *et al.*, 2020; Li *et al.*, 2023; Rong, Ristevski, and Carroll, 2023). At the same time, other investigations emphasized the importance of cultural context in the success of health programs but often lacked exploration of faith-based communities as research subjects (Latif, 2020; Dwivedi *et al.*, 2021; Layson, Carey and Best, 2023; Afrianti *et al.*, 2024). Other studies also frequently employed less robust designs, making it challenging to measure the long-term impact (Alderwick *et al.*, 2021; Vaiyapuri *et al.*, 2023; Elsheli, Patrick and Stokes, 2024; Leong *et al.*, 2024). These research gaps underscore the necessity for more comprehensive studies with community-based approaches in specific contexts, such as faith-based communities, to evaluate the efficacy and sustainability of community-based health education programs. This study offers an approach to integrating health education into faith-based community activities. This innovation supports existing theories and creates a new model relevant to the socio-cultural context of Indonesian society. From a practical standpoint, this research can potentially enhance the effectiveness of public health programs in areas with limited access to formal health facilities.

This study analyses the effectiveness of community-based health education in improving knowledge levels, early detection of diabetes risk, and diabetes risk factors, including body mass index (BMI), waist circumference, and blood pressure, in the GKI Oikumene Bahtera Injil Aspol Remu community. It expands the application of the Health Belief Model (HBM) theory in the context of faith-based communities (Jones *et al.*, 2015; Glanz, 2017; Alamer, 2023). From a practical perspective, this research

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can also be a foundation for developing relevant and contextualized community-based health education programs. This paper utilizes innovative approaches, i.e., the integration of health education with church community activities. It can potentially reach populations that have been challenging to access through the formal health system.

METHOD

This study used a quasi-experimental design with a prospective approach, measuring the effectiveness of community-based health education in enhancing knowledge and early detection of diabetes risk in the target population over a specified period. A prospective approach was selected, enabling observation of changes over time and providing more robust evidence than a retrospective design. The study duration was six months, encompassing participant recruitment to the final evaluation. The independent variable in this study was health education. At the same time, the dependent variables comprised knowledge level, early detection of diabetes risk, and diabetes risk factors, including body mass index (BMI), waist circumference, and blood pressure. The Authors implemented various strategies to control potential bias. Participant recruitment was conducted inclusively based on clearly defined criteria to avoid selection bias. Information bias was mitigated through the utilization of validated instruments. Confounding bias was controlled by regression-model-based statistical analysis to adjust for confounding variables that might influence the study results.

The intervention in this study utilized a group-based health education approach with materials developed based on national guidelines. The program consisted of four main sessions, each 90 minutes, covering a range of salient topics. The first session addressed a fundamental understanding of diabetes and its risk factors. The second session focused on managing a healthy lifestyle, including nutrition and physical activity. The third session taught risk factors measurement techniques, such as BMI calculation and blood pressure measurement. The final session examined prevention strategies and early detection of diabetes. The intervention procedures were standardized to ensure uniformity of implementation across groups. Researchers provided training materials to health workers through simulations and practical guidance over two training days. Attendance registers monitored participant compliance. There was a brief evaluation after each session. The principal investigator provided direct supervision during each session to maintain fidelity.

Meanwhile, the control group received only standardized information in leaflets without health education. The intervention schedule was conducted at separate locations and times to prevent potential information contamination between the groups. Additionally, a blinding procedure was applied to data analysis (single-blinded), wherein respondents did not know the allocation of intervention or control groups to

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ensure objectivity in the results processing. The sample size was determined through power analysis with a significance level of 5% (α=0.05) and a test power of 80% (1-β=0.80). Based on the estimated prevalence of diabetes in the Malasimsa region (10 %), a minimum of 50 participants were required in each group. The Authors recruited 110 participants to anticipate a 10% attrition rate.

The recruitment process was conducted through a church-based approach, utilizing regular announcements and collaborating with local community leaders. The informed consent procedure was implemented in writing after giving respondents a detailed explanation of the purpose, benefits, risks, and their rights as research participants. This study employed SMS reminders and regular home visits to enhance participant retention and mitigate attrition.

The measurement instruments in this study included validated knowledge and behavior questionnaires with Cronbach's alpha reliability >0.7. In addition, physical measurements such as body mass index (BMI), waist circumference, and blood pressure using standardized and regularly calibrated tools. Data collection procedures were standardized through intensive training of data collectors to ensure consistency and accuracy. The principal investigator conducted quality control through field supervision and random rechecking of the data. All data were stored digitally on a secure server with a regular backup system. Multiple imputation analysis was applied to address missing data. The data collection timeline was divided into three stages: pre-intervention at month 0, intervention implementation from months 1 to 3, and post-intervention evaluation at month 6.

Data analysis in this study was conducted using SPSS software version 26.0. The primary analytical methods employed included the paired t-test and chi-square test to compare outcomes before and after the intervention. Furthermore, a secondary analysis was performed using logistic regression to evaluate the factors contributing to changes in early detection. Subgroup analyses were also conducted based on age to identify responsiveness to the intervention.

This study was approved by the Ethics Committee of Health Polytechnic of the Health Ministry of Sorong, Indonesia, with certificate number DM.3.1/472/2024. Informed consent procedures ensured data confidentiality and the protection of respondents' rights. There were minimal risks and no invasive interventions in this investigation. Data management adhered to privacy protection standards. The results of the study will be disseminated openly under the data-sharing policy. Adverse event reporting protocols ensured prompt response in the event of complications during the research.

RESULT

Table 1 presents respondents' demographic and baseline health characteristics. The respondent characteristic data indicates a balanced distribution between the intervention and control groups. There

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are no statistically significant differences (p>0.05) in age, sex, BMI, blood pressure, or family history of diabetes. Most respondents are aged 30–50 years. In addition, most have above-normal BMI, suggesting a high prevalence of obesity in this community. Thus, the relevance of this study in addressing diabetes risk factors is crucial.

Table 1. The Characteristics of Respondents

The Characteristics of The Respondents	Intervention Group (n=75)	Control Group (n=75)	*p*
Age (years, mean ± SD)	42.1 ± 10.5	43.3 ± 9.8	0.523
Gender (Male, %)	47.3%	50.9%	0.712
Body Mass Index (BMI)	25.4 ± 3.2	26.1 ± 3.0	0.214
Blood Pressure (mmHg)	128.5 ± 12.7	129.7 ± 11.9	0.637
Family History of Diabetes (%)	21.8%	20.0%	0.834

Table 2 summarizes knowledge level and early detection of diabetes risk assessed using pre-and post-test scores. It shows that knowledge scores increased from 55.3 ± 10.2 to 82.4 ± 8.5 in the intervention group. Knowledge levels improve significantly in the intervention group after health education (p< 0.001). In addition, the early detection rate in the intervention group is higher, 70.9%, compared to that in the control group, which is 31.8%. The early detection of diabetes risk significantly doubles in the intervention group compared to that in the control group.

Table 2. Knowledge Levels and Early Detection of Diabetes Risk

Variables	Intervention Group (n = 55)	Control Group (n = 55)	*p*
Knowledge Score (Pre-test)	55.3 ± 10.2	54.8 ± 11.0	0.794
Knowledge Score (Post-test)	82.4 ± 8.5	57.2 ± 10.8	<0.001
Early Detection Rate of Diabetes Risk (%)	70.9%	31.8%	<0.001

The results indicated the positive impact of health education on minimizing diabetes risk factors. There were significant reductions in body mass index (-1.2 ± 0.8 kg/m²) and systolic blood pressure (-5.4 ± 4.2 mmHg) in the intervention group compared to the control group. In addition, physical activity increased significantly (+45.6 ± 15.3) in the intervention group (table 3).

Table 3. Changes in Diabetes Risk Factors

Variables	Intervention Group (n = 55)	Control Group (n = 55)	*p*
Body Mass Index (BMI, kg/m²)	-1.2 ± 0.8	-0.2 ± 0.5	<0.001
Systolic Blood Pressure (mmHg)	-5.4 ± 4.2	-1.1 ± 3.6	<0.001
Physical activity (minutes/week)	+45.6 ± 15.3	+5.8 ± 12.1	<0.001

Table 4 shows increased early detection rates across all age subgroups. Further, the 31–50-year age group has the highest early detection rates. Thus, the productive age group (31–50 years) most responds to the health education intervention.

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Table 4. Early Detection Rates by Age Subgroup

Age Group (years)	Intervention Group (n = 55)	Control Group (n = 55)	*p*
18–30	65.3	28.7	0.002
31–50	75.8	33.1	<0.001
>50	70.0	35.5	0.011

DISCUSSION

This study demonstrated that community-based health education significantly enhanced knowledge levels and early detection of diabetes risk in the GKI Oikumene Bahtera Injil Aspol Remu community. Furthermore, the program contributed to decreased diabetes risk factors, such as reduced body mass index (BMI) and blood pressure and increased physical activity. These findings were consistent across age groups, with the most substantial impact observed in the 31-50 age group. Integrating these findings with the Health Belief Model (HBM) theory suggests that health education enhances community perceptions of diabetes risk and promotes health behavior change. This finding aligns with previous research indicating that community-based interventions effectively improved health literacy and chronic disease prevention (Walters *et al.*, 2020; Shao *et al.*, 2023).

The primary findings indicated that community-based health education significantly increased the early detection of diabetes risk in a religious community. These results corroborate the theory that providing relevant and comprehensible information can increase individuals' awareness of their health conditions. Thus, health education is applicable as a viable preventive approach in faith-based communities.

In addition, this investigation showed alterations in physical parameters, such as decreased BMI and blood pressure. There were also significant changes in community behavior, including increased physical activity, which is one of the indicators of lifestyle change. These diabetes risk factor reductions are likely attributable to increased risk awareness and practical guidance during the intervention. The community-based approaches effectively improve chronic disease prevention, particularly in areas with limited access to health facilities (Byun *et al.*, 2021). This finding is consistent with prior research, demonstrating the efficacy of community-based health education interventions in reducing the prevalence of diabetes risk factors (Fritz *et al.*, 2024).

However, this study revealed that the young age group (18-30 years) was less responsive to health education than those in the productive age group. This finding diverges from the study by (Chen and Wang, 2021), who found that younger age groups were more responsive to digital-based health campaigns. This discrepancy may be due to the social context and intervention methods. The method in this study may be less congruent with the communication preferences of the younger generation. In other words, this research had limited utilization of digital technology in information dissemination.

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An unanticipated finding was that a small proportion of respondents resisted change despite receiving health education. This resistance may be due to personal beliefs or adherence to unhealthy traditional dietary practices. In addition, there is an absence of social support for adopting a healthy lifestyle, particularly in neighborhoods with a high prevalence of diabetes risk factors.

This study contributes to the literature by demonstrating that community-based health education can reinforce elements of HBM, particularly in enhancing risk perception and the benefits of behavior change. In addition, it addresses the knowledge gap regarding the effectiveness of health education in faith-based communities. This research provides novel insights into how a structured and contextualized framework can significantly impact the promotion of health behavior changes. Furthermore, it offers relevant health education implementation guidelines for stakeholders, such as local governments and public health organizations. Depending on the local cultural context, it can be applied in other communities with minor modifications. Practical recommendations include utilizing digital media to engage younger age groups and integrating health education programs with primary health care. Implementing this study can potentially reduce the prevalence of diabetes through community-based prevention strategies.

However, this study had several limitations. First, the quasi-experimental design may increase the potential for selection bias. Second, the sample was limited to a specific faith-based community, necessitating cautious generalization of the results. Third, the six-month observation period may be insufficient to measure the long-term impact of this intervention. In addition, data collection relying on self-reporting may introduce information bias. Future research could employ a randomized controlled trial design to enhance internal validity. Moreover, the development of technology-based interventions, such as health applications or online modules, could be evaluated for their effectiveness in younger age groups. Other unexplored aspects were social support and local culture's influence on health education's success. New research questions include how variations in health education formats affect their effectiveness across different demographic groups.

CONCLUSION

Community-based health education increases knowledge levels and early detection of diabetes risk, as well as decreases diabetes risk factors, such as decreased body mass index (BMI) and blood pressure, and increased physical activity, especially in productive age groups. These findings strengthen community-based approaches in chronic disease prevention, supporting the Health Belief Model theory on the importance of perceived risks and benefits in driving health behavior changes. In addition, this study provides practical insights into the development of community-based interventions in diverse local contexts. Moreover, it supports efforts to strengthen public health policies by encouraging the

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implementation of health education programs at the community level, potentially reducing the prevalence of diabetes through early detection and proactive prevention.

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Hematology Profiles in Colorectal Cancer Patients in Bali

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A B S T R A C T

Colorectal cancer is a leading cause of cancer-related deaths worldwide. This study explores blood profile and cancer staging in colorectal cancer patients in Bali. It was a descriptive-analytical study that collected demographic and clinical data from medical records of colorectal cancer patients at Prof. Dr. I.G.N.G. Ngoerah Hospital. The results of the study showed the basic characteristics and hematology profiles of 100 colorectal cancer patients. The average age of patients was 55.6 ± 11.4 years, with 54% of the total sample being male. The average body mass index (BMI) was 21.1 ± 3.6 kg/m², with an average height of 161.9 ± 6.1 cm and an average weight of 55.3 ± 10.0 kg. Laboratory tests revealed an average hemoglobin (Hb) level of 11.0 ± 3.6 g/dL, red blood cell count of 4.0 ± 0.9 million/µL, white blood cell count of 11.2 ± 7.3 thousand/µL, and platelet count of 302.8 ± 154.8 thousand/µL. The average hematocrit (HCT) level was 33.7 ± 6.6 L/L. Liver function parameters indicated average aspartate aminotransferase (AST/SGOT) levels of 45.6 ± 63.6 U/L and alanine aminotransferase (ALT/SGPT) levels of 24.6 ± 29.4 U/L. Renal function was described by an average blood urea nitrogen (BUN) level of 21.8 ± 21.0 mg/dL, urea levels of 21.9 ± 21.2 mg/dL, and creatinine levels of 2.3 ± 11.5 mg/dL. Our study highlights the importance of hematology profiles in colorectal cancer patients as part of cancer screening examination. Further study with a larger number of samples and more diverse populations is needed to analyze the relation between variables.

INTRODUCTION

Colorectal cancer accounts for approximately 10% of all diagnosed cancer cases globally and has become one of the leading causes of cancer-related deaths. In women, colorectal cancer is the second most frequent cancer diagnosed, while it ranks third among men. Its incidence has become the highest in developed countries, though developing nations are also experiencing a significant rise in cases. By 2023, the global incidence of colorectal cancer is estimated to reach 2-5 million new cases. In Indonesia, colorectal cancer ranks third among the most diagnosed cancers and fourth as a cause of cancer-related deaths (Sung et al., 2021).

Clinical manifestations of colorectal cancer vary, including visible or occult rectal bleeding, changes in bowel habits, anemia, and abdominal pain. Diagnosis is typically established through colonoscopy, which provides direct visualization of the colon mucosa to detect lesions. Early-stage mucosal lesions are often inconspicuous, appearing as laterally spreading flat polyps that seem harmless, complicating early detection (Siegel et al., 2019).

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Colorectal cancer screening is critical, particularly for high-risk populations, as most patients are asymptomatic in the early stages. Symptoms only appear when the cancer has reached advanced stages, resulting in a poor prognosis. Regular screening in at-risk populations is expected to detect the disease early, thereby reducing morbidity and mortality rates and significantly improving patient prognosis (Rex et al., 2015). Individuals aged 45 years or older with new-onset rectal bleeding are advised to undergo colonoscopy. For younger patients, further evaluation is necessary to determine the risk, including family history, changes in bowel habits, unexplained weight loss, and the presence of blood in stools. This approach enables early detection across broader populations, improving clinical outcomes and increasing patient survival rates (Demb et al., 2024).

Various diagnostic modalities have been developed to support the diagnosis and evaluation of colorectal cancer, ensuring accurate diagnosis and optimal management planning. Radiological imaging, such as CT colonography, is often used as an additional method if colonoscopy results are insufficient. To detect metastases, both locoregional and distant, modalities like MRI and CT scans are highly useful, particularly for assessing cancer spread to organs such as the liver and lungs (Mármol et al., 2017).

Laboratory examinations also play a vital role in diagnosing and evaluating colorectal cancer. Complete blood counts, liver and kidney function tests, and occult blood detection tests in stools, such as fecal occult blood tests (FOBT) and fecal immunochemical tests (FIT), are frequently used in screening tests. Additionally, carcinoembryonic antigen (CEA) levels are also monitored; high CEA levels are often associated with poor prognosis. If postoperative CEA levels do not return to normal, it may indicate residual disease (Srivastava et al., 2001).

Histopathological examination is required to determine the disease stage, forming the basis for therapeutic management decisions. Modern tumor markers, such as mismatch-repair testing and immunoscore, are now routinely used in some medical facilities. Mismatch-repair testing is conducted through immunohistochemistry, and if the results are inconclusive, PCR-based microsatellite instability (MSI) testing is performed for clarity (Graham & Cassidy, 2012).

The etiology of colorectal cancer is multifactorial, involving complex interactions between genetic, lifestyle, and environmental factors. Risk factors include advanced age, unhealthy diet, obesity, physical inactivity, and smoking habits. A family history of colorectal cancer also affects the risk, with 10-20% of patients having affected relatives. This risk varies depending on the number of affected family members, the degree of kinship, and the age of diagnosis. The combination of genetic and environmental influences plays a significant role in the pathogenesis of colorectal cancer, and understanding these interactions provides deeper insight into the disease mechanisms (Schoen et al., 2015).

This study aimed to describe the hematology profile in colorectal cancer patients in Bali. The results of this study are expected to provide a strong scientific basis for understanding the nature of the disease and developing strategies for prevention, early diagnosis, and management for colorectal cancer in the future.

METHOD

This study was a descriptive-analytical study aimed to understand various factors through an observational approach by collecting data at a specific time. The study population included all colorectal cancer patients undergoing therapy at Ngoerah Hospital, Bali who met the established inclusion and exclusion criteria. Data was collected from patient medical records containing demographic data and laboratory test results. The data collection process was started in January 2024. Ethical approval for the study was granted by the Ethics Committee of the Faculty of Medicine, Udayana University, and Ngoerah Hospital with registration number 0488/UN14.2.2.VII.14/LT/2024.

