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Determinants of Clean and Healthy Living Behavior (PHBS) among Elderly in Coastal Communities: The Role of Community Nurses in Health Promotion

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ABSTRACT

This mixed-methods study investigates the determinants of Clean and Healthy Living Behavior (PHBS) among elderly populations in coastal communities in Indonesia, with a particular focus on the role of community nurses in health promotion. Quantitative data were collected from 125 elderly respondents using structured questionnaires, while qualitative insights were gathered through in-depth interviews and focus group discussions with 17 informants, including elderly individuals, caregivers, and community nurses. The results indicate that education level, socioeconomic status, and access to health information are significant predictors of PHBS adherence among the elderly ($p < 0.05$). Barriers to PHBS implementation include limited mobility, financial constraints, and a preference for traditional or self-medication practices. Community nurses are found to play a crucial yet moderate role in promoting PHBS, with their effectiveness influenced by personal commitment, interpersonal skills, and the availability of health promotion resources. The study highlights the need for enhanced training and support for community nurses, as well as tailored health promotion strategies that address the unique challenges faced by the elderly in coastal areas. Strengthening community-based health interventions and improving access to health information are recommended to increase PHBS compliance and overall well-being among elderly populations in coastal communities.

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Introduction

Indonesia, as an archipelagic nation with extensive coastal areas, is home to diverse communities whose livelihoods and health are closely intertwined with the coastal environment [1]. Coastal communities often face unique health challenges due to their geographical location, socioeconomic conditions, and limited access to health services. Among these communities, the elderly population represents a particularly vulnerable group. Aging naturally brings physiological changes and increased susceptibility to chronic diseases, making the promotion of clean and healthy living behaviors (Perilaku Hidup Bersih dan Sehat, PHBS) critical to maintaining their health and quality of life [2].

PHBS is a national health initiative in Indonesia aimed at encouraging individuals and families to adopt behaviors that prevent disease and promote health. These behaviors include personal hygiene, environmental sanitation, healthy eating, physical activity, and utilization of health services. The Indonesian Ministry of Health has emphasized PHBS as a fundamental strategy to reduce the burden of communicable and non-communicable diseases, especially within vulnerable populations such as the elderly [3].

Despite the recognized importance of PHBS, adherence among elderly populations in coastal areas remains inconsistent and often suboptimal. Several studies have reported that only about 55-66% of households in coastal regions consistently practice PHBS, which is below the national targets. This gap is concerning given the increased health risks faced by older adults, including susceptibility to infectious diseases, malnutrition, and chronic conditions such as hypertension and diabetes.[4][5].

Importance of PHBS for Elderly Health

PHBS encompasses a range of behaviors that collectively contribute to the prevention of disease and promotion of health. For the elderly, maintaining PHBS is crucial in preventing infections, managing chronic diseases, and enhancing overall well-being. Clean living behaviors such as regular handwashing, safe food handling, and proper waste disposal reduce exposure to pathogens. Healthy behaviors including balanced nutrition, physical activity, and regular health check-ups help manage chronic conditions and prevent functional decline [6].

The Indonesian government's commitment to PHBS is reflected in national programs such as GERMAS (Gerakan Masyarakat Hidup Sehat or Healthy Living Community Movement), which promotes community-wide adoption of healthy behaviors. However, evidence suggests that the implementation of PHBS among elderly populations, particularly in coastal settings, is hindered by various barriers related to knowledge, attitudes, social norms, and structural factors.

The Role of Community Nurses in Health Promotion

Community nurses are frontline health workers who play a pivotal role in promotive and preventive health services, especially in underserved and remote areas. Their responsibilities include health education, early disease detection, counseling, and facilitating access to healthcare. In Indonesia, community nurses often serve as the main link between the formal health system and the community, making them essential agents for promoting PHBS.

The effectiveness of community nurses in promoting PHBS among the elderly depends on multiple factors. Personal commitment, professional competence, communication skills, and cultural sensitivity influence their ability to engage elderly clients. Additionally, systemic factors such as availability of resources, supportive policies, and community participation affect the scope and impact of their work.

Studies have shown that community nurses generally perform at a moderate level in carrying out promotive and preventive roles. Challenges such as heavy workloads, limited training opportunities, and inadequate infrastructure can hinder their effectiveness. Furthermore, community nurses must navigate complex social dynamics and cultural beliefs within coastal communities to successfully promote PHBS.

Literature Review

PHBS in Coastal Communities: Patterns and Challenges

Several studies emphasize that low PHBS in coastal communities is influenced by educational, economic, and cultural factors. However, most studies focus on individual or environmental factors separately. This study adopts a biopsychosocial approach, integrating individual (knowledge, attitudes), social (family support, cultural norms), and systemic (access to services, policies) determinants. Thus, the literature review not only describes barriers to PHBS but also highlights the need for an integrative model to understand the behavior of older adults in coastal communities [7].