A non-probability sampling technique was employed, as defined by Sarwono (2013), meaning that not all population elements had an equal opportunity to be selected as a sample. The method used was consecutive sampling, in which samples were selected sequentially based on inclusion criteria until the required sample size was achieved within a specific time frame. Sample size calculations were performed using the G*Power application with the following parameters: test family = $\chi 2$ tests, effect size = 0.6, alpha error probability = 0.05, power = 0.90, and degrees of freedom (df) = 1. Based on these calculations, a minimum sample size of 90 participants was required. To anticipate data loss during the research process, an additional 10% of the total sample size was included, bringing the minimum sample size to 99 participants. Data analysis was conducted using the SPSS software program. Demographic data and hematological profiles were presented descriptively using mean values for numerical data or percentages for categorical data. The data generated will serve as the foundation for further research, whether cross-sectional, longitudinal, or experimental.

RESULT

Based on data collection from patient medical records at Ngoerah Hospital, Bali, who met inclusion and exclusion criteria, a total of 100 samples were obtained. Table 1 describes the basic characteristics of colorectal cancer patients. The average age of the patients was 55.6±11.4 years, with males comprising 54% of the total samples. The mean body mass index (BMI) was 21.1±3.6 kg/m², with an average height of 161.9±6.1 cm and weight of 55.3±10.0 kg. The cancer stage was classified from 0 to 4, with 17 patients unclassified. The number of patients for stages 0, 1, 2, 3, and 4 were 10, 4, 11, 19, and 39, respectively, suggesting that many patients were diagnosed at advanced stages.

Hematology profiles are described in Table 2 and Table 3. Table 2 describes complete blood count (CBC) results, including hemoglobin (HGB), erythrocyte (RBC), leukocyte (WBC), thrombocyte (PLT), and hematocrit (HCT). The results showed a mean HGB level of 11.0±3.6 g/dL, RBC count of 4.0±0.9 million/µL, WBC count of 11.2±7.3 thousand/µL, and PLT count of 302.8±154.8 thousand/µL, and the average HCT value was 33.7±6.6 L/L.

Table 1. Basic characteristics of colorectal cancer patients

The characteristics of the respondents	Mean±SD or n (%)
Age, years old	55.6±11.4
Sex, Male	54 (54)
Body mass index, kg/m^2	21.1±3.6
Height, cm	161.9±6.1
Weight, kg	55.3±10.0
Cancer stage	
Not Classified	17
Stage 0	10
Stage 1	4
Stage 2	11
Stage 3	19
Stage 4	39

kg/m²: kilograms per square meter; cm: centimeter; kg: kilogram; SD, standard deviation; n, number of participants.

Table 2. Complete blood count results

Laboratory Parameter	Mean ± SD or N (%)
Hemoglobin (HGB), g/dl	11.0±3.6
Erythrocyte (RBC), mil/µL	4.0±0.9
Leukocyte (WBC), 10^3µL	11.2±7.3
Thrombocyte (PLT), 10^3µL	302.8±154.8
Hematocrit (HCT), %	33.7±6.6

g/dl, gram per deciliter; mil/µL, million cell per microliter; 10^3µL, thousand cell per microliter; %, percentage; SD, standard deviation; n, number of participants.

Table 3. Blood chemistry results

Laboratory Parameter	Mean ± SD or N (%)
Aspartate aminotransferase (AST)[1], U/L	45.6±63.6
Alanine aminotransferase (ALT)[1], U/L	24.6±29.4
Blood urea nitrogen (BUN)[2], mg/dL	21.8±21.0
Ureum[3], mg/dL	21.9±21.2
Creatinine[4], mg/dL	2.3±11.5

U/L, unit per liter; mg/dL, miligram per deciliter; SD, standard deviation; n, number of participants; 1, n=91; 2, n=96; 3, n=94; 4, n=95.

Table 3 describes blood chemistry results. Liver function parameters indicated a mean aspartate aminotransferase (AST) concentration of 45.6±63.6 U/L and alanine aminotransferase (ALT) concentration of 24.6±29.4 U/L. Kidney function parameters showed mean concentrations of blood urea nitrogen (BUN) at 21.8±21.0 mg/dL, ureum at 21.9±21.2 mg/dL, and creatinine at 2.3±11.5 mg/dL. These data provide an overview of basic characteristics and hematology profiles of colorectal cancer patients in Bali.

DISCUSSION

Previous studies have shown a relationship between colorectal cancer symptoms, disease stages, and prognosis. Early detection of colorectal cancer has been proven to significantly improve patients' survival rates (Maida et al., 2017). Our study provides some valuable data about basic characteristics and hematology profiles of colorectal cancer patients in Bali, that can be utilized for further study about risk factors and cancer pathogenesis.

Basic characteristics of the colorectal cancer patients showed an average age of 55.6±11.4 years, suggesting that the disease mostly happened in late adulthood. This finding followed a previous study that reported older patients aged more than 50 years as high-risk populations (Sung et al., 2021). The cancer stadium was classified from 0 to 4. The result showed that most of the patients were diagnosed at a late stage, 19 patients at stage 3 and 39 patients at stage 4. American Society of Colorectal Surgery reported that 70% of colorectal cancer cases were diagnosed in later stages when the patients had developed symptoms, including hemorrhage or occlusion (Vogel et al., 2022). Therefore, routine screening in the high-risk population becomes critical to prevent advanced disease.

In our patient samples, the average value of CBC results was within the normal range. However, as one of the CBC parameters, HB serves as an important parameter for the disease. Anemia, caused by low HB levels, frequently occurs in colorectal cancer patients, which is a result of gastrointestinal bleeding, systemic inflammatory processes, and side effects of cancer treatment. Gastrointestinal bleeding, whether visible like bloody stools (hematochezia) or occult, leads to chronic blood loss, resulting in iron deficiency anemia. Anemia, caused by gastrointestinal bleeding, is one of the clinical manifestations of malignancies in the colon and rectum. Hematochezia is commonly observed in colorectal cancer patients and can be used as a significant predictor for determining the stage of colorectal cancer (Schult et al., 2021).

Being routinely evaluated through HB measurement, anemia, as a symptom, offers advantages due to its specificity, ease of measurement, and high positive predictive value (PPV) compared to other clinical symptoms. Severe anemia has been identified as a crucial predictive factor for advanced-stage colorectal cancer. More advanced cancer has a higher risk of anemia caused by severe bleeding and inflammation. Pre-operative anemia symptoms have also been proven as an effective indicator for assessing cancer prognosis based on the stage (Saraste et al., 2017). Furthermore, optimal anemia management not only supports the overall health of patients but also enhances the success of ongoing cancer therapies (Majano et al., 2022). These findings underscore the importance of anemia evaluation within the clinical context of colorectal cancer, both for early detection and prognosis assessment.

Based on the blood chemistry results, we found a high serum creatinine level in our patient samples. Serum creatinine is an important parameter used to calculate the estimated glomerular filtration rate (eGFR), which is used to evaluate kidney function. Creatinine serum concentration had been studied for

years as a prognosis marker for several malignancies, including ovarian cancer, liposarcoma, and renal cell carcinoma (Lafleur et al., 2018).

Some studies have also evaluated the association between kidney functions, especially creatinine serum concentration, and the outcome of colorectal cancer patients. A multi-center cohort study found creatinine serum concentrations and overall survival of colorectal cancer patients. Furthermore, the study discovered that abnormal (low or high) creatinine serum concentration was associated with lower overall survival. Another cohort study also noted the fact that higher serum creatinine concentrations were associated with a 39% increase of all-cause mortality in patients with rectal cancer, but not colon cancer (Ose et al., 2023). Finally, another observational study observed that low eGFR as an independent risk factor for stage III colon cancer. In this study, a combination of preoperative eGFR and CEA levels would be beneficial in predicting postoperative adjuvant chemotherapy responses and patients' prognosis (Chiang et al., 2019).

CONCLUSION

Our study highlights the importance of hematology profiles in colorectal cancer patients as part of cancer screening examination. Further study with a larger number of samples and more diverse populations is needed to analyze the relation between the hematology profiles, especially HB and creatinine serum concentrations.

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Analysis of The Effect of INA CBGs Diagnoses on Costs in Outpatient THT Specialist Poly Hospital X Surabaya

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A B S T R A C T

BPJS Kesehatan will pay to advanced referral Health Facilities. BPJS Kesehatan pays with the INA CBG's (Indonesia Case Base Groups) package system. INA CBGs is a payment system with a package system based on the diseases suffered by patients (1) knowing the disease pattern in the ENT-KL Polyclinic of RSX Surabaya, (2) calculating the unit cost of the 10 most common diseases, (3) calculating the relationship between age range and INA CBGs coding on drug costs using the relationship test. The method used in this research is a retrospective descriptive study. The population and sample of this study were BPJS patient data. The type of data used was TXT secondary data in the outpatient ENT clinic. The type of data used is secondary data from BPJS patient, the total sample was a population of 750. The data was processed using Chi-Square. From this study, it was found that most of the BPJS patients of the ENT Poli of X Hospital were male, with the highest age range being at the age of 51 - 55 years, with the INA CBGs coding being Q - 5 - 44 - 0 with the diagnosis of Tinnitus / Ringing in the ears with the total average difference per patient against hospital tariff financing compared to the INA CBGs Tariff was 83,593. There is a relationship between the Age Range and INA Cbgs coding on the funding in the Pharmacy Unit, which is ENT.

INTRODUCTION

BPJS Kesehatan will pay to advanced referral Health Facilities. It pays with the INA CBG's (Indonesia Case Base Groups) package system. (Kementerian Kesehatan Republik Indonesia, 2013). The system is a payment model used by BPJS Kesehatan to reimburse claims billed by hospitals. INA CBGs is a payment system with a package system based on the disease suffered by the patient (Basuki, 2016). Referring to the BPJS dictionary of terms on its website states that the hospital will get a payment amount based on the appropriate number at the INA CBGs tariff, which is the average cost spent on a diagnosis group (Sariunita & Syakurah, 2023).

In this case, the system calculates, for example, a patient with dengue fever, what services will be provided for the patient and the treatment until the patient is declared cured or during one period of care at the hospital (Ruslang & Diah Ayu Puspandari, 2023). All Health Facilities, even though they do not cooperate with BPJS Kesehatan, are obliged to serve patients in an emergency; after the emergency is resolved and the patient can be transferred, the health facility is obliged to refer to a health facility that cooperates with BPJS Kesehatan (Basuki, 2016). BPJS Kesehatan will pay health facilities that do not cooperate after

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providing emergency services equivalent to the prevailing tariff in the region (Simorangkir Lasmaria, 2021).

Health services are important in improving the welfare and health of every human being in the world. Where every individual has the right to obtain health services provided by the government as a form of responsibility for health efforts that are safe, quality, and affordable for the entire community (Kementerian Kesehatan Republik Indonesia, 2013). Hospitals are individual healthcare institutions that are plenary in providing services, INAp care, and outpatient care (Presiden Republik Indonesia, 2013).

Polyclinics in Surabaya X Hospital ENTKL Poly: This is very helpful for patients who are using the services provided by the hospital. Disease patterns in the ENT-KL Polyclinic can vary depending on where the research is conducted. This is due to the influence of climate, habits, heredity, and exposure obtained from each individual. For example, the incidence of otitis media is more common in young children than in adults, and so is the incidence of tonsillitis. These patterns may also vary from community to community or hospital to hospital based on the availability of specialists or supporting facilities.

Knowledge of the disease patterns of the ear, nose, throat, and head and neck surgery is fundamental because if there is a disorder of these organs, it will affect the quality of life of the patient himself. In some conditions, ENT-KL disorders can cause social and occupational problems, so first-level health facility services such as Puskesmas can be maximized, including the availability of essential ENT-KL examination tools. Research conducted at the ENT-KL Polyclinic of X Surabaya Hospital was reported on 2023 BPJS patients. The purpose of this study was to (1) determine the pattern of diseases in the ENT-KL Polyclinic of RSX Surabaya, (2) calculate the unit cost of the 10 most common diseases, (3) calculate the relationship between age range and INA CBGs coding to drug financing using the relationship test.

METHOD

The method used in this research is a retrospective descriptive study conducted at the BPJS ENT Polilinic of RS X Surabaya in 2023. The population and sample of this study were BPJS patient data. The type of data used was TXT secondary data in the outpatient ENT clinic. The type of data used is secondary data from BPJS patient bills at the X Hospital ENT Specialist Outpatient Clinic; during 2023, the total sample was a population of 750. Data analyzed is Gender, Age Range, INA CBG coding, and the top 10 most common diseases. The data was processed using Chi-Square to test the relationship between Age Range and INA CBG coding on drug costs.

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RESULT

Table 1. Distribution of Respondent Characteristics in BPJS Poli THT X Patients

Characteristics	Frequency	Percentage
Gender		
Male	716	68,58%
Female	328	31,42%
Age Range		
< 5 Years	60	5,75%
11 - 15 Years	47	4,50%
16 - 20 Years	62	5,94%
21 - 25 Years	64	6,13%
26 - 30 Years	48	4,60%
31 - 35 Years	35	3,35%
36 - 40 Years	55	5,27%
41 - 45 Years	64	6,13%
46 - 50 Years	66	6,32%
5 - 10 Years	94	9,00%
51 - 55 Years	77	7,38%
55 - 60 Years	110	10,54%
> 60 Years	262	25,10%
INA CBGs		
Q-5-31-0	1	0,10%
Q-5-42-0	26	2,49%
Q-5-44-0	920	88,12%
U-3-14-0	14	1,34%
U-3-15-0	83	7,95%
Total	1044	100,00%

From Table 1, it is found that most patients are male, with the highest age being 55-60 years old, with the most INA CBGs financing code being Q-5-44-0. The following is a cross-crosstabulation between the age range and the INA CBG code for Patient Examination. The following are the top 10 diagnoses of the most common diseases: BPJS ENT Poly X.

Table 2. Diagnoses of the top 10 most common diseases BPJS Poli THT X

Diagnosis		Frequency	Hospital rate	INA CBGs Tariff	Rate Difference	Average Difference
Z09.8;H93.1	Tinnitus (ringing in the ears)	120	15.057.559	24.748.900	9.691.341	80.761
Z09.8;H61.2	Impacted cerumen Diseases of the ear and mastoid processus	103	13.758.764	27.632.300	13.873.536	134.695
Z09.8;H66.1	Chronic tubotympanic suppurative otitis media	69	9.995.828	14.378.300	4.382.472	63.514
Z09.8;H66.0	Acute suppurative otitis media	65	8.940.277	13.406.000	4.465.723	68.703
Z09.8;H60.8	Other otitis externa	49	6.312.214	10.165.600	3.853.386	78.641
Z09.8;J01.9	Acute sinusitis, unspecified	28	4.370.381	5.765.200	1.394.819	49.815
Z09.8;J32.0	Chronic maxillary sinusitis	28	4.647.996	5.738.200	1.090.204	38.936
Z09.8;J32.8	Chronic sinusitis	20	2.783.811	4.118.000	1.334.189	66.709
Z09.8;H91.1	Other hearing loss	19	2.373.998	4.223.200	1.849.202	97.326
Z09.8;J31.2	Corpus Alienum.	18	2.242.729	3.692.700	1.449.971	80.554
	Total	519	70.483.557	113.868.400	43.384.843	83.593

Table 2 provides information from the 10 most common ENT disease diagnoses, the diagnosis of Tinnitus / Ringing in the ears, with a total average difference per patient against hospital tariff financing

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compared to the INA CBGs Tariff is 83,593. The following is a Cross-Crosstabulation Between Age Range and INA CBGs Code for BPJS Patient Examination at Poli THT Hospital X Surabaya.

Table 3. Cross-Crosstabulation Between Age Range and INA CBGs Code for BPJS Patient Examination at Poli THT Hospital X Surabaya

Age Range	Q-5-31-0	Q-5-42-0	Q-5-44-0	U-3-14-0	U-3-15-0	Total
< 5 Years		3	50		7	60
11 - 15 Years		3	37		7	47
16 - 20 Years	1		52		9	62
21 - 25 Years		3	58		3	64
26 - 30 Years		3	40		5	48
31 - 35 Years		2	28		5	35
36 - 40 Years		2	47	1	5	55
41 - 45 Years		1	58	3	2	64
46 - 50 Years		4	58	1	3	66
5 - 10 Years		3	79		12	94
51 - 55 Years			72	1	4	77
55 - 60 Years		1	98	4	7	110
> 60 Years		1	243	4	14	262
Grand Total	1	26	920	14	83	1044

Based on Table 3, it is found that the highest number of patients are patients with an age of more than 60 years with INA CBGs code Q-5-44-0. The following is a comparison of hospital rates with r CBG rates.

Table 4. Comparison of Hospital Rates with INA CBGs Rates INA CBGs Code at Poli THT RS X Surabaya

Row Labels	Frequency	Hospital Rate	INA CBGs Tariff	Rate Difference	Average Difference
Q-5-31-0	1	285.000	147.100	- 137.900	-137.900
Q-5-42-0	26	3.834.403	5.541.300	1.706.897	65.650
Q-5-44-0	920	120.132.457	188.172.500	68.040.043	73.957
U-3-14-0	14	2.877.806	4.377.700	1.499.894	107.135
U-3-15-0	83	12.053.435	26.461.100	14.407.665	173.586
Grand Total	1044	139.183.101	224.699.700	85.516.599	81.912,45

Based on Table 4, the most significant difference is that the INACBGs code is Q-5-44-0, with an average per patient of 73,957. The following is a crosstabulation between the age range and the amount of drug dollars generated. From the data generated by the average data on the results of drug use and whether it affects each age range, the amount of drug data on average is declared good if the average amount of drug is below the average price of the amount. In contrast, it is declared immoral if the drug price is above the average drug.

Table 5. Cross tabulation of Age Range with Total Drug Price at Poli THT Hospital X Surabaya

Age range	Total Drugs		Total	Significant
	Good	Not Good		
< 5 Years	54	6	60	0,0000
5 - 10 Years	73	21	94	
11 - 15 Years	31	16	47	
16 - 20 Years	36	26	62	
21 - 25 Years	39	25	64	
26 - 30 Years	26	22	48	
31 - 35 Years	24	11	35	
36 - 40 Years	35	20	55	
41 - 45 Years	35	29	64	

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46 - 50 Years	51	15	66
51 - 55 Years	51	26	77
55 - 60 Years	81	29	110
> 60 Years	214	48	262
Total	750	294	1044

Based on Table 5, crosstabulation of Age Range with Total Drug Price at Poli THT RS X Surabaya, it is found that there is a relationship between age range and the use of total drugs at Poli THT RS X Surabaya. The following is a crosstabulation of INA CBGs with the total price of drugs at Poli THT Hospital X Surabaya.

Table 6. Crosstabulation of INA CBGs with Total Drug Price at Poli THT Hospital X Surabaya

INA CBGs	Total Drugs		Total	Significant
	Good	Not Good		
Q-5-31-0	1	0	1	0,000
Q-5-42-0	14	12	26	
Q-5-44-0	641	279	920	
U-3-14-0	14	0	14	
U-3-15-0	80	3	83	
Total	750	294	1044	

Based on Table 6, cross tabulation of Age Range with Total Drug Price at Poli THT RS X Surabaya, it is found that there is a relationship between age range and the use of total drugs at Poli THT RS X Surabaya.

DISCUSSION

Health financing is an important part of the implementation of the National Health Insurance. The objectives of health financing are to encourage quality improvement and patient-oriented services, encourage efficiency, not reward providers who over-treat, under-treat, or perform adverse events, and encourage team services. With the right financing system, it is hoped that the above objectives can be achieved (Hilfi L et al., 2015). Two hospital payment methods were used: retrospective payment method and prospective payment method (Suprayitno et al., 2021).

The retrospective payment method is a method of payment made for health services provided to patients based on each service activity provided, and the more health services provided, the greater the costs to be paid (Min et al., 2022). An example of a retrospective payment pattern is Fee For Services (FFS). A prospective payment method is a method of payment made for health services whose amount is known before the health service is provided (Romliyadi & Oxyandi, 2018). Examples of prospective payments are global budget, Perdiem, Capitation, and case-based payments. No single financing system is perfect, and each financing system has advantages and disadvantages (Widati et al., 2017; Ali Hanifah, Nabila Farah Wardani, 2021).

Table 4 compares hospital rates and INA CBGs rates from 1044 cases with a total difference of Rp.85,516,599 while the average per patient is Rp.81.912/patient. The advantages of prospective and

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retrospective payment systems are that health service tariffs at advanced health facilities are carried out with the payment pattern of Indonesian Case Base Groups (INACBG's) (Simorangkir Lasmaria, 2021; Putra et al., 2023) Obtained: In the implementation of the National Health Insurance (JKN), it has been regulated that the payment pattern to advanced health facilities is with INA-CBGs by Presidential Regulation Number 12 of 2013 concerning Health Insurance as amended by Presidential Regulation Number 111 of 2013 (Presiden Republik Indonesia, 2013). For tariffs that took effect on 1 January 2014, adjustments have been made from the INA-CBG Jamkesmas tariffs and have been stipulated in Minister of Health Regulation No. 69 of 2013 concerning Standard Tariffs for Health Services at First Level Health Facilities and Advanced Health Facilities in the implementation of Health Insurance (Simorangkir Lasmaria, 2021; Ari Sukawan, 2019).

The number of cases in the top 10 diagnoses had hospital rates that were greater than the INA-CBGs rates. At the same time, the other two diagnoses had an average number of cases with hospital rates smaller than the INA-CBGs rate. So, the total positive difference obtained from the two diagnoses cannot cover the negative difference (Fatmawati & Dewi, 2016). Diagnoses that produce more negative differences come from Mastoid Otitis diagnoses, with an average number of 134,695. This is based on research conducted by Dumaris (2015), which states that cardiac polyclinics in outpatients produce a negative difference of Rp.4,427,201 (Umar et al., 2019).

In 10 outpatient service diagnoses, there are three diagnoses with the most prominent billing component, namely drug costs; diagnoses including those with the highest bills are Tinnitus, Mastoid Otitis, and Chronic Tubotmbani (Min et al., 2022). Meanwhile, the other two diagnoses had the highest bills for supporting examinations. The total hospital tariff or the cost incurred by the hospital to provide health services to JKN patients for one year in the outpatient service unit is IDR 160,434,520. While the total INA-CBGs tariff is Rp.93,656,112 (Fajarwati et al., 2022). This means that the total cost of outpatient services incurred by the hospital is huge compared to the total paid by BPJS in the form of INA-CBG packages. The hospital suffered a loss of Rp.66,778,404 (Basuki, 2016; Santiasih, 2021).

CONCLUSION

From this study, it was found that most of the BPJS patients of the ENT Poli of X Hospital were male, with the highest age range being at the age of 51 - 55 years, with the INA CBGs coding being Q - 5 - 44 - 0 with the diagnosis of Tinnitus / Ringing in the ears with the total average difference per patient against hospital tariff financing compared to the INA CBGs Tariff was 83,593. There is a relationship between the age range and INA Cbgs coding on financing in the pharmacy unit, which is ENT.

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Differences in The Effect of Breast Care and Oketani Massage on Breast Milk Production in Postpartum Mothers

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A B S T R A C T

The low breastfeeding coverage is proven by the high rate of infant stunting in Indonesia. Apart from inadequate implementation of breast care, maternal diet, and psychology also play a role in the limited coverage of exclusive breastfeeding. This research aimed to determine the mother's ability to produce breast milk after breast care and *Oketani* massage. Dupak Community Health Center was the research location, and a quasi-experimental nonrandomized control group pretest-posttest design was used. Thirty-two postpartum mothers were selected using purposive sampling. Breast milk production observation sheet as a research instrument. Data analysis with Wilcoxon and Mann Withney U. Results: The Mann Withney U test revealed no difference in the effect of breast care and massage on postpartum mothers' ability to produce breast milk, with a p-value of 0.093, meaning that H0 is accepted and H1 is rejected. The Wilcoxon test revealed that postpartum mothers' ability to produce breast milk was influenced by breast care and massage, with a p-value of 0.001. Conclusion: There is no real difference between the effects of *Oketani* massage and breast care on breast milk supply. It is recommended that more researchers develop new intervention strategies by including characteristics that influence postnatal mothers' ability to produce breast milk.

INTRODUCTION

Indonesia still has a low level of breastfeeding distribution; in 2022, the breastfeeding rate is only 67.96%, decreasing compared to 2021 by 69.7%; this requires intensive support so that the coverage can increase (WHO, 2023). The infant mortality rate is the leading indicator of the country's health. Breastfeeding within 6 months can reduce the infant mortality rate by up to 13 percent (Surabaya City Health Profile, 2022). The percentage of babies who are exclusively breastfed in East Java is 69.72% (BPS, 2022). In Surabaya, mothers who breastfeed exclusively in 2022 get 73.56%, and at the Dupak Health Center, they get 66.7% (Kusuma, 2023).

Low breastfeeding coverage is due to a lack of breast milk production and production. Lack of breast milk production is caused by a lack of nutritious nutritional intake, maternal anxiety, and fear, which results in mental health disruption, trauma after using hormonal contraceptives, and lack of self-care for the breast (Pratiwi, 2022). Several factors, such as diet, mental health, breast care, contraceptive use, birth weight, smoking habits, and alcohol consumption, as well as the frequency of breastfeeding and breastfeeding, can lead to unsmooth breast milk production (Qiftiyah et al., 2021; Sholeha et al., 2019; Yanti et al., 2018).

Poor breast milk production will have an impact on babies, such as malnourished babies, susceptible to diseases and infections, suboptimal growth and development, and prone to obesity in adulthood (Wulandari et al., 2022). Prevention that can be done so that this incident does not occur is that health

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workers can provide positive changes to breastfeeding mothers by providing information about breast care, education, and counseling during pregnancy and postpartum periods. Breast care aims to facilitate blood circulation so as to prevent inhibition of the production and production of breast milk, as well as prevent dirty and drowning nipples so that the baby does not have difficulty in breastfeeding, avoiding swelling or damage of breast milk, mastitis, and Breast abscesses can also result in infection (Qiftiyah et al., 2021; Sitepu et al., 2023). In addition to breast care, octane massage can also be done.

Oketani massage is a gentle massage for breastfeeding mothers. The purpose of Oketani massage is to strengthen the pectoralis muscles, which are helpful in increasing milk production and softening and plumping the breasts so that it is easier for babies to take breast milk (Sudirman & Jama, 2019).

Based on this problem, the researcher will examine the effect of breast care and *Oketani* massage, so this study is titled The Difference in the Influence of Breast Care and *Oketani* Massage on the Milk Production of Postpartum Mothers.

The formulation of the problem is "Is there a difference in the influence of breast care and *Oketani* massage on the production of milk for postpartum mothers?". The purpose of the study was to analyze the difference in the influence of breast care and *Oketani* massage on the production of breast milk in postpartum mothers.

METHOD

The design used in the study is a Nonrandomized Control Group Pretest-Posttest. The purposive sampling technique is carried out by visiting the home of the postpartum mother, providing an explanation to the mother about the purpose and benefits of the research to be carried out, providing an application sheet to become a respondent, providing informed consent, observing breast milk production using observation sheets, provide breast care interventions or massage *Oketani*. This research was conducted for three days, and the mother will be observed again on the third day using an observation sheet of breast milk production. The population is 47 postpartum mothers, the sample is taken based on inclusion criteria, namely postpartum mothers from day 5 to day 10, physiological postpartum mothers, and postpartum mothers with normal breasts. The researcher calculated and determined the sample using the federal formula and obtained as many as 16 postpartum mothers for the breast care experimental group and 16 postpartum mothers for the *Oketani* massage control group. Data collection is primarily done with an observation sheet of breast milk production. The analysis technique used is univariate analysis to process data from observation sheets so that the characteristics of postpartum mothers are obtained. Bivariate analysis to determine the relationship or correlation, influence, and difference between the two variables using the Wilcoxon and Mann Whitney U tests.

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RESULT

Table 1. Characteristics of Postpartum Mothers

Characteristics		Experimental Group Breast Care		Control Group *Oketani* Massage	
		n	%	n	%
Age	< 20 Years	2	12,5	3	18,75
	20-35 Years	14	87,5	13	81,25
	>35 Years	0	0	0	0
Education	No School	0	0	0	0
	Elementary School	1	6,25	1	6,25
	Junior High School	2	12,5	5	31,25
	Senior High School	11	68,75	9	56,25
	Diploma/Bachelor	2	12,5	1	6,25
Work	Not Working	9	56,25	13	81,25
	Private/Entrepreneur	5	31,25	2	12,5
	Civil Servants	0	0	0	0
	Laborer	2	12,5	1	6,25
Parity	Primipara	4	25	8	50
	Multipara	10	62,5	7	43,75
	Grandemulti	2	12,5	1	6,25

Source: Primary Data, 2024

The characteristics of postpartum mothers in the experimental group were obtained from almost all postpartum mothers (87.5%) with the age of 20-35 years, most of the postpartum mothers had their last high school education (68.75%), most of the postpartum mothers were not working (56.25%), and most of the postpartum mothers (62.5%) had a history of multipara parity by having children ≥ 2.

Table 2. Postpartum Mother's Breast Milk Production Before Breast Care and *Oketani* Massage

Group	Category	Breast Milk Production	
		n	%
Experimental Group: Breast Care	Less Smooth	14	87,5
	Quite Smooth	2	12,5
	Fluent	0	0
Control Group: *Oketani* Massage	Less Smooth	13	81,25
	Quite Smooth	3	18,75
	Fluent	0	0
Total		16	100

Source: Primary Data, 2024

Before breast treatment, almost all (87.5%) of breast milk production was not smooth, and before *Oketani* massage was carried out almost entirely (81.25%) was not smooth.

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Table 3. Postpartum Mother's Breast Milk Production After Breast Care and *Oketani* Massage

Group	Category	Breast Milk Production	
		n	%
Experimental Group: Breast Care	Less Smooth	4	25
	Quite Smooth	5	31,25
	Fluent	7	43,75
Control Group: *Oketani* Massage	Less Smooth	2	12,5
	Quite Smooth	9	56,25
	Fluent	5	31,25
Total		16	100

Source: Primary Data, 2024

After breast treatment, almost half of the postpartum mothers (43.75%) produced smooth milk, and after a massage of the mother, most (56.25%) produced relatively smooth milk.

Table 4. Analysis of the Effect of Breast Care on Breast Milk Production in Postpartum Mothers

Breast Milk Production	Experimental Group			
	Before Breast Care		After Breast Care	
	n	%	n	%
Less Smooth	14	87,5	4	25
Quite Smooth	2	12,5	5	31,25
Fluent	0	0	7	43,75
Total	16	100	16	100
Wilcoxon signed-rank test	*p-value* 0,001			

Source: Primary Data, 2024

Before breast treatment, almost all postpartum mothers (87.5%) had less smooth milk production, while after breast treatment, almost half of postpartum mothers (43.75%) had smooth milk production. Data analysis with Wilcoxon resulted in a p-value of 0.001, indicating that breast care affects breast milk production.

Table 5. Analysis of the Effect of *Oketani* Massage on Breast Milk Production in Postpartum Mothers

Breast Milk Production	Control Group			
	Before *Oketani* Massage		After *Oketani* Massage	
	n	%	n	%
Less Smooth	13	81,25	2	12,5
Quite Smooth	3	18,75	9	56,25
Fluent	0	0	5	31,25
Total	16	100	16	100
Wilcoxon signed-rank test	*p-value* 0,001			

Source: Primary Data, 2024

Before the *Oketani* massage, almost all (81.25%) of the breast milk was not smooth; after the *Oketani* massage, most (56.25%) were obtained quite smoothly. Data analysis with Wilcoxon produced a p-value of 0.001, meaning that *Oketani* massage affected breast milk production.

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Table 6. Analysis of Differences in the Effects of Breast Milk Production in Postpartum Mothers After Breast Care and *Oketani* Massage

Breast Milk Production	Post Test 2 Groups			
	Breast Care		*Oketani* Massage	
	n	%	n	%
Less Smooth	4	25	2	12,5
Quite Smooth	5	31,25	9	56,25
Fluent	7	43,75	5	31,25
Total	16	100	16	100
Mann Whitney U Test	*p-value* 0,093			

Source: Primary Data, 2024

Based on the Mann-Whitney U test, it produces a p-value of 0.093, which indicates that H0 is accepted and H1 is rejected. Breast care and *Oketani* massage both stimulate breast milk production. Therefore, it can be said that both are equally effective in promoting breast milk production.

DISCUSSION

Before breast care and massage were given, almost all postpartum mothers had less smooth milk production. In accordance with previous research, the unsmooth production of breast milk is influenced by other factors such as food, psychological, breast care, contraceptive use, baby weight at birth, smoking, alcohol consumption, and frequency of breastfeeding and breastfeeding (Qiftiyah et al., 2021; Sholeha et al., 2019; Yanti et al., 2018). This is in line with other studies, where breast milk production is not smooth before breast care and massage (Sari & Syahda, 2020; Wulandari et al., 2022). Based on research by Rosmalia and Silpi, parity is an important factor in postpartum mothers. An individual's understanding of how to exclusively breastfeed can be improved by the experience that mothers gain during breastfeeding, which is related to parity (Mother and Breastfeeding, 2023). This is in line with the findings of another researcher, who found that the level of breastfeeding experience of a mother correlated with her parity (Asrina et al., 2021). According to researchers, less smooth milk production can be caused by food or nutrients consumed by mothers. The experience of breastfeeding mothers before is also a factor causing breast milk production to be smooth; in this study, mothers with a history of primipara and multipara parity get breast milk less smoothly compared to mothers with a history of grande-multi parity milk production smooth since the third day of puerperium.

After breast treatment, almost half of the postpartum mothers produce smooth milk, and after a massage, most of them produce relatively smooth milk. In this study, the results were obtained that the smooth production of breast milk can be affected by breast care and massage (Sari & Syahda, 2020; Wulandari et al., 2022). Age, parity, and education are also important factors for postpartum mothers (Asrina et al., 2021). The age of the mother can affect the level of maturity in thinking, as well as parity related to a mother's experience. Postpartum mothers' education also affects their way of thinking and receiving

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information. A person's knowledge and ease of absorbing new information are directly proportional to their level of education. On the other hand, a person's attitude in accepting new knowledge will be hampered due to lack of education. According to researchers, breast care and *Oketani* massage, which are applied for 3 days, significantly affect breast milk production. Both are very influential, and they can be used as an alternative to facilitate breast milk production. Besides that, easy breast care and *Oketani* massage movements are also the reasons for postpartum mothers to do it themselves at home. The success carried out by the researcher is inseparable from midwives or other health workers, where officers who are good at conveying information and inviting postpartum mothers to carry out breast care and *Oketani* massage, as well as age, education, and maternal parity are also factors in success in carrying out breast care and *Oketani* massage. The productive age and education level of postpartum mothers also affect the way researchers understand or receive information, so researchers must be able to convey it well and clearly according to the characteristics of postpartum mothers. The history of maternal parity also affects the smooth production of breast milk due to previous breastfeeding experience. Mothers with a history of primipara and multipara parity often experience less smooth breastfeeding compared to mothers with a history of grande-multi parity whose milk production has been smooth since the third day of puerperium.

Before breast treatment, almost all postpartum mothers get less smooth milk production, while after breast treatment, almost half of postpartum mothers get smooth breast milk. Data analysis with the Wilcoxon test revealed that breast milk production is affected by breast care. After three days of breast care therapy with sequencing and massage performed by researchers, mothers, husbands, and families, postpartum women showed substantial improvements in their breast health. There is evidence of this from the Wilcoxon Signed Rank Test. The pituitary gland is affected to produce prolactin and oxytocin when the mammary glands are stimulated using the massage and massage techniques used in breast care. Several hormones, such as prolactin and oxytocin, affect the milk supply to breastfeeding mothers, which ultimately increases the amount of breast milk produced (Purwanto et al., 2018).

This research is in line with what Wulandari conducted, and it has a significant impact on the smooth production of breast milk before and after breast care (Wulandari et al., 2022). According to the theory that supports this study, breast care is one of the necessary life needs after childbirth and is an important component of the mother's routine after childbirth. Taking care of the breasts aims to improve blood flow and reduce the possibility of blockage of the milk ducts, which in turn increases milk production and secretion (Mustika et al., 2018). According to researchers, mothers who take care of their breasts during the postpartum period have a positive influence on breast milk production so that it becomes smooth. In contrast to mothers who do not apply it, breast milk production becomes less smooth. Easy breast care movements can also help mothers do it themselves at home, so this breast care can be used as an alternative to facilitate breast milk production.