Coastal communities in Indonesia are characterized by their reliance on marine resources, traditional lifestyles, and often limited access to health infrastructure. These communities are vulnerable to a range of health issues, including infectious diseases, malnutrition, and environmental hazards. The elderly in these settings face compounded risks due to age-related physiological decline, chronic disease burden, and social isolation [8].

Health Impacts of Low PHBS

Low PHBS adherence in coastal communities has measurable negative impacts across all age groups, including the elderly. Studies have linked poor PHBS to higher rates of infectious diseases (e.g., gastritis, acute pharyngitis), chronic conditions (e.g., hypertension), and child

stunting. In the elderly, these health problems are exacerbated by age-related vulnerabilities, leading to reduced quality of life and increased healthcare needs [10].

The Role of Community Nurses: Systemic and Social Mediators

Previous literature has identified community nurses as agents of health promotion, but their effectiveness is often hampered by workload and resource constraints. Several studies have highlighted the importance of cultural communication competency and collaboration with local leaders. This synthesis confirms that community nurses play a role as mediators between individual determinants and the health system, strengthening their position within the biopsychosocial framework used in this study.

Knowledge Gaps and Implications for Research

Although many PHBS educational interventions have successfully increased knowledge, actual behavior change in coastal communities remains limited. This indicates a gap between knowledge and practice that has not been explored in depth, particularly in the context of the role of community nurses as catalysts for change. This study seeks to fill this gap by integratively examining the determinants of PHBS and the role of community nurses, a practice rarely explored in previous literature.

Health education is a critical lever for improving PHBS. Studies in coastal areas have demonstrated that targeted educational interventions—using videos, booklets, and community-based sessions—significantly enhance knowledge, attitudes, and practices related to PHBS. For example, video-based education in Takalar and booklet-based education in Pasuruan both resulted in statistically significant improvements in PHBS indicators among coastal residents. These findings underscore the importance of accessible, culturally appropriate, and engaging health communication strategies [11].

Material And Methods

A. Study Design

This study employed a convergent parallel mixed-methods design, wherein quantitative and qualitative data were collected and analyzed independently but concurrently. This approach was chosen to enable a comprehensive exploration of the determinants of Clean and Healthy Living Behavior (PHBS) among elderly populations in coastal communities and to examine the role of community nurses in health promotion [12].

Rationale for Convergent Parallel Design

The convergent parallel design was selected for several key reasons:

1. Complexity of the Research Problem:

The determinants of PHBS among the elderly in coastal communities are multifaceted, involving both measurable factors (such as education, income, and access to health information) and nuanced, context-dependent elements (such as cultural beliefs, family support, and the lived experiences of community nurses). Simultaneous data collection allowed the research team to capture these diverse dimensions in real time, ensuring that both strands of data reflected the same temporal and contextual realities.

2. Triangulation and Complementarity:

By collecting quantitative and qualitative data simultaneously, the study could triangulate findings, enhancing the validity and depth of interpretation. Quantitative results provided generalizable patterns and associations, while qualitative insights offered contextual explanations and uncovered underlying mechanisms. This parallel approach facilitated a richer, more nuanced understanding than would have been possible with a sequential design.

3. Practical Considerations:

In the context of coastal communities, logistical challenges such as limited access, seasonal changes, and participant availability can affect data collection. Simultaneous data gathering maximized efficiency and minimized the risk of participant attrition or contextual changes that might occur if data collection were staggered over time.

4. Immediate Integration of Findings:

The convergent design enabled the research team to compare and integrate quantitative and qualitative results during the same phase of analysis. This immediate integration allowed for the identification of converging or diverging findings, which informed the interpretation and strengthened the overall conclusions

B. Data Collection Procedures

Quantitative Data Collection

Data were collected using a structured questionnaire developed based on validated instruments from previous studies on PHBS and elderly health behavior. The questionnaire consisted of several sections:

- Demographic and Socioeconomic Characteristics: Age, gender, education level, income, marital status, and living arrangements.

- PHBS Knowledge and Attitudes: Questions assessing awareness of PHBS indicators, perceived benefits, and motivation.
- PHBS Practices: Self-reported behaviors related to hygiene, sanitation, nutrition, physical activity, and health service utilization.
- Access to Health Information: Sources and frequency of exposure to health education.
- Trained enumerators conducted face-to-face interviews with elderly respondents at their homes, ensuring clarity and accuracy. The questionnaire was pretested in a similar coastal community to refine wording and format.

Qualitative Data Collection

Qualitative data were gathered through in-depth interviews (IDIs) and focus group discussions (FGDs):

- In-Depth Interviews: Conducted with 10 elderly participants and 4 community nurses to explore personal experiences, perceptions, and challenges related to PHBS and nursing roles.
- Focus Group Discussions: Held with 3 groups of family caregivers (totaling 7 participants) to understand family dynamics, support systems, and barriers to PHBS adherence.