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Breast milk production after being massaged by the *Oketani* turned out to be relatively smooth, in contrast to before the massage, where the majority of postpartum mothers were not smooth. Based on these findings from the Wilcoxon test, it was concluded that the milk production of postpartum mothers was influenced by *Oketani* massage. After three days of *Oketani* massage performed by researchers, mothers, husbands, and families, postpartum women showed substantial improvements in breast health. There is evidence of this from the Wilcoxon Signed Rank Test. *Oketani* massage is a breast massage method with the aim of stimulating the mother to produce more milk by focusing on the areola and nipple area. In addition to the benefits mentioned above, octane massage can relieve muscle pain, soften breast tissue, and improve the elasticity of the areola and nipples, all of which facilitate breastfeeding in babies (Halimatussakdiah et al., 2023; Mulyaningsih et al., 2019). According to researchers, mothers who do *Oketani* massage during the postpartum period will have a good impact on breast milk production so that it becomes smooth; compared to mothers before doing *Oketani* massage, breast milk production is less smooth. The easy movement of octane massage is one of the reasons postpartum mothers do their octane massage at home.

Researchers found that mothers who received breast care and *Oketani* massage produced more breast milk. Theoretically, postpartum mothers can increase breast milk production by massaging their breasts twice a day, for three consecutive days, for a total of fifteen minutes per session. (Rahayu et al., 2023; Taqiyah et al., 2019). This theory is in accordance with the research results that show that these two treatments affect breast milk production in postpartum mothers.

According to researchers, breast care and *Oketani* massage are both helpful in facilitating breast milk production for postpartum mothers, so both are alternatives for facilitating breast milk production. Apart from that, easy movements are the main reason why mothers do their own breast care and massage at home. The success of the researchers cannot be separated from that of the midwives or other health workers, where the officers are good at conveying information and inviting postpartum mothers to carry out breast care and *Oketani* massage. The characteristics of the mother's age, education, and parity are also factors in success in carrying out breast care and *Oketani* massage. The productive age and educational level of postpartum mothers influence the way the information conveyed by researchers is understood or received, so researchers must be able to convey it well and clearly according to the characteristics of postpartum mothers. The mother's history of parity also influences the smooth production of breast milk due to previous breastfeeding experience. Mothers with a history of primiparous and multiparous parity often experience less smooth breastfeeding compared to mothers with a history of grande multiparous parity whose breast milk production has been smooth since the third day of postpartum.

CONCLUSION

This research concludes that there is no significant difference in the effect of breast care and Oketani massage on breast milk production in postpartum mothers, as indicated by the Mann-Whitney U test with a p-value of 0.093. Both interventions are equally effective in promoting the smooth production of breast milk. Breast care was observed to improve milk production, with 43.75% of postpartum mothers achieving smooth milk flow after treatment, compared to 12.5% before treatment. Similarly, the Oketani massage resulted in 31.25% of postpartum mothers achieving smooth milk flow after the intervention, compared to those before the massage.

The research findings also highlighted the importance of implementing both breast care and Oketani massage as complementary interventions in postpartum care. They provide practical and evidence-based strategies to support lactation, ensuring that postpartum mothers can achieve optimal milk production to meet the nutritional needs of their infants. Further research may explore long-term effects, maternal satisfaction, and potential benefits when these interventions are combined.

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Exploring Family Resilience Within Adolescent Marriages: A Case Study

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A B S T R A C T

The prevalence of marriages involving women aged 18 is significant, with approximately 15 million cases globally and over 1.2 million in Indonesia. Early marriage poses a substantial risk of Domestic Violence (DV). This research used a qualitative descriptive design; the research informants were five people who underwent early marriage, and the sample selection used snowball sampling. Data were collected using interviews with an interview guide, and the data collected was subjected to thematic analysis using Nvivo 12 Plus computer software. In this study, five teenagers were married, one woman had never been married, two women were divorced, and two women were married. Two major themes were found in the experience of marriage at an early age, namely internal factors and external factors regarding the resilience of early marriage. In the theme and sub-theme project map, it was found that internal factors include communication patterns with conditions of emotional instability at a young age and behavior patterns that tend to involve partners and even domestic violence. External factors consist of socioeconomic factors, environmental factors, and psychological resilience. The resilience of teenage marriages that needs to be considered is the pattern of effective communication between partners to understand each other and external factors on the psychological resilience of family conflict management. It is hoped that teenagers can limit their social freedom and prepare for marriage well physically, psychologically, and economically.

INTRODUCTION

Child marriage represents a significant public health and human rights issue with a detrimental impact on the lives of women and girls. Globally, approximately 15 million girls under the age of 18 are married each year. In developing countries, 900 million of the 1.8 billion adolescents reside in circumstances where 38% of girls marry before the age of 18. In Indonesia, over one million women aged 20-24 were married before the age of 18 (1.2 million individuals), and 61,300 women aged 20-24 were married before the age of 15 (UNICEF, 2020).

The term 'child marriage' is defined as the formal or informal union of a girl or boy under the age of 18 (Farida, 2009). The prevalence of child marriage is shaped by a number of socio-economic and cultural factors, including economic status and income (Wulanuari et al., 2017), social perceptions of early marriage, the costs associated with schooling, and limited opportunities for adolescent girls (Raj et al., 2019). The likelihood of girls marrying at a young age is three times higher for those who do not attend school compared to their peers who do (Ahonsi et al., 2019). Despite their desire to delay marriage, young girls who marry are often compelled to do otherwise by a range of factors, including family structure, limited decision-making autonomy, and unmet social and emotional needs (Montazeri et al., 2016).

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The data from the Bantul Religious Court (PA) indicates a considerable number of applications for marriage dispensation due to early marriage. As of March 2021, there have been 18 applications for marriage dispensation, with 15 cases already adjudicated. This figure is noteworthy in comparison to the figures recorded in the preceding years. In 2020, there were 246 applications, while in 2019, there were only 125 applications (Kanwil Kemenag, 2021).

In order to reduce the incidence of early marriage, the government has implemented age restrictions as outlined in the Amendment to the Marriage Law No. 16 of 2019. This stipulates that marriage can only occur if both parties are at least 19 years old. Additionally, Article 71 of Law No. 36 of 2009 on Health states that reproductive health encompasses physical, mental, and social well-being and is not merely the absence of disease or disability related to the reproductive system, functions, and processes in both males and females. Moreover, Law No. 35 of 2014 on Child Protection also addresses this issue.

A number of factors contribute to the prevalence of early marriage in Indonesia, including low social and economic status, cultural norms that favor early marriage, forced marriages, and premarital sexual relations (BKKBN, 2012). Other contributing factors include arranged marriages, religious beliefs, family pressure, social pressures, personal desire, and educational background. Furthermore, the perception that early marriage can alleviate burdens and resolve issues is a significant factor.

As evidenced by the research conducted by Djamilah (2015), early marriage is a significant risk factor for domestic violence (DV). The study revealed that 44% of young brides were subjected to high-frequency domestic violence (DV), while the remaining 56% experienced low-frequency DV. These findings indicate that young couples often lack the requisite readiness to establish a stable family unit, which can compromise family resilience. As defined by Government Regulation of the Republic of Indonesia Number 21 of 1994 (cited in Cahyaningtyas, Tenrisana, & Triana, 2016), family resilience is "a dynamic condition of a family possessing perseverance, toughness, and the physical, material, and mental capabilities to live independently." The data on DV indicates that a dearth of education impedes the attainment of family resilience. In the context of a family, resilience is vital for overcoming and adapting to challenging life changes or severe problems (Apriliani & Nurwati, 2020). This study seeks to elucidate the function of family resilience among adolescents who marry at an early age.

METHOD

A qualitative case study design was employed, utilizing the phenomenological approach. A total of five adolescent brides who demonstrated resilience were selected from the Sewon Community Health Center catchment area. Of these, four had been married, while one had never been married. Additionally, one woman had been divorced, and another two had been married through snowball sampling. Data was collected using audio recordings, stationery, demographic questionnaires, and interview guides. A

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qualitative analysis was conducted using content analysis (content validity), with the results interpreted and illustrated by the researchers themselves, assisted and enriched by the findings of the literature studies. Triangulation was employed to ascertain the veracity of the data by comparing the accounts of the subjects in question, namely the teenagers' parents, spouses, and other individuals with direct contact with the respondents. This approach was utilized to enhance the reliability and credibility of the information obtained. The data were then subjected to a thematic analysis using the NVivo 12 Plus computer software.

RESULT

The study involved five informants who were mothers married at a young age. These informants were selected from the Sewon District, Bantul Regency, in the Special Region of Yogyakarta.

Table 4.1 Informant Characteristics

Informant Code	Age	Education	Marriage Status
IF1Y	22 Years	Senior high school	Divorced
IF2	22 Years	Junior high school	Married
IF3T	19 years	Junior high school	Unmarried
IF4W	22 Years	Senior High School	Married
IF5A	19 Years	Junior High School	Married

Source: Primer Data

Theme and Sub-theme

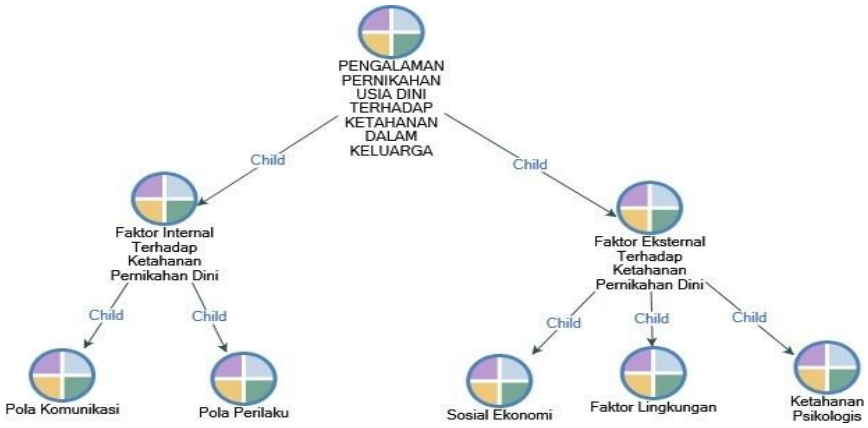

Figure 1. Project Map Theme and Sub Theme Experience of Early Marriage on Family Resilience

The Person Correlation Coefficient for internal factors affecting the resilience of early marriages indicates that "communication patterns" have the highest value among the internal factors under consideration. This finding suggests that communication patterns are a common experience among informants and were frequently mentioned in interview transcripts.

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Internal Factors

Communication Patterns

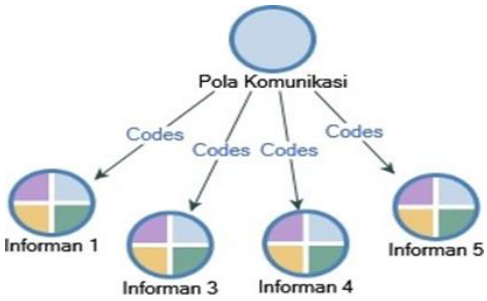

Figure 2. Project maps of communication Patterns

The sub-theme "communication patterns" delineates the attitudes and methods of communication between spouses within a household, which are pivotal for maintaining harmony. Figure 2 illustrates that informant 1, 3, 4, and 5 discussed communication patterns. Some informants indicated that communication was ineffective, whereas others asserted that communication within the family was seamless daily. Furthermore, some informants indicated that all issues or problems were resolved collectively. The informants provided the following statements:

"We are just talking casually since the beginning because he is often away and rarely at home." (IF1Y)

"Maybe when we get together to eat, we will talk about anything, or when we get home after school, or when we have our dinner." (IF4T)

Behavioral Patterns

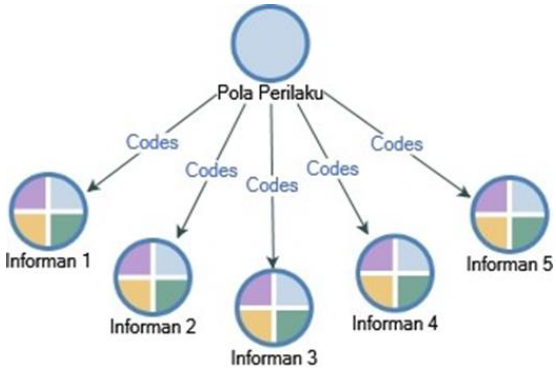

Figure 3. Project maps of Behavioral Patterns

The following analysis is based on the data presented in Figure 3. The term "behavior patterns" is used to describe the positive and negative behaviors experienced within the household by informants 1, 2, 3, 4, and 5. The behavior patterns observed among the informants include experiences of domestic violence (DV), a lack of financial support from their husbands, and frequent conflicts. The informants provided the following statements:

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"That is violence. I never get into domestic violence, but sometimes my husband likes to get angry while nothing happened suddenly" (IF1Y)

".....he hits me a few times, and he also gets angry easily, and he often gets into a fight. When I was nine months pregnant, he went to prison" (IF2)

External Factors

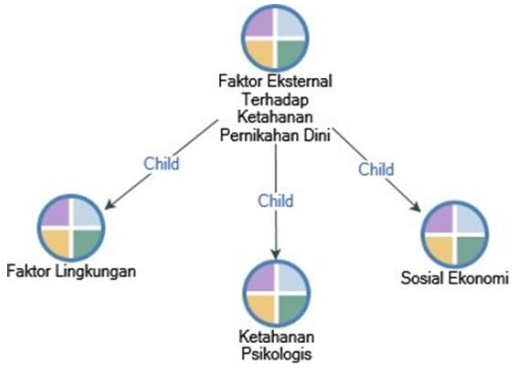

Figure 4. Project maps of Eksternal Factor

The term "external factors affecting the resilience of early marriage" is used to describe external elements that may influence the stability of early marriages. These elements include environmental factors, psychological resilience, and socio-economic conditions. The Person Correlation Coefficient analysis indicates that environmental factors have the highest correlation with the resilience of early marriages in comparison to other external factors. This suggests that environmental factors are the most experienced by mothers and are most frequently referenced in the interview transcripts.

Social Economics

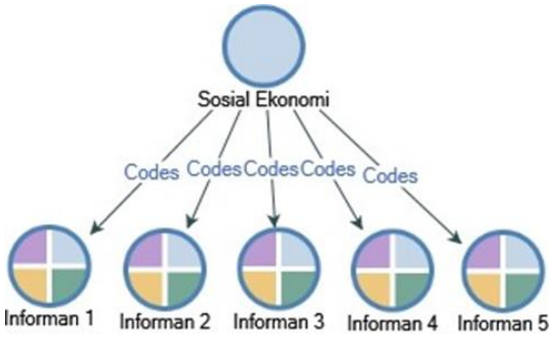

Figure 5. Project maps of Socioeconomic

Figure 5 of the sub-theme "socioeconomic" illustrates the relationships between the mother and her spouse, as well as the conditions of the household residence, income, and interactions with the

surrounding environment based on the experiences of Informant 1, Informant 2, Informant 3, Informant 4, and Informant 5. The following statements are from Informants 4 and 5.

"I am confident and sure, I gather with my neighborhood or other gatherings like that." (IF4T)

"Sometimes when I cannot make it, I will have a debt, or ask for my parents' help" (IF5A)

Environmental Factors

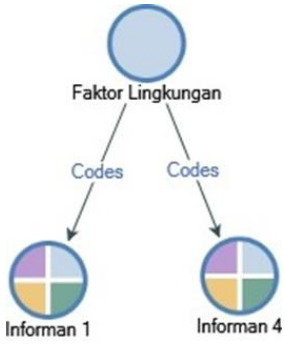

Figure 6. Project maps of Environmental Factors

In the sub-theme "Environmental Factors," two informants, namely Informant 1 and Informant 4, are observed to be influenced by environmental factors. The informants indicate that their husbands infrequently return home, often engage in excessive alcohol consumption, are unemployed, and rarely perform the five daily prayers. The statements from Informants 1 and 4 are presented below:

".....when he had a problem, and I ask what his problem, he will not answer, because of that he likes to drunk and high" (IF1Y)

"I got married in August and got pregnant in October when I was 16, and my husband never went to prison, and he does not have any job until right now" (IF4W)

Psychological Resilience

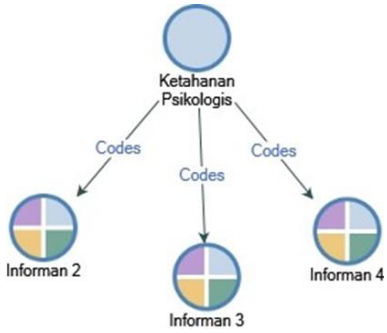

Figure 7. Project Maps of Psychological Resilience

The subsequent sub-theme, "psychological resilience," as illustrated in Figure 7, is experienced by Informant 2, Informant 3, and Informant 4. The informants have demonstrated resilience through their

efforts, which include prayer and seeking counsel from their spouses on various matters, as observed in the accounts of Informants 3 and 4.

"Trust the process, pray, and keep me up" (IF3T)

"If there is a problem with my parents, I will talk about it to my husband and find the solution. Because we are family, I always share my story with him" (IF3T)

DISCUSSION

Internal Factors Affecting Early Marriage Resilience

The term 'family resilience' is used to describe the dynamic condition of a family, characterized by its capacity to withstand and recover from adversity, encompassing physical, material, psychological, and spiritual capabilities. Such resilience enables the family to live independently, foster personal and familial development, and maintain harmonious living conditions, thereby enhancing both physical and emotional well-being (UU Nomor 10 Tahun 1992). It is indubitable that the establishment of harmonious relationships within the domestic sphere represents a significant challenge. It is incumbent upon each couple to prepare a range of resources to establish family resilience. The key efforts to build family resilience include the provision of support, the establishment of communication patterns, and the fostering of behavioral patterns.

Communication Patterns

The findings indicate that the average age at which the interviewed women married was below 20 years of age. In these households, communication was often ineffective and characterized by a lack of openness. This situation was further compounded by the frequent absence of husbands from the home due to their engagement in external activities and the display of high levels of egotism. As posited by Khoirot and Sa'diyi (2020), establishing a household at a young age can prove challenging, given that the emotional instability and heightened egotism of the individuals involved can give rise to conflicts between partners. Effective communication is regarded as a vital instrument for the resolution of disputes, with each couple developing their distinctive communication patterns (Khoirot & Sa'diyi, 2020). Young couples, who may still be in a state of emotional immaturity or adolescence, often encounter a multitude of conflicts, particularly in the early years of marriage (Ningsih & Herawati, 2017).

The institution of marriage at a relatively young age is often associated with distinct communication patterns that differ from those observed in marriages at a more advanced stage of life. The capacity to address issues and the approaches taken are also distinct, which can contribute to the eventual harmonious resolution of conflicts within the family (Thariq, 2018). Effective communication fosters a sense of togetherness and belonging, thereby preventing the occurrence of family conflicts that may ultimately

result in divorce (Respati, Muhariati, & Hashanah, 2014). Moreover, effective communication can improve the quality of family life by fostering mutual support (Pristiani & Widodo, 2018).

Behavioral Patterns

The findings indicate that several women have reported experiencing domestic violence (DV), which ultimately resulted in their divorces. As Smith (2012) notes, the failure of partners to adequately prepare for familial harmony can give rise to a range of issues. The issue of family resilience is indicated by the occurrence of divorce and other problems, such as domestic violence (DV) (Mustaqim, Tamam & Rahman, 2021). Muawanah (2021) posits that the emotional volatility of minors frequently results in irritability and a proclivity to seek outlets through violence against children or spouses. It can thus be argued that marriages involving minors may be a contributing factor in incidents of domestic violence due to the instability and susceptibility to disruption of their emotions (Muawanah, 2021). Conversely, Wijayanti (2021) posits that high egos can prove challenging to manage between spouses. While some individuals can manage conflicts effectively, others exacerbate these issues, which can ultimately lead to a weakened family resilience and an eventual divorce (Wijayanti, 2021).

In accordance with the findings that women frequently report domestic conflicts, these disagreements are typically resolved without long-term consequences, as both parties can regulate their emotions. However, the results indicate that many women stated that despite their efforts to compromise and alleviate tensions to prevent prolonged disputes, the presence of a husband with a volatile temperament and a proclivity for alcohol consumption, who reacts emotionally to discussions, led them to decide on divorce. They consider their marriage to be untenable. As elucidated by Mulawarman (2022), individuals are bound to encounter difficulties in their lives, including within the context of family relationships. The resolution of these issues is contingent upon the utilization of efficacious conflict management strategies. When managed effectively, conflicts can serve as valuable learning experiences, thereby strengthening familial bonds. Conversely, the persistence of unresolved conflicts, characterized by excessive emotional outbursts and physical aggression, can result in violence that undermines family harmony. Such behaviors have been identified as a potential trigger for domestic violence (Rahmawati, Sukidin, & Suharso, 2018).

External Factors Affecting Early Marriage Resilience

The term 'family resilience' is used to describe the capacity of a family unit to safeguard itself from a range of potential challenges and threats that could otherwise disrupt the cohesion and stability of the family. The concept of family resilience can be understood as a measure of a family's success in fulfilling its roles, functions, and responsibilities to achieve the well-being of its members. The degree of family resilience is contingent upon the behaviors exhibited by individuals and communities. Those who possess a comprehensive understanding of their adaptive capacities will be better equipped to adapt to changes in family structure, functions, and roles, which are subject to evolution in response to advancements in

information and communication technology (Amalia, Akbar, & Syariful, 2018). The development of family resilience is contingent upon three key factors: environmental, psychological, and socioeconomic.

Environmental Factors

As posited by Stanley and Markman (2020), early marriage is frequently precipitated by a paucity of guidance and attention from parents. Consequently, factors such as the opportunity for free social interactions can result in early marriage due to pregnancies that occur prior to the couple's marriage (Stanley & Markman, 2020). The findings indicate that women who become pregnant outside of marriage often experience unstable marriages. This is since they may be married to individuals who are abusive, financially irresponsible, and engage in domestic violence, which ultimately results in divorce.

As elucidated by Radhitya et al. (2020), domestic violence issues result in women enduring intolerable conditions and ultimately opting for divorce (Radhitya, Nurwati, & Irfan, 2020). Domestic violence (DV) is defined as any act of abuse perpetrated by a partner or parent, including physical, sexual, and emotional violence (Lengkong et al., 2021). In accordance with the stipulations set forth in Law No. 23 of 2004 on the Elimination of Domestic Violence, Article 1, point 1, domestic violence (DV) is defined as any act perpetrated against a person, particularly a woman, that results in physical, sexual, psychological, and/or household neglect, including threats of such acts, coercion, or unlawful deprivation of freedom within the household (Law No. 23 of 2004, 2004). Dermawan et al. (2021) posit that early marriage renders young women more susceptible to sexual, physical, psychological, and emotional violence and social isolation. The practice of early marriage often gives rise to several conflicts, which can, in turn, give rise to disputes and instances of domestic violence. In some cases, this may ultimately result in the dissolution of marriage (Dermawan, Darmawan, & Ummah, 2021).

Psychologist

As posited by Apriliani (2020), the concept of family resilience is contingent upon several factors, including the capacity for psychological resilience in the management of familial conflicts, the ability to regulate positive emotions, the presence of a positive self-concept, and the existence of mutual concern between partners or spouses (Apriliani et al., 2020). The findings indicate that some women employ various strategies to enhance their psychological resilience. These include maintaining composure, engaging in prayer, and fostering positive communication with their husbands. They regard their husbands as confidants and discussion partners on all matters, thereby facilitating open and constructive dialogue. This is consistent with several studies on social-psychological resilience, which indicate that families can address non-physical issues and positively managing emotions, thus avoiding violence against family members (Satriawan et al., 2021; Sianipar, 2020). Furthermore, Sekarayu and Nurwati (2021) propose that the psychological impact of early marriage can also influence preparedness for the first pregnancy and marital life, potentially resulting in anxiety and stress (Sekarayu Nurwati, 2021).

Furthermore, the World Health Organization (WHO) (2020) asserts that early marriage has adverse effects on health. Pregnancy in adolescence is associated with an increased risk of premature birth, low birth weight, and postpartum hemorrhage, which can ultimately result in maternal and infant mortality. Complications during pregnancy and childbirth represent a significant cause of mortality among women aged 15-19 years (WHO, 2020).

Social Economics

Economic circumstances within the family unit may influence the decision to marry at a young age. For example, parents may be unable to meet the needs of their children, which can result in the family unit experiencing poverty. In such cases, parents may elect to arrange their children's marriages (Sudarto, 2019). Meanwhile, Herawati et al. (2017) put forth the proposition that a woman's decision to pursue limited education is often shaped by her parents' preference for early marriage, which is frequently constrained by financial limitations. The findings indicated that the parents met the family's financial needs and that the women also engaged in income-generating activities to supplement the family's resources, given that their husbands were not employed and did not contribute financially.

The dissolution of household integrity represents a significant challenge to family resilience, particularly in the context of economic necessity (Mustaqim, Tamam & Rahman, 2021). Meanwhile, Muawanah (2021) posits that one of the fundamental assets of a household is the availability of a reliable source of income to meet the financial needs of the family unit. The continued existence of the family is contingent upon the smooth functioning of the economy. Conversely, economic instability can give rise to domestic discord (Muawanah, 2021). A substandard economy can give rise to domestic disputes, particularly when it leads to a reduction or lack of fulfillment within the family unit (Radhitya, Nurwati, and Irfan, 2020).

A lack of economic security is frequently a consequence of limited educational attainment among both spouses. This results in the absence of a job that can guarantee meeting basic needs (Apriliani & Nurwati, 2020). The inability to meet household needs will inevitably result in conflict, thereby undermining the concept of family resilience, specifically social-psychological resilience (Atmaja et al., 2020). Couples who marry at a young age frequently lack the emotional stability necessary to effectively navigate challenges, thereby undermining the resilience of their family unit (Lestari, 2015).

CONCLUSION

The resilience of early marriage is shaped by a number of internal factors, including communication patterns and behavioral norms within the household. The application of communication patterns within the household serves as the foundation for interaction between the husband and wife. The communication patterns of couples who are still young and whose emotional stability is still developing are more susceptible to quarrels and domestic violence, as they encounter particular difficulties in adjusting to a

partner. The term "domestic violence" is defined as any act of violence committed by a partner in various forms, including physical violence, sexual violence, and emotional violence. The resilience of the family unit is contingent upon a number of factors, including the capacity for psychological resilience to manage conflict within the family, positive emotional control, a positive self-concept, and care for each life partner or husband and wife. It is anticipated that parents will provide guidance and encouragement to facilitate their children's pursuit of higher education and discourage early marriage by limiting promiscuity.

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The Correlation between Parity and Residence with Maternal Mortality during Miscarriage and Abortion in Papua Province in 2020

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A B S T R A C T

This research urgently needs to examine the correlation between parity and residential characteristics with maternal mortality during miscarriage and abortion in Papua Province in 2020. The study employs a unique quantitative analytical investigation using a cross-sectional design and secondary data from the 2020 SDKI. The comprehensive sampling method for participants, specifically fertile women aged 15 to 49, yielded 14,802 samples. Bivariate analysis of basic logistic regression was conducted at a 95% confidence level (α = 0.05), after which variables with a p-value <0.25 were analysed using multivariate multiple logistic regression. A significant association was identified between parity, residential characteristics, and maternal mortality during miscarriage and abortion, with a p-value <0.05 and negative values (p parity = 0.000 OR = 0.475; p residence = 0.000 OR = 0.394). This study's findings demonstrate a significant correlation between parity and residential characteristics with maternal mortality after miscarriage and abortion, highlighting the potential impact of these factors on maternal health policies in Papua Province.

INTRODUCTION

According to the Sustainable Development Goals (SDGs) of the 2030 sustainable development agenda, one objective is to implement strategic measures to enhance health (United Nations, 2023). The World Health Organization (WHO) aims to expedite the decrease of the global Maternal Mortality Rate (MMR) as part of its health improvement initiatives. Maternal mortality refers to death occurring during pregnancy or within 42 days following the conclusion of pregnancy, resulting from pregnancy or its management, and not attributable to accident or injury (WHO, 2023). Maternal Mortality Ratio (MMR) refers to the death of a woman during pregnancy or within 42 days of pregnancy termination, irrespective of gestational duration or birth location. This maternal mortality transpires during gestation, parturition, and the postpartum phase (Central Bureau of Statistics, 2021). According to the Indonesian Demographic Health Survey (SDKI), maternal mortality was 189 per 100,000 live births in 2020. The MDGs aim for a maternal mortality rate of 70 per 100,000 live births by 2030 (WHO, 2023). In 2017, the maternal mortality ratio (MMR) in Papua Province was 289 per 100,000 live births, rising to 565 per 100,000 live births by 2020. Maternal mortality in Papua Province has dramatically increased during the past three years (Papua Provincial Health Office, 2019). As per standardized coding and categorization by the International Statistical Categorization of Diseases (ICD), maternal death is categorized into many definitions. Gestational Maternal mortality refers to the demise of a woman during pregnancy or within one year postpartum, resulting from difficulties arising during pregnancy or the exacerbation of a pre-

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existing ailment unrelated to the physiological effects of pregnancy. Pregnancy problems are physical and psychological issues that may occur before, during, or after pregnancy, thereby impacting on the health of pregnant individuals, postpartum individuals, and their infants (CDC, 2023). Late maternal death refers to the demise of a woman resulting from direct or indirect obstetric causes occurring more than 42 days but less than one year following the conclusion of pregnancy. Late maternal mortality includes both direct and indirect maternal fatalities. Pregnancy or birthing difficulties can result in mortality after 6 weeks (42 days) postpartum, and the growing accessibility of contemporary life-sustaining interventions and technologies is allowing more women to survive such complications. It may also postpone inevitable fatalities beyond the 42-day postpartum interval. Direct maternal death refers to fatalities arising from obstetric problems during pregnancy, childbirth, and the postpartum period.

These difficulties arise from intervention, neglect, improper treatment, or a sequence of following occurrences (WHO, 2023). Maternal death causes are categorized into direct and indirect maternal deaths. Direct maternal deaths refer to fatalities resulting from issues arising during pregnancy, childbirth, and the postpartum phase. Severe bleeding, infection, hypertension during pregnancy, birthing difficulties, and botched abortion account for over 75% of all maternal fatalities (WHO, 2023). Indirect maternal deaths refer to maternal fatalities resulting from pre-existing medical disorders that are aggravated by pregnancy or from diseases that develop during pregnancy and impact the pregnancy itself. Pre-existing medical disorders or those that develop during pregnancy include malaria, anemia, Human Immunodeficiency Virus (HIV) / Acquired Immune Deficiency Syndrome (AIDS), and cardiovascular disease (UNICEF, 2023). In Indonesia, the primary contributors to indirect maternal mortality remain numerous 4 T and 3 T instances. 4T cases refer to maternal mortality instances affected by risk variables like age and parity, leading to numerous complications if not adequately screened and managed. 4T cases can be predicted based on the initiatives of the National Population and Family Planning Agency to ensure the success of the Family Planning program (Hazairin et al., 2021). 3T cases exhibit delays in decision-making on referrals to health services, identifying pregnancy danger signals, and obtaining appropriate care at these facilities. The delay in decision-making about referrals to health facilities typically arises during the family's decision-making process; therefore, enhancements are necessary for various aspects that affect medical decision-making and the identification of postpartum danger indications. Enhance the transportation system to facilitate expedited access to healthcare facilities, eliminating delays in reaching referral destinations. The delay in effective management within health facilities is attributed to prolonged administrative procedures, insufficient referral health facilities, a shortage of healthcare personnel at referral sites, inadequate infrastructure, and insufficient blood supply, which fails to meet maternal needs. Consequently, enhancements are required from the Regional Government to aid in the reduction of maternal mortality rates in Papua Province (Mariya U, 2019).

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Various factors associated with postpartum maternal mortality include maternal parity, precisely the total number of children a mother has borne, whether living or deceased. Parity is an indirect indicator to evaluate the maternal condition during pregnancy and the status of the fetus till delivery (Renaldi, 2018). Social determinants of residency may reflect disparities in disease incidence between rural and urban regions. Factors contributing to disparities in disease prevalence and mortality between rural and urban areas include variations in population density and age distribution, differences in occupational and lifestyle practices, divergent health and illness perceptions, and discrepancies in living conditions and sanitation (Lengkong et al., 2020).

METHOD

The study population comprised women of reproductive age, specifically those aged 15-49 years, who participated in the 2020 SDKI. After data cleaning, the initial cohort of 439,562 individuals was reduced to a research sample of 14,802. The researcher employed complete sampling in this study, focusing on maternal mortality during miscarriages and abortions that transpired within the last two years. The study's exclusion criteria included incomplete data and discrepancies in RUTA IDs among variables. The information is secondary data derived from the 2020 SDKI. The study's results were categorized and structured utilizing SPSS software version 26 for Windows.

RESULT

The 2020 SDKI data categorizes the dependent variable into four distinct types of maternal mortality: pregnancy, miscarriage and abortion, delivery and postpartum. The Central Bureau of Statistics results show that maternal mortality in Papua Province is significantly higher than in other provinces.

Table 1 Distribution of maternal mortality in Papua Province in 2020

Maternal Mortality	Death n (%)	Life n (%)
Pregnancy	121 (26,30)	
Miscarriage and abortion	66 (14,35)	
Delivery	204 (44,35)	
Postpartum	69 (15)	
Total	460 (3,10)	14.342 (96,90)

The study examined several independent variables, including parity and residence. Table 2 displays the distribution of these variables.

Table 2. Distribution of Parity and residence

Factor	Category	n (%)
Parity	> 3 children	2421 (16.36)
	≤ 3 children	12,381 (83.64)
residence	Urban	4,136 (27.94)
	Rural	10,666 (72.06)

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In 2020, a simple logistic regression test analyzed the correlation between parity and maternal mortality in Papua Province. The basic logistic regression test yielded a p-value of less than 0.05, indicating a significant connection between parity and residence with maternal mortality at a significance threshold of 0.05. The Odds Ratio indicates the association between parity and maternal mortality during miscarriage and abortion is negative. Mothers with more than three children face a higher risk of maternal mortality compared to those with three or fewer children. The unfavorable Odds Ratio indicating the association between residence and maternal mortality during miscarriage is a significant finding. It implies that urban moms face a higher risk of maternal mortality compared to their rural counterparts. The test outcomes are presented in Table 3.

Table 3 Logistic Regression Analysis of Parity and Residence with Maternal Mortality during Miscarriage and Abortion

Maternal Mortality	Parity	Maternal Mortality		Total n (%)	*p-value*	*Odds Ratio* (95% CI)
		Life n (%)	Death n (%)			
Miscarriage and Abortion	> 3 children	2.412 (99,62)	9 (0,37)	2.421 (100)	0,005*	0,475 0,284-0,794
	≤ 3 children	12.324 (99,54)	57 (0,46)	12.381 (100)		
	Urban	4.121 (99,64)	15 (0,36)	4.136 (100)	0,000*	0,394 0,258-0,602
	Rural	10.615 (99,52)	51 (0,48)	10.666 (100)		

*Meaningful if p-value < 0.05

DISCUSSION

The Ministry of Health in 2023 categorizes parity into two classifications: ideal parity (≤ 3 children) and non-ideal parity (> three children). Women are classified as having high parity if they have more than three children and low parity if they have three or fewer children. This impacts future pregnancies, making them riskier for women with high parity. Most, precisely 12,381 moms (83.64%), exhibit low or optimal parity of three or fewer children. Parity is intricately linked to complications during childbirth encountered in prior deliveries that lead to maternal and neonatal mortality (Renaldi, 2018). The parity of 2-3 deliveries is associated with the lowest maternal mortality risk, whereas mothers with high or non-ideal parity beyond three children constitute 2,421 cases (16.36%). The essential logistic regression analysis findings indicated a strong correlation between parity and maternal mortality in Papua Province in 2020. The data revealed that moms with more than three children faced a higher risk of maternal mortality compared to those with three or fewer children. This aligns with the Ministry of Health's 2018 report indicating that having excessive children adversely affects the high demands on family resources. The disparity between wants and resources, specifically attention and affection among family members, is particularly evident, especially since mothers prioritize their children or other relatives. Consequently, mothers are becoming progressively susceptible to health issues, and their survival capacity is diminishing, mainly due to the demands of pregnancy that necessitate a heightened focus on maternal and

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fetal health. Consequently, it is prudent for moms and husbands to strategize the number of offspring by evaluating health, economic factors, caregiving, and other significant considerations. Mothers and husbands may seek counsel from health professionals to obtain suitable Family Planning services. Mothers who bear an excessive number of children are deemed in danger of mortality (Ministry of Health of the Republic of Indonesia, 2018). According to research by Hazairin et al. (2021), diminished and falling reproductive organ performance can elevate the risk of difficulties, low birth weight, and other health issues that may jeopardize maternal safety. Moreover, high parity is typically correlated with advanced maternal age and reduced birth intervals, thereby elevating the risk to the mother (Hazairin et al., 2021). This study aims to encourage the government to enhance the family planning program for the community, increasing awareness of the dangers associated with pregnancy, labor, and postpartum periods that may arise with high or non-ideal parity exceeding three children.

Papua is an island in the eastern part of Indonesia, where the inhabitants typically experience impoverished, isolated, and underdeveloped circumstances. Presidential Regulation Number 131 of 2015 identifies 122 districts as undeveloped areas from 2015 to 2019, with 103 districts, or 84%, located in the eastern portion of Indonesia (President of the Republic of Indonesia, 2019). The Eastern Region of Indonesia is characterized by mountainous terrain, hilly landscapes, and steep topography, comprising small islands divided by the sea (Ministry of Health of the Republic of Indonesia, 2017). Insufficient infrastructure, challenging accessibility, limited regional connectivity, inadequate service availability in health, education, and other essential areas, and diverse natural conditions hinder individuals from optimally fulfilling their basic needs, leading to a diminished quality of life (Bappenas, 2016). Geographical location significantly influences the accessibility of healthcare services in a region. Pregnant women residing in distant places, typically isolated communities with challenging transportation, would encounter higher maternal mortality rates due to prolonged travel times to health services when referred, as well as limited access to prenatal care. The prevalence of maternal mortality is elevated in women residing in rural regions and among economically disadvantaged populations (WHO, 2023). Most moms, specifically 10,666 (72.06%), reside in rural areas, compared to 4,136 (27.94%) who live in urban areas. The essential logistic regression analysis findings indicated a strong correlation between residential location and maternal mortality in Papua Province in 2020. The investigation revealed that mothers residing in urban regions face a higher risk of maternal mortality compared to those in rural areas. Unintended pregnancies are associated with hazardous abortion procedures. According to the Basic Health Research (Riskesdas) data, the annual incidence of abortion is 2.5 million, with a higher prevalence in urban regions (Ministry of Health of the Republic of Indonesia, 2019). In 2018, Papua Province ranked 10th in Indonesia for the number of miscarriages and abortion cases during the past five years. The Riskesdas study provided a nationwide overview of the prevalence of miscarriage and

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abortion, unplanned pregnancy, and attempted miscarriage and abortion in Indonesia, correlating these factors with demographic and socio-economic positions to ascertain the motivations for contemporary abortions (Pranata et al., 2018). No data was identified about the causes of miscarriage and abortion fatalities in adult women-only information about adolescent pregnancies was available. Childbirth, miscarriage, or elective abortion without medical justification culminates in abortion and is linked to a significant risk of adolescent or maternal mortality (Ray et al., 2024).

CONCLUSION

Following an analysis of secondary data regarding maternal mortality in Papua Province in 2020, the subsequent conclusions were derived from the research findings 2020 in Papua Province the majority of mothers had a parity of three or fewer children (83.64%) compared to those with a parity exceeding three children (16.36%). The proportion of mothers residing in rural regions was higher (72.06%) than that in urban areas (27.94%). Parity and residency are inversely correlated with maternal mortality during miscarriage and abortion. The presence of more than three children and urban residency significantly increases the risk of maternal mortality. The research findings provide a strong foundation for future policies and interventions to reduce maternal mortality in Papua Province.

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Correlation Between HbA1C Levels And C-Reactive Protein Levels In Diabetes Mellitus Patients

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A B S T R A C T

Diabetes mellitus (DM) is a chronic disease characterised by elevated blood glucose levels ≥ 200 mg/dl due to metabolic disorders. Insulin resistance triggers a blood glucose imbalance, resulting in no energy supply needed by the body's cells. The condition of DM is destructive to the body and, therefore, needs to be measured with stable parameters for the long term. HbA1c is a standard clinical examination used as a determinant of glycaemic status in DM disease. C-reactive protein (CRP) level is an effective parameter in determining the index of damage or inflammation that occurs in the body due to DM. This study aims to determine the relationship between HbA1c levels and CRP levels in patients with diabetes mellitus at Dr. Sardjito Hospital. Twenty patients with type 2 diabetes mellitus were included in this study using the purposive sampling technique. HbA1c data and CRP levels were analysed with the Spearman correlation test. The Pearson correlation test results showed a p-value = 0.001 and an r-value = 0.705. There is a relationship between HbA1c levels and CRP levels in DM patients at RSUD Dr. Soedirman Kebumen.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder characterized by hyperglycemia due to abnormalities in insulin secretion, insulin action, or both, causing metabolic function disorders and multi-organ failure, especially in the kidneys, eyes, nerves, heart, and blood vessels (Tandjungbulu et al., 2022). The Ministry of Health of the Republic of Indonesia reported in 2018 that the prevalence of DM mainly aged 55–64 years at 6.29% and females at 1.78% (Kemenkes RI, 2019). The prevalence of DM in Central Java in 2021 was 10.7% (DinkesProv Jateng, 2021). During 2022, there were 647 thousand cases of diabetes in Central Java, and in Kebumen Regency, two types of diabetes were identified, namely type I DM with 980 cases and type 2 DM (T2DM) with 10,482 cases. The results of data collection at RSUD Kebumen found 739 cases of diabetes, with 137 cases of type 1 DM (T1DM), 491 cases of type II diabetes, 23 cases of diabetes during pregnancy, and 88 cases of other types of diabetes.

DM disease can thus be diagnosed through blood glucose measurement (Bistara, et al., 2022). The application of DM disease management cannot be applied to general blood glucose measurements because the results are less specific (Bistara et al., 2022). HbA1c is one of the components that determines the glycemic status of DM patients. This component has been standardized and is effective for long-term use. HbA1c in DM patients will increase based on the presence or absence of binding between hemoglobin and blood glucose, not on the rise and fall of glucose levels in the body. The binding between

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the two is stable, so the value is not easily influenced by external factors such as the amount of food intake (Widiyanti et al., 2020).

Metabolic disorders in patients with DM will affect the body's tissue regeneration cycle, resulting in tissue damage or inflammation very quickly. C-reactive protein (CRP) is used as an inflammatory marker with high sensitivity. Even high-sensitivity C-reactive protein (Hs-CRP) can detect CRP levels as low as 0.3 mg/L to as high as 300 mg/L quantitatively (Blinc et al., 2020). Omer and Ali reported that there were significant differences in fasting blood glucose, HbA1C, Hs CRP, IL-6, and TNF-α levels between the control group and the case group in patients with T2DM in Sudan. Still, there were no significant differences in all these parameters between male and female patients (Omer & Ali, 2019).

Bhaskar et al. reported that there is a correlation between CRP levels and HbA1C levels in patients with T2DM at Nalanda Medical College and Hospital in Patna, Bihar, India (Bhaskar et al., 2021). There was a difference in HbA1C levels between DM and non-DM groups at Kütahya Private Hospital in Kutahya province, western Turkey. HbA1C levels correlate with CRP levels in T2DM patients (Son, 2019). This study aims to determine the correlation between HbA1C levels and CRP levels in T2DM patients at RSUD Dr. Soedirman Kebumen, Kebumen Regency.

METHOD

This study used a cross-sectional design and was conducted in July 2023 at RSUD Dr. Soedirman Kebumen after obtaining ethical clearance from the Health Research Ethics Commission of Universitas Muhammadiyah Purwokerto number KEPK/UMP/49/VII/2023. Twenty T2DM patients were involved in this study using the purposive sampling technique.

Inclusion criteria: 1) DM patients who were registered at RSUD Dr. Soedirman Kebumen for the last year, according to medical records; 2) Patients willing to sign informed consent; 3) Chronic type 2 DM patients obtained through medical record results. Exclusion Criteria: 1) No history of metabolic syndrome, hypertension, viral or bacterial infections, or other comorbidities; 2) DM patients with anemia based on medical records. Measurement of HbA1C levels used the VIVaDiag POCT Analysis Vim 1000, while measurement of CRP levels used the BiOLiS 30i. The data were analysed using the Spearman correlation test.

RESULT

The majority of T2DM patients at RSUD, Dr. Soedirman Kebumen, were aged ≥ 56 years old. There were 16 patients (80%). The mean age of the patients was 60.10 ± 11.323 years old. The majority of T2DM patients were male: 12 patients (60%), experienced excessive thirst and hunger: 13 patients (65%), severe weight loss: 11 patients (55%), often urinated at night: 14 patients (70%), and regularly exercised:

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13 patients (65%). The mean HbA1C level was 7.87 ± 2.499%, while the mean CRP level was 4.96 ± 2.103%. The details of the subject characteristics are illustrated in Table 1, while the correlation between HbA1C levels and CRP levels is illustrated in Table 2.

Table 1. Subject Characteristics

Characteristics	Frequency (n)	Percentages (%)	Mean ± SD	Median (Min-Max)
Age (y.o)				
25-40	2	10	60,10 ± 11,323	62,50 (27-82)
41-55	2	10		
≥ 56	16	80		
Gender				
Male	12	60		
Female	8	40		
The patient feels excessive hunger and thirst.				
Yes	13	65		
No	7	35		
Severe weight loss in patients				
Yes	11	55		
No	9	45		
The patient urinates frequently at night.				
Yes	14	70		
No	6	30		
The patient is taking anti-diabetic drugs.				
Yes	20	100		
No	-	-		
The patient exercises regularly.				
Yes	13	65		
No	7	35		
Frequency of exercise rhythm within 1 week				
1-2 times	20	100		
3-4 times	-	-		
HbA1C levels (%)			7,87 ± 2,499	7,17 (5,17 - 13,46)
CRP levels (mg/L)			4,96 ± 2,103	4,82 (1,01 - 11,32)

Table 2. Correlation between HbA1C levels and CRP levels in T2DM patients

	Kadar CRP
Kadar HbA1c	r = 0,705 p = 0,001

Based on Table 2, it is known that there is a correlation between HbA1C levels and CRP levels in T2DM patients at RSUD Dr. Soedirman Kebumen.

DISCUSSION

HbA1C levels and CRP levels are two components that are related to each other. HbA1C is a biomarker of glycemic status, while CRP levels are a biomarker of inflammation that occurs in a person's body (Aini

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et al., 2020). Because HbA1C can be a marker of conditions leading to acute and chronic organ damage occurring due to DM, checking CRP levels is effective in confirming the presence or absence of inflammation or infection (Oktavia et al., 2021).

Most T2DM patients in this study were aged ≥ 56 years. Elderly conditions affect physiological changes in the body. When the aging process occurs, the body experiences a slow decline in ability, and even body tissues cannot regenerate completely or experience a decrease in ability. This condition causes a loss of immunity, resulting in susceptibility to diseases such as DM (Yusrita & Novela, 2018).

Gender affects the condition of DM. Women are more susceptible to DM due to a lack of physical activity and exercise and an uncontrolled lifestyle (Khairinisa et al., 2022). DM patients feel excessive hunger and thirst due to difficulties in processing energy through glucose synthesis obtained from carbohydrates, resulting in insulin resistance as the body's homeostatic response by sending hunger signals (Driva et al., 2021).

Severe weight loss occurs in people with DM because glucose and energy cannot be processed correctly, leading the body to break down energy reserves such as fat and muscle during the metabolic process. Frequent urination at night was caused by hyper concentration in the kidney organs (Permatasari et al., 2020). These kidneys will naturally maintain a normal state and automatically try to remove excess glucose. This process occurs more often at night when the body is resting while metabolic processes continue. The body is aided by physical activity during the day through the release of sweat and is, therefore, fluidly balanced, not only in the kidneys (Kusumawardhani, 2021).

The results of this study are in line with the research of Elimam et al., which showed that there is a relationship between HbA1C levels and CRP levels in T2DM patients ($p = 0.001$, $r = 0.761$) (Elimam, Abdulla, and Taha, 2019). It is also supported by the research of Seo and Shin, which shows that there is a positive correlation between HbA1C and hs-CRP in South Korea. Hs-CRP levels affected HbA1c levels. HbA1c increased significantly as hs-CRP increased (Seo & Shin, 2021). The study of Ramesh et al. also showed a positive correlation between HbA1C levels and hs-CRP levels in T2DM patients in Mysore, India (Ramesh et al., 2019). In contrast to the research of Permatasari et al., which showed there was no relationship between HbA1c levels and CRP levels in DM patients with obesity and non-obesity (Permatasari et al., 2020).

The HbA1C level test includes the hemoglobin component that binds blood glucose. This test is used in the assessment of blood glucose control and is the most reliable because it can describe the average blood glucose level in the previous 3 months (Anggrina et al., 2022). In addition to being positively correlated with CRP levels, HbA1C levels are also known to have a positive correlation with several other biomarkers, including serum ferritin, insulin levels, blood glucose levels, and triglyceride levels in T2DM patients (Son, 2019).

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CONCLUSION

There is a correlation between HbA1C levels and CRP levels in patients with T2DM at RSUD Dr. Sardjito. It is necessary to conduct research related to the correlation of HbA1C levels with CRP levels in controlled T2DM patients. It is required to research other inflammatory markers such as IL-6, TNF-α, and procalcitonin, as well as examination of insulin levels and kidney function, in an effort to manage DM.

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Use of SADARI Educational Video Media on the Knowledge and Attitudes of Menopausal Women

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A B S T R A C T

Indonesia ranks eighth in the number of cases of breast cancer in Southeast Asia. Deaths are rising as 70% of detections are in advanced stages. Low knowledge leads to a woman who doesn't know there are bumps on her breasts. So, we need health promotion. For menopause, breast checks themselves (SADARI) are done every month on the same date, but still, many do not apply SADARI. Objective: This study is intended to analyze the use of SADARI Educational Video Media for SADARI Knowledge and Attitudes in menopausal women. Quantitative research, with design pre-experiment one group pre-post-test, research carried out in Dusan Bluru Kidul, Sidoarjo, Sampling technique using simple random sampling of 38 women menopause, Primary data collection technique with instrument questionnaire knowledge and attitude SADARI. Data analysis technique using Wilcoxon Signed Rank Test. Results show p-value 0,000 (<0,05), which means there is an increase in knowledge from less to sufficient and suitable, negative attitude to positive after displayed educational media video SADARI in menopausal women. So, it can be concluded that educational video media about SADARI can be used to improve the knowledge and attitudes of menopausal women. It's expected that menopausal women can do a monthly routine as early detection.

INTRODUCTION

Indonesia ranks eighth in Southeast Asia with a cancer incidence rate of 421 per 100,000, with an average mortality rate of 17 per 100,000 population (Wiyanti, 2022). Early breast cancer detection data from the Sidoarjo Health Profile 2022 found that women aged 30-50 years were suspected of having cancer. This age is the age of entering menopause. Sidoarjo Regency itself ranks eighth with a rate of 0.9%, showing a high incidence of breast cancer in Sidoarjo (Irmayanti, 2020). About 70% of detections are already in advanced stages, and treatment is too late, causing high mortality (Halim, 2023). Low knowledge makes menopausal women unaware of what to do, so they cannot detect breast cancer early. Therefore, health promotion efforts regarding SADARI are needed (Emilia, 2021).

The government, in its plan to tackle breast cancer, has three pillars: health promotion, early detection, and case management (Huda, 2023). During menopause, SADARI can be done every month on the same date. Preliminary study results show that the number of menopausal women in Dusun Bluru Kidul is 42, with many still having low knowledge and negative attitudes toward SADARI. SADARI should be applied every month on the same date, but many do not perform it (Riani, 2019).

Factors affecting SADARI include knowledge and attitudes about SADARI, healthcare workers, and information on SADARI counseling. This can be seen in whether someone has received education,

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motivation, and support from social or family circles (Sundari, 2022). Low knowledge and unfamiliarity with how to perform proper SADARI procedures cause someone to be unfamiliar with the topic. This is due to the lack of information and supporting theory to teach SADARI (Tuelah, 2020). Mass media is a factor that influences knowledge. Mass media is also called a tool to present, introduce, and show information to the public. Various types of information media range from print to electronic media, which are exceptionally functional for conveying information (Sumarni, 2021). Attractive counseling media is needed to present and deliver information to the public. Video media combines audio and visual elements, making it more engaging and easier to understand (Sitompul, 2019). The indicator of successful counseling is increased knowledge. Attitude is not an action but a tendency to accept or reject a received topic of information (Notoatmodjo, 2018). Based on the problem description above, the author wants to conduct a study titled "Utilization of SADARI Educational Video Media on Knowledge and Attitude in Menopausal Women" in Dusun Bluru Kidul Sidoarjo

The problem formulation in this research is "Does SADARI educational video media benefit the knowledge and attitudes of menopausal women?". The general objective of this research is to analyze the utilization of SADARI educational video media in relation to the knowledge and attitudes of menopausal women. The specific objectives are to investigate the understanding of SADARI among menopausal women before and after being shown the educational video media and to analyze the attitudes toward SADARI among menopausal women before and after being shown the educational video media.

METHOD

This type of research is quantitative with a one-group pre-posttest design. The study was conducted by collecting respondent samples in one place, explaining the research procedure to be used, providing informed consent, distributing pre-test questionnaires, giving interventions, providing a break, and then giving post-test questionnaires. Post-test measurements are used as the basis to determine whether the intervention has an effect or not. The population in this study was 42 menopausal women aged 45 to 55 years. Samples were taken based on inclusion criteria, which included premenopausal, menopausal, and postmenopausal women and those who could communicate well. Exclusion criteria included illiterate women. Researchers calculated and determined the sample size using the Slovin formula, resulting in 38 samples representing the population. The sampling technique used probability sampling with simple random sampling, where samples were chosen by lottery, giving all an equal chance. Primary data collection used modified and validated questionnaires. Data analysis used univariate analysis to process data from the questionnaires to obtain knowledge levels (good, sufficient, poor) and attitudes (positive, negative)—bivariate analysis aimed to analyze differences in the effects of the given intervention. The indicator was whether there was a change in knowledge and attitudes before and after the intervention.

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The statistical test used was the Wilcoxon test, with a significance level of 0.05. If the p-value ≤ 0.05, the null hypothesis is rejected, meaning there is an effect of SADARI educational video media on increasing the knowledge of menopausal women. The intervention used in this study was the SADARI educational video media, which provided an overview of breast cancer and the steps for performing SADARI. It included animated visuals demonstrating the procedure and audio explaining each step, as well as text captions describing the actions shown.

RESULT

Table 1 Frequency Distribution of Respondent Characteristics of Research on the Utilization of Educational Video Media SADARI on Knowledge and Attitudes of Menopausal Women in 2024

Characteristics	Frequency (n)	Percentage (%)
Age		
45-50 Years	11	28,9
51-55 Years	27	71,1
Work		
Housewives	31	81,6
Work	7	18,4
Education		
Low (Elementary/Junior High)	20	52,6
Medium (Senior High School)	18	47,4
Higher el (Diploma, Bachelor)	0	0
Total	38	100

Table 1 shows that many respondents were aged 51-55 years (71.1%). Most were housewives (81.6%), and a significant portion had a medium education level (47.4%).

Table 2 Frequency Distribution of Knowledge of Menopausal Women about SADARI.

Knowledge	Before		After		Z	*p-value*
	n	%	n	%		
Less	19	50,0	0	0		
Enough	6	15,8	10	26,3	-5.028	0,000
Good	13	34,2	28	73,7		
Total	38	100	38	100		

Table 2 shows that of the 38 menopausal women before being exposed to the SADARI educational video media, most of the respondents (50%) had insufficient knowledge. Meanwhile, after being presented with SADARI educational video media, most of the respondents (73.7%) became well knowledgeable. The results of the statistical test of knowledge before and after being presented with SADARI educational video media using the Wilcoxon Signed Rank Test obtained a significant value of p-value = 0.000, which means that there is a substantial difference between the level of knowledge before and after being exposed to SADARI educational video media in menopausal women.

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Table 3 Frequency Distribution of Menopausal Women's Attitudes Towards SADARI

Attitude	before		after		Z	*p-value*
	n	%	N	%		
Positive	18	47,4	27	71,1	-5.091	*0,000*
Negative	20	52,6	11	28,9		
Total	38	100	38	100		

Table 3 shows that of the 38 menopausal women before being exposed to the SADARI educational video media, most of the respondents (52.6%) had a negative attitude. Meanwhile, after being presented with SADARI educational video media, some of the respondents (71.1%) had a positive attitude. The results of the attitude statistics test before and after being presented to SADARI educational video media using the Wilcoxon Signed Rank Test obtained a significant value of p-value = 0.000, which means that there is a meaningful difference in attitude before and after being exposed to SADARI educational video media in menopausal women.

DISCUSSION

The research results show that the knowledge of menopausal women before being exposed to the SADARI educational video media was lacking in half of the respondents. In contrast, the understanding of menopausal women after being exposed to the SADARI educational video media showed that almost all respondents had good knowledge. Seven factors influence a person's knowledge, namely the level of education, occupation, age, experience, environment, and information. The level of education can affect the understanding of menopausal women, as a higher level of education correlates with better knowledge. This is supported by Ekawati (2021), which states that higher education allows individuals to receive information developments more effectively and thus increases their knowledge. This is also supported by Ratna et al. (2022) in their study titled "Training for Early Detection of Breast Cancer and SADARI Examination for Health Cadres" in Tertek Village, Kediri, which found that a good level of education leads individuals to actively seek information from various media and readily accept and understand the information received (Hidayati, 2022).

Age is another factor that affects knowledge. The research results show that many women aged between 51 and 55 years who are not yet classified as elderly received much educational input. This is consistent with the results of Ratna et al. (2022) in their study titled "Training for Early Detection of Breast Cancer and SADARI Examination for Health Cadres" in Tertek Village, Kediri, which found that as age increases, individuals become more skilled at making choices (Hidayati, 2022). However, the theory of decline states that with increasing age, memory capacity tends to decrease (Pramudaningsih, 2020). This can be supported by activities that stimulate memory, such as brain exercises and puzzle games (Fahrudiana, 2023).

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Another factor influencing knowledge is the media. The results of this study are supported by Rafiah (2020), who found that audiovisual media in the form of health education videos is more effective in providing an understanding of SADARI because it is known to increase the knowledge of the target audience. The significant role of health education media as a source of information and knowledge enhancement is evident. Video media effectively conveys information using multiple senses, such as sight and hearing (Pulungan, 2020).

According to the researchers, the increase in knowledge from insufficient to sufficient and reasonable after exposure to the SADARI educational video media is attributed to the characteristics of menopausal women, who are mature enough to receive and process information. This is also supported by their exemplary level of education, engaging and easily understood audiovisual media, and the involvement of personnel who can explain well.

The research results show that the attitudes of menopausal women before being exposed to the SADARI educational video media were negative, whereas, after exposure, most had positive attitudes. This change in attitude is evidenced by the decrease in negative attitudes among menopausal women after being exposed to the SADARI educational video media. Attitude refers to a person's response to a stimulus or object. Attitude does not necessarily imply action but rather the acceptance or rejection of an idea (Notoatmodjo S, 2014).

Based on the review of this research, the knowledge of menopausal women is influenced by characteristics such as age and education level, which affect the information they receive. The level of understanding of menopausal women influences their attitudes towards SADARI itself (Wulandari, 2022). This is consistent with the research by Asyima (2021), which explained that there is a significant difference in knowledge and attitudes before and after being provided with information media, where increased knowledge is accompanied by positive attitudes (Asyima, 2021). This is also supported by Retno (2022), who found that there was a change to a positive attitude along with an increase in knowledge after being given the SADARI video media (Hidayati, 2022).

Knowledge is the foundation for forming individual attitudes and actions. Personal knowledge is formed from various topics and media. When information is presented in detail, the knowledge of individual decision-making increases. Besides knowledge, other influential factors include significant others, those whose opinions are heard, those whose opinions are sought, and trusted individuals in society, such as healthcare workers, officials, leaders, and family (Notoatmodjo S, 2014).

According to the researchers, the change in respondents' attitudes, besides being influenced by characteristics such as age, education, and occupation, is also affected by the level of knowledge, media, and personnel. Good knowledge creates a positive attitude, as knowing information makes it easier to determine the attitude to be taken. From a media perspective, audiovisual media provides engaging

information through animated images that demonstrate, making it attractive and easy to understand for respondents. Attitudes can also be influenced by personnel, where skilled personnel who effectively communicate information and encourage respondents will result in positive attitudes, especially with the support of social reminders and personnel frequently reminding respondents to perform SADARI regularly.

CONCLUSION

Based on the research results above, it can be concluded that there is a significant difference in knowledge before and after being exposed to the SADARI educational video media in menopausal women, and there is a meaningful difference in attitudes before and after being exposed to the SADARI educational video media in menopausal women.

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The Effect of Oxytocin Massage on First-Stage Labor Pain

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A B S T R A C T

Pain during labor results from uterine contractions that cause cervical dilation, often leading to increased anxiety, vasoconstriction, and decreased oxygen levels. These factors can contribute to prolonged labor for the mother and potential hypoxia for the fetus. Effective pain management techniques, such as oxytocin massage, may help alleviate labor pain and improve maternal comfort. This study aimed to analyze the effect of oxytocin massage on first-stage labor pain. This quantitative study employed a pre-experimental one-group pretest-posttest design. The research was conducted at TPMB Afah Fahmi, Surabaya, involving 17 laboring mothers selected through purposive sampling. Pain levels were measured using the Numeric Rating Scale (NRS) ranging from 0 to 10. Data were analyzed using the Paired Sample T-Test. Statistical analysis showed a significant reduction in first-stage labor pain following oxytocin massage, with a p-value of 0.000 ($p < 0.05$). This indicates a meaningful difference in pain levels before and after the intervention. Oxytocin massage effectively reduces first-stage labor pain, promoting a more comfortable labor experience. Healthcare providers are encouraged to integrate oxytocin massage as a non-pharmacological pain management strategy to support laboring mothers.

INTRODUCTION

Every pregnant woman craves a standard, smooth, and painless delivery. Young mothers who give birth think that childbirth is scary and constantly painful. This is commonplace. However, if left unchecked, it will become a big problem (Wijaya, Bewi, and Rahmiati, 2018). The contraction of the uterine muscles that radiate to the waist, abdomen, and thighs makes the opening of the uterine mouth a labor pain (Rejeki, 2020).

It is reported that sources from WHO, 15% have mild pain, 35% have moderate pain, 30% have severe pain, and 20% have very severe pain. This makes pregnant women feel worried during childbirth (Barus, Widiyanti, and Yulyana, 2023). Research conducted by Ebirim reported a total of 300 deliveries in the first stage, with 32% severe pain, 57% moderate, and 11% mild pain (Utari and Futriani, 2022). According to research conducted by Livana, it was reported that 30 mothers gave birth in the latent phase; three mothers had mild pain, 18 had moderate pain, 9 had severe pain, and 0 had uncontrollable severe pain (Livana et al., 2020).

Factors that affect labor pain include culture, anxiety, fear, previous experience, support, and preparation for childbirth. Pain in each respondent is unique and different (Rejeki, 2020). Problems due to pain are not resolved, namely increased anxiety during the delivery process so that blood pressure rises due to the

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narrowing of blood vessels triggered by the hormone adrenaline, disruption of blood distribution to the fetus makes hypoxia (fetus) and old parts (mother) (Wijaya, Bewi and Rahmiati, 2018).

Pain can be reduced by pharmacological and non-pharmacological. Pharmacological, with analgesic drugs and anesthetics. Non-pharmacological with relaxation, breathing, hypnobirthing, acupuncture, acupressure, water birth, TENS, and massage (Himawati and Kodiyah, 2020). Developments in the provision of comprehensive care are currently carried out with a natural or non-pharmacological therapy approach (Jamir and F, 2021). Non-pharmacological therapies are often used because they tend to be safer and more manageable, one of which is oxytocin massage. Oxytocin massage brings out a relaxing effect due to the increased production of endorphins. This relaxation stimulates the brain to lower the production of adrenaline but increases oxytocin so that uterine contractions become adequate. Massage is applied to the spine from the scapula to the costa 5-6, the location of the massage. Adequate contractions are expected to speed up and facilitate the delivery process to avoid pain that lasts too long (Himawati and Kodiyah, 2020).

Oxytocin massages provide many benefits. Many studies have proven the benefits of oxytocin massage in increasing breast milk production. Other benefits are stimulating oxytocin and avoiding stress and pain (Litasari, 2020). From the above problem, the researcher wants to research "The Effect of Oxytocin Massage on First Stage Labor Pain" conducted at TPMB Afah Fahmi Surabaya.

The formulation of the problem is "Is there an effect of oxytocin massage on labor pain in the first stage?". The general purpose of this study is "to determine the effect of oxytocin massage on labor pain in the first stage." The first specific goal is "to identify labor pain in the first stage before being given oxytocin massage," the second "to identify labor pain in the first stage after being given oxytocin massage." The third "to analyze the effect of oxytocin massage on labor pain in the first stage." The theoretical benefits of this research are that it is valuable information in enriching obstetrics science to add insight into the effect of oxytocin massage on labor pain in the first stage and be used as material for further research.

METHOD

This study is a quantitative research pre-experimental one-group pretest-posttest design. The population in March - April 2024 is 90 mothers giving birth, with a sample of 17 mothers giving birth using purposive sampling. As for the inclusion criteria, respondents who give birth during the first active phase of the maximum dilatation period (VT result of 5-9 cm) are willing to be used as respondents and complete oxytocin massage intervention in accordance with standard operating procedures. Data collection with primary data uses an observation sheet instrument with NRS (Numeric Rating Scale) pain measurement on a ratio scale (0-10) instead of categorically. Univariate analysis techniques are used to process data from

observation sheets so that data in the form of percentages and interpretations are known. Bivariate analysis to analyze whether there was a difference in labor pain in the first stage between before and after oxytocin massage. Paired Sample T-Test statistical test. Previously, a data normality test was carried out with a p-value of > 0.05, meaning that it was normally distributed.

RESULT

Table 1 Frequency Distribution of Maternal Characteristics by Age

Age	Frequency (n)	Percentage (%)
<20 years	1	5,9
20-35 years	16	94,1
>35 years	0	0
Total	17	100

Table 1 shows the characteristics of maternity mothers by age; almost all (94.1%) have an age range of 20-35 years, as many as 16 people.

Table 2 Distribution of Frequency of Menstrual Pain in Phase I Before Oxytocin Massage

Pain Score	Frequency (n)	Percentage (%)	*Mean*	St. deviation
0	0	0		
1	0	0		
2	0	0		
3	0	0		
4	0	0		
5	2	11,8	7,2353	1,3074
6	3	17,6		
7	5	29,5		
8	3	17,6		
9	4	23,5		
10	0	0		
Total	17	100		

Table 2 shows that almost half (29.5%) of mothers who give birth feel labor pain before being given oxytocin massage, with a score of 7 (0-10) for as many as five people. The average pain score was 7.23, and the standard deviation was 1.30.

Table 3 Distribution of Frequency of Vaginal Pain After Oxytocin Massage

Pain Score	Frequency (n)	Percentage (%)	*Mean*	St. deviation
0	0	0		
1	0	0		
2	1	5,9		
3	1	5,9		
4	3	17,6		
5	1	5,9	5,47059	1,5384
6	7	41,2		
7	3	17,6		
8	1	5,9		
9	0	0		
10	0	0		
Total	17	100		

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Table 3 shows that almost half (41.2%) of pregnant women feel pain in the first stage after being given oxytocin massage, with a score of 6 (0-10) for as many as seven people. The average pain score was 5.47, and the standard deviation was 1.53.

Table 4 Analysis of the Effect of Oxytocin Massage on First-Stage Labor Pain

Variable	Before		After		*p-value*
	Mean	St. Deviation	Mean	St. Deviation	
First Stage Labor Pain	7,2353	1,3074	5,47059	1,5384	0,000

Table 4 shows an average decrease in labor pain between before and after oxytocin massage, with a difference of 1.76. The standard deviation after the intervention was given had a more excellent value than before the intervention, indicating that the data were increasingly varied. The results of the Paired Sample T-Test with p-value = 0.000 ($p < 0.05$) mean that H0 was rejected and H1 was accepted, so it was concluded that there was a difference in labor pain in the first stage between before and after giving oxytocin massage.

DISCUSSION

The results of this study were known that before being given oxytocin massage, almost half of the respondents felt labor pain with a score of 7 (0-10), and the average overall pain score of all maternity mothers was classified as controlled severe pain. In this study, the respondents were almost all aged 20-35 years. After being given oxytocin massage, nearly half of the mothers who gave birth felt pain in the first stage of labor with a score of 6 (0-10), and the average overall pain score was classified as moderate pain. Before the administration of oxytocin massage, the average value of labor pain was classified as severe controlled pain. In contrast, after the administration of oxytocin massage, the average value of labor pain became moderate pain. Childbirth pain before and after giving oxytocin massage was decreased, as evidenced by the difference in mean values. The results of the parametric analysis test with the paired sample t-test produced a value of p-value = 0.000 ($p<0.05$).

In line with WHO data in 2019, it was reported that almost half of the mothers in childbirth experience severe pain (Barus, Widiyanti, and Yulyana, 2023). Research conducted by Ebirim reported that nearly half of mothers who give birth experience severe pain (Utari and Futriani, 2022). Research conducted by Livana also shows that almost half of mothers who give birth experience severe pain (Livana et al., 2020). Labor pain is a sensation felt physically or physically caused by uterine contractions, opening, and efficiency, as well as Hodge in the lowest part of the fetus during childbirth (Sari, Rufaida, and Lestari, 2018). Childbirth pain in the first stage in general in the lower back, if the pain appears excessively, causing the adrenaline hormone to increase, anxiety eventually arises, and fear and tension so that the body's ability to withstand pain decreases (Riskiya, 2018).

Lailatul and Naomi's research stated that age is an essential factor in childbirth (Mustaghfiroh and Hesti, 2022). WHO in 2018 noted that the safe age of pregnancy is 20-35 years old because the reproductive organs are mature and the risk of complications is small (Anashrin, Aryanti, and February 2024). In line with Adam's research, it is reported that younger people are also more likely to feel pain because they are not emotionally stable to reduce anxiety during childbirth (Maryuni, 2020).

In line with Laily's research, it was reported that almost half of mothers in childbirth experienced moderate pain, none of whom were in severe pain (Himawati and Kodiyah, 2020). Saleha's research also reported that labor pain after being given the intervention mainly experienced mild pain, almost half moderate pain, and none of them were severe (Saleha, 2023).

Oxytocin massage is to massage the spine of the costa to the 5-6th to the scapula to relax the body. Oxytocin massage is carried out for 5 minutes and repeated 3 times, thereby reducing pain in the mother. Oxytocin itself is a love hormone, so an increase in the hormone oxytocin facilitates childbirth, controls pain and stress, reduces pain, relaxes the body, feels comfortable, and reduces childbirth complications (Himawati and Kodiyah, 2020).

Oxytocin massage stimulates the hormone oxytocin, so it provides many benefits. Many studies have proven the benefits of oxytocin massage in increasing breast milk production and reducing stress and spinal pain (Litasari, Mahwati, and Rasyad, 2020).

Oxytocin massage is a safe and easy non-pharmacological method to overcome labor pain (Himawati and Kodiyah, 2020). Wijaya's research reported that there was an effect of oxytocin massage on pain but not with the progress of labor due to the duration and method or strength of massage that was less than optimal (Wijaya, Bewi, and Rahmiati, 2018). Chakti's research has found that the effect of massage on labor pain is practical (Chakti, Indrayani, and Sariaty, 2022).

First-stage labor pain felt before being given oxytocin massage appears due to contractions of the uterine muscles. Contractions that are increasingly inadequate in the opening process can increase the pain of labor felt. Maternity mothers are expected to be still able to communicate and be cooperative so that they can complete a series of oxytocin massage administrations according to standard operating procedures based on previously planned inclusion criteria. Oxytocin massage is a massage that can provide benefits both during the labor process and after childbirth. A gentle massage accompanied by communication between the midwife and mother makes her more relaxed so that she can pass the first stage as comfortably as possible. Give space for the maternity mother to relax so that fear and anxiety subside.

The difference in the mean value has shown that there is a difference in the occurrence of a decrease in labor pain in the first stage between before and after being given oxytocin massage because, in the operational definition table that has been prepared previously, the measurement scale chosen by the researcher is a ratio with a value range of 0-10 not categorically.

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CONCLUSION

The conclusion from the results of the above study is that the labor pain in the first stage before being given oxytocin massage is classified as severe controlled pain on average, the labor pain in the first stage after being given oxytocin massage is classified as moderate pain on average, and there is an effect of oxytocin massage on labor pain in the first stage.

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Study of Clinical Characteristics of AIDS Patients with Opportunistic Infections: Findings from Cut Mutia General Hospital

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A B S T R A C T

HIV/AIDS remains a global public health challenge, with opportunistic infections (OIs) being a major cause of morbidity and mortality. In resource-limited settings such as Aceh, Indonesia, the burden of OIs significantly impacts the management and outcomes of HIV/AIDS patients. Purpose: This study aims to describe the demographic and clinical characteristics, the prevalence of OIs, and treatment outcomes among HIV/AIDS patients treated at Cut Mutia General Hospital in Lhokseumawe, Aceh. A retrospective observational study was conducted using medical records of 55 HIV/AIDS patients treated between January 2023 and October 2024. Data included demographic profiles, clinical features, types of OIs, and treatment outcomes. Descriptive statistical analysis was performed. Many patients were male (67.3%) and aged 25–44 years (81.8%). Oral candidiasis (28.1%) and pulmonary tuberculosis (17.7%) were the most common OIs. Notably, some patients experienced multiple OIs. Most patients (76.4%) were discharged in stable condition, while 23.6% succumbed to their illnesses. This study highlights the high prevalence of OIs among HIV/AIDS patients in Lhokseumawe, emphasizing the need for early detection, improved clinical management, and integrated care services. Targeted interventions are critical to reducing mortality and improving patient outcomes in resource-constrained settings.

INTRODUCTION

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) are global public health issues that have caused millions of deaths worldwide. According to the World Health Organization (WHO), approximately 38 million people were living with HIV globally in 2019 (Buchacz et al., 2016; Harjoni, 2023; Tewachew et al., 2021). HIV attacks the immune system, making infected individuals vulnerable to various opportunistic infections (OIs), which are major causes of morbidity and mortality among AIDS patients (Buchacz et al., 2016; Fatimatuzzahra et al., 2022; Shi et al., 2011). In Indonesia, despite increased access to antiretroviral therapy (ART), the incidence of opportunistic infections remains high. According to data from the Ministry of Health of Indonesia in 2024, more than 543,100 HIV/AIDS cases have been reported nationwide, with 23,100 new cases reported in the last two years. In Aceh, the cumulative number of cases reached 1,750, with a significant increase in Lhokseumawe City, which accounted for 280 cases during the same period. This situation reflects significant challenges in HIV/AIDS prevention and management efforts in Indonesia.

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Opportunistic infections present significant challenges in the clinical management of HIV/AIDS patients. Infections such as tuberculosis, pneumonia, cryptococcal meningitis, and cerebral toxoplasmosis are frequently reported in AIDS patients (Buchacz et al., 2016; Fatimatuzzahra et al., 2022; Tewachew et al., 2021). In Indonesia, delays in early diagnosis and poor adherence to ART exacerbate the situation, causing patients to present to healthcare facilities in advanced stages with complications from opportunistic infections (Harjoni, 2023; Shi et al., 2011; Tewachew et al., 2021). Therefore, studies on the clinical characteristics of opportunistic infections are necessary to improve strategies for prevention and management.

This study aims to examine the clinical characteristics and types of opportunistic infections in AIDS patients treated at Cut Mutia General Hospital. It also seeks to identify the main risk factors contributing to the occurrence of opportunistic infections (Ando, 2024; Savadogo et al., 2021; Utarini, 2017).

Various studies have shown a high prevalence of opportunistic infections among HIV/AIDS patients. Studies in China found that cytomegalovirus (CMV) retinitis often occurs in AIDS patients, and treatment with ganciclovir has proven effective (Damtie et al., 2013; Fenner et al., 2017; Opoku et al., 2018; Tewachew et al., 2021). Research in Ethiopia by Tewachew et al (2021) identified malnutrition and a history of previous opportunistic infections as significant predictors of recurrent infections. In Indonesia, research by Fatimatuzzahra et al (2022) Fatimatuzzahra et al. (2022) found that cerebral toxoplasmosis is the most common central nervous system infection, with high mortality rates among patients with other opportunistic infections (Adamu & Petros, 2010; Almaw, 2024; Harjoni, 2023; Sanyaolu et al., 2016).

Although studies on opportunistic infections in AIDS patients have been widely conducted in various countries, research on the specific characteristics of patients in Indonesia, particularly in Aceh, remains very limited (Ahmetagic et al., 2015; Harjoni, 2023; Teeka, 2023). Most existing studies focus only on prevalence without delving deeper into the types of infections and other risk factors. This gap needs to be addressed to develop evidence-based management strategies, especially in Aceh, which has unique social and cultural challenges in managing HIV/AIDS (Fatimatuzzahra et al., 2022; Mo, 2016; Shi et al., 2011).

This research offers new contributions by presenting a detailed analysis of patient characteristics and types of opportunistic infections found at Cut Mutia General Hospital. Additionally, the study focuses on the relevance of community-based support such as Peer Support Groups (PSGs), which have proven effective in assisting HIV/AIDS patients in North Aceh (Dawet & Onaiyekan, 2020; Fatimatuzzahra et al., 2022; Harjoni, 2023; Wulandari, 2023). This data is expected to serve as a reference for local health policy.

The findings from this study can provide new insights for the medical community and researchers in understanding the epidemiology of opportunistic infections in Indonesia. Practically, this research can help clinicians identify high-risk patients and implement early interventions. Furthermore, the study's results can support the development of community-based education and prevention programs to improve ART

adherence and reduce the burden of opportunistic infections (Fatimatuzzahra et al., 2022; Harjoni, 2023; Tewachew et al., 2021).

Based on the aforementioned background, the research data was collected from January 2023 to October 2024 to understand the clinical characteristics and types of opportunistic infections in AIDS patients at Cut Mutia General Hospital. The research question is: "What are the clinical characteristics and types of opportunistic infections in AIDS patients treated at Cut Mutia General Hospital?"

METHOD

This study employed a retrospective observational design to analyze secondary data from medical records of HIV/AIDS patients treated at Cut Mutia General Hospital. The study period covered January 2023 to October 2024, with a total population of 55 patients included in the analysis. The primary objective was to describe the clinical characteristics and types of opportunistic infections among these patients. The sampling method involved using the total population approach, meaning all 55 patients who met the inclusion criteria were included as the sample. This approach was chosen to ensure that the study captured comprehensive data from all available cases during the study period. The inclusion criteria specified that patients must have a confirmed diagnosis of HIV/AIDS, must have received treatment at Cut Mutia General Hospital between January 2023 and October 2024, and must have complete medical records documenting demographic and clinical details. Exclusion criteria were not applied, as all cases within the defined population met the requirements for analysis.

Data were collected from medical records, which included demographic information such as gender, age, last educational attainment, marital status, and AIDS stage. Clinical data included types of opportunistic infections diagnosed and treatment outcomes, including recovery, complications, or mortality. The statistical analysis was conducted using the IBM Statistical Package for the Social Sciences (SPSS) version 15.0 (Chicago: SPSS Inc., 2006). The data are presented in accordance with the following conventions: as a number (n) and percentage (%), or as a median and interquartile range (IQR, 25th and 75th percentile). Descriptive statistics were used to summarize the data, and no inferential or multivariate analyses were performed due to the scope and nature of the study.

Ethical approval for the study was obtained from the Ethics Committee of Cut Mutia General Hospital with approval number 016/KEPK-RSUCM/X/2024. All data were anonymized to ensure confidentiality and were handled according to ethical guidelines for research involving human subjects.

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RESULT

This study analyzed a total of 55 patients diagnosed with HIV/AIDS at Cut Mutia General Hospital from January 2023 to October 2024. The findings are presented below, encompassing both demographic and clinical characteristics, as well as patient outcomes.

Table 1 Demographic and clinical characteristics of AIDS patients

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	37	67.3
Female	18	32.7
Total	55	100.0
Age		
15-24 years	3	5.5
25-44 years	45	81.8
45-59 years	7	12.7
Total	55	100.0
Educational Level		
Junior High School	6	10.9
High School	31	56.4
Diploma (D3)	8	14.5
Advanced Diploma (D4)	2	3.6
Bachelor's Degree (S1)	8	14.5
Total	55	100.0
Marital Status		
Married	24	43.6
Unmarried	29	52.7
Widowed	2	3.6
Total	55	100.0
AIDS Stage		
Stage IV	39	70.9
Stage III	12	21.8
Stage II	4	7.3
Total	55	100.0
Opportunistic Infections		
Oral Candidiasis	27	28.1
Pulmonary Tuberculosis	17	17.7
Gastroenteritis	10	10.4
Oesophageal Candidiasis	9	9.4
Syphilis	7	7.3
Pneumocystis carinii Pneumonia	6	6.3
Toxoplasmosis Encephalitis	6	6.3
Hepatitis B	3	3.1
Bronchitis	2	2.1
Lymphadenitis	2	2.1
Tuberculous Lymphadenitis	2	2.1
Miliary Tuberculosis	2	2.1
Pleural Effusion	1	1.0
Pneumonia	1	1.0
Tuberculous Gland	1	1.0
Total	96	100.0
Patient Outcomes		
Lives	42	76.4
Deaths	13	23.6
Total	55	100.0

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Demographic Characteristics

The study revealed that many of the patients were male, accounting for 67.3% (n = 37), while females made up 32.7% (n = 18). The age distribution showed that most patients (81.8%, n = 45) were aged 25-44 years, followed by 12.7% (n = 7) aged 45-59 years, and 5.5% (n = 3) aged 15-24 years. Regarding education levels, the majority had completed high school (56.4%, n = 31), followed by those with diplomas (D3, 14.5%, n = 8) and bachelor\u2019s degrees (S1, 14.5%, n = 8). Patients with junior high school education (SMP) accounted for 10.9% (n = 6), and those with advanced diplomas (D4) represented 3.6% (n = 2). Marital status distribution indicated that 52.7% (n = 29) were unmarried, 43.6% (n = 24) were married, and 3.6% (n = 2) were widowed. Most patients were classified as having stage IV AIDS (70.9%, n = 39), while others were in stage III (21.8%, n = 12) or stage II (7.3%, n = 4).

Clinical characteristics and patient outcomes

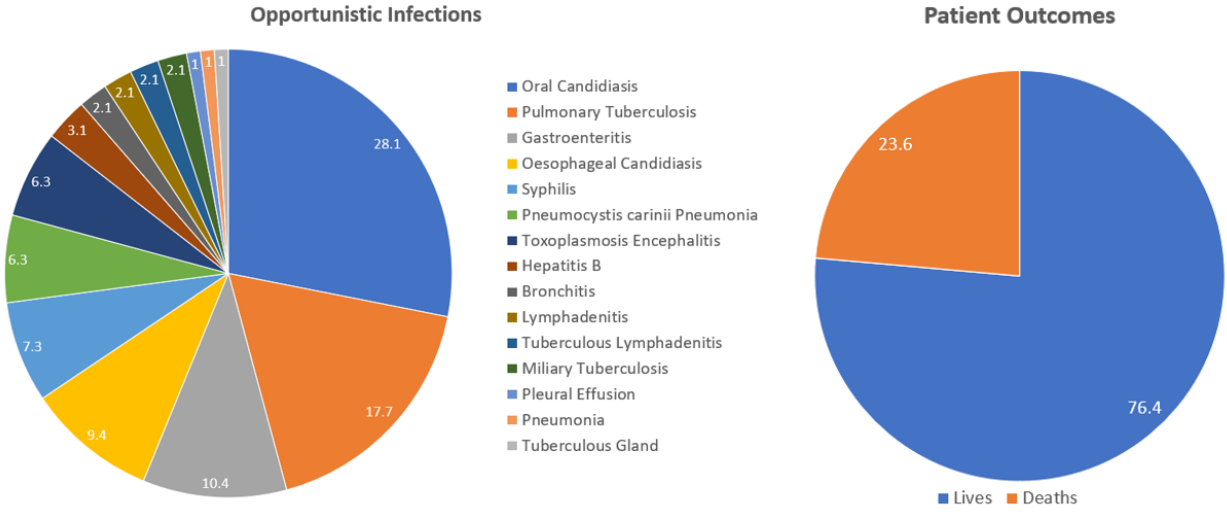

Figure 2. Clinical characteristics and patient outcomes

A total of 96 opportunistic infections were identified among the 55 patients, highlighting that some patients experienced multiple infections. The most common opportunistic infection was oral candidiasis (28.1%, n = 27), followed by pulmonary tuberculosis (17.7%, n = 17), gastroenteritis (10.4%, n = 10), and oesophageal candidiasis (9.4%, n = 9). Other notable infections included syphilis (7.3%, n = 7), Pneumocystis carinii pneumonia (6.3%, n = 6), and toxoplasmosis encephalitis (6.3%, n = 6). Less frequent infections included hepatitis B (3.1%, n = 3), bronchitis (2.1%, n = 2), lymphadenitis (2.1%, n = 2), and miliary tuberculosis (2.1%, n = 2). Rare cases included pleural effusion (1.0%, n = 1), pneumonia (1.0%, n = 1), and tuberculous gland (1.0%, n = 1). The treatment outcomes demonstrated that 76.4% (n = 42) of the patients were discharged in stable condition, while 23.6% (n = 13) succumbed to their illnesses during the study period. Notably, some patients were

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diagnosed with more than two opportunistic infections, emphasizing the severe immunocompromised state observed in this population.

DISCUSSION

This study provides crucial insights into the demographic and clinical characteristics of HIV/AIDS patients treated at Cut Mutia General Hospital in Lhokseumawe, Aceh, particularly in understanding the burden of opportunistic infections (OIs) and treatment outcomes. These findings align with and expand on existing literature, highlighting significant challenges and opportunities for improving HIV/AIDS management in resource-limited settings.

The predominance of male patients (67.3%) in this study is consistent with global and regional trends, where men are disproportionately affected by HIV due to higher-risk behaviors such as unprotected sexual activity and injecting drug use (Harjoni, 2023; Pinheiro et al., 2018; Tewachew et al., 2021). The concentration of cases among the productive age group (25–44 years, 81.8%) underscores the socio-economic impact of HIV/AIDS, as individuals in this age range are key contributors to household and national productivity. Studies by Buchacz et al (2016) and Shi et al (2011) have similarly noted that this demographic bears the highest burden of disease, necessitating targeted prevention and intervention strategies. The finding that most patients have completed high school education (56.4%) suggests that awareness and knowledge gaps about HIV/AIDS persist even among educated populations. Research in Ethiopia by Tewachew et al (2021) identified similar patterns, where educational attainment did not always correlate with comprehensive knowledge about HIV transmission and prevention. Additionally, the high proportion of unmarried patients (52.7%) highlights vulnerabilities among single individuals, particularly related to limited social support and increased engagement in high-risk behaviors (Buchacz et al., 2016; Fatimatuzzahra et al., 2022; Tewachew et al., 2021).

The predominance of oral candidiasis (28.1%) as the most common opportunistic infection aligns with global evidence that candidiasis serves as a frequent marker of severe immunosuppression in HIV patients (Ahmetagic et al., 2015; Montúfar-Andrade et al., 2016; Savadogo et al., 2021) . Pulmonary tuberculosis (17.7%) remains a critical concern in regions with a high TB burden, corroborating studies by Fatimatuzzahra et al (2022) and Buchacz et al (2016)that identify TB as both a primary cause of morbidity and mortality among HIV/AIDS patients. The co-occurrence of TB with other OIs, such as toxoplasmosis encephalitis (6.3%) and Pneumocystis carinii pneumonia (6.3%), highlights the severe immune dysfunction characteristic of advanced AIDS stages (Elango et al., 2022; Kawakami et al., 2018; Radisic, 2018).

The presence of multiple infections in individual patients reflects the cumulative burden of immunosuppression. At least one patient in this study experienced more than two OIs, illustrating the

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complexity of clinical management. Such cases demand an integrated approach, combining antimicrobial therapies with supportive care, as recommended by global treatment guidelines (WHO, 2021). Gastroenteritis (10.4%) and oesophageal candidiasis (9.4%) were also notable contributors to morbidity, emphasizing the need for vigilant monitoring of gastrointestinal symptoms, which are often overlooked in routine care (Epplein et al., 2014; Patel, 2023; Qua et al., 2020).

The mortality rate of 23.6% observed in this study underscores the challenges of managing advanced HIV/AIDS in resource-limited settings. Similar studies in Indonesia and sub-Saharan Africa report comparable mortality rates, often linked to late presentation, co-infections, and delayed initiation of antiretroviral therapy (ART) (Dereje et al., 2019; Harjoni, 2023; Pantazis et al., 2023). The successful discharge of 76.4% of patients indicates that timely and appropriate clinical interventions can lead to positive outcomes, even in advanced cases. However, the need for early diagnosis and ART initiation remains critical to reducing mortality further.

This study contributes valuable data to the growing body of literature on HIV/AIDS management in Indonesia, particularly in Aceh. The high prevalence of opportunistic infections highlights gaps in prevention and early detection, necessitating stronger community-based health education and outreach programs. Research by Tewachew et al (2021) and Fatimatuzzahra et al (2022) supports the implementation of peer support groups and targeted education campaigns to address stigma and improve treatment adherence. The study also emphasizes the importance of integrating tuberculosis control programs with HIV care services, given the significant overlap between these conditions. WHO (2021) recommends routine TB screening for all HIV patients, a practice that could significantly reduce morbidity and mortality in settings like Aceh.

The findings underscore the need for comprehensive training of healthcare providers in managing complex cases of HIV/AIDS with multiple OIs. Strengthening diagnostic capacities, such as access to advanced imaging and laboratory tests, is essential for timely identification and treatment of infections like toxoplasmosis encephalitis and Pneumocystis pneumonia. Additionally, expanding ART coverage and ensuring uninterrupted drug supply chains are critical for sustaining treatment success rates. From a policy perspective, integrating HIV care into primary healthcare systems can enhance access and reduce stigma, as recommended by global health organizations (Buchacz et al., 2016; WHO, 2021). Collaborative efforts between governmental and non-governmental organizations are vital to address the multifaceted challenges posed by HIV/AIDS in resource-limited settings.

This study has several limitations. The retrospective design may limit the completeness of data, particularly in documenting patient histories and follow-ups. Additionally, the study was conducted in a single hospital, which may not represent the broader HIV/AIDS population in Aceh or Indonesia. Future

research should consider multicenter studies and longitudinal designs to provide a more comprehensive understanding of disease progression and treatment outcomes.

CONCLUSION

The findings of this study provide a detailed overview of the demographic, clinical, and treatment characteristics of HIV/AIDS patients in Cut Mutia General Hospital in Lhokseumawe, Aceh. These results highlight the urgent need for improved prevention, early diagnosis, and integrated care services to address the high burden of opportunistic infections and associated mortality. By addressing these gaps, healthcare providers and policymakers can enhance the quality of life for individuals living with HIV/AIDS and contribute to the broader goal of epidemic control.

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