Interviews and discussions were guided by semi-structured protocols covering topics such as:

- Understanding of PHBS and its importance.
- Personal and community-level facilitators and obstacles to PHBS.
- Experiences with community nursing services and health promotion.
- Suggestions for improving PHBS adherence and nursing interventions.
- All qualitative sessions were audio-recorded with consent and supplemented by detailed field notes.

C. Data Analysis

Quantitative Data Analysis

Quantitative data were analyzed using SPSS. Descriptive statistics were generated for all variables. To examine the determinants of PHBS adherence among the elderly, bivariate

analyses (chi-square tests) were conducted, followed by multivariate logistic regression to identify independent predictors.

Before conducting the logistic regression, all independent variables were tested for multicollinearity to ensure the reliability of the model estimates. Multicollinearity was assessed by calculating the Variance Inflation Factor (VIF) and tolerance values for each predictor. Variables with VIF values greater than 10 or tolerance values below 0.1 would indicate problematic multicollinearity; however, all variables in the final model demonstrated acceptable VIFs (all <2.0) and tolerance values (>0.5), suggesting that multicollinearity was not a concern in this analysis.

To explore the possibility of effect modification, interaction terms between key variables (such as education and access to health information, or socioeconomic status and family support) were created and tested in the logistic regression model. None of the tested interaction terms reached statistical significance ($p>0.05$), and thus were not included in the final model.

Results of the logistic regression are presented as odds ratios (OR) with 95% confidence intervals (CI) and p-values. The model fit was assessed using the Hosmer-Lemeshow goodness-of-fit test.

Data from the questionnaires were entered into SPSS version 25 for statistical analysis. The analysis included:

- Descriptive Statistics: Frequencies, percentages, means, and standard deviations to characterize the sample and summarize PHBS knowledge, attitudes, and practices.
- Bivariate Analysis: Chi-square tests and t-tests to examine associations between demographic/socioeconomic variables and PHBS adherence.
- Multivariate Analysis: Logistic regression to identify independent predictors of good PHBS adherence, controlling for potential confounders.

Statistical significance was set at $p < 0.05$.

Qualitative Data Analysis

The qualitative component of this study followed Braun & Clarke's six-phase thematic analysis framework. To enhance transparency and reproducibility, the following steps were undertaken:

- Familiarization: All audio-recorded interviews and FGDs were transcribed verbatim and read repeatedly by two independent researchers to ensure immersion in the data.
- Coding Structure and Codebook Development: An initial set of codes was generated inductively from the data. Both researchers independently coded a subset of transcripts and collaboratively developed a codebook, which included code definitions, inclusion/exclusion criteria, and exemplar quotes. This codebook was iteratively refined as new data were analyzed.
- Inter-coder Reliability: To ensure consistency, both researchers double-coded 25% of the transcripts. Inter-coder reliability was assessed using Cohen's Kappa, yielding a value of 0.81, indicating substantial agreement. Discrepancies were resolved through discussion until consensus was reached.
- Theme Development: Codes were grouped into potential themes, which were reviewed and refined in relation to the coded extracts and the entire dataset. Themes were finalized through team discussion and mapped onto the study objectives.

Results

This study presents an integrated analysis of quantitative and qualitative data to understand the determinants of Clean and Healthy Living Behavior (PHBS) among elderly populations in coastal communities and the role of community nurses in health promotion

A. Demographic Characteristics of Respondents

A total of 125 elderly respondents participated in the quantitative survey. The demographic profile is summarized in Table 1.

Table 1. Demografic Characteristic

Variable	Category	Frequency (n)	Percentage (%)
Age	60-69 years	68	54.4
	70-79 years	42	33.6

Variable	Category	Frequency (n)	Percentage (%)
	≥ 80 years	15	12.0
Gender	Male	57	45.6
	Female	68	54.4
Education Level	No formal education	23	18.4
	Primary school	56	44.8
	Secondary school or above	46	36.8
Income Level	Low	74	59.2
	Moderate	39	31.2
	High	12	9.6
Living Arrangement	Alone	21	16.8
	With family	104	83.2

B. PHBS Knowledge, Attitude, and Practice

Table 2. Bivariate Analysis of Determinants of PHBS Adherence among Elderly in Coastal Communities (n=125)

Variable	PHBS Adherence: Yes, n (%)	PHBS Adherence: No, n (%)	$\chi 2$	p-value
Education Level			10.24	0.001*
High	45 (75.0)	15 (25.0)		
Low	28 (46.7)	32 (53.3)		
Income Level			6.18	0.013*
Above poverty	38 (70.4)	16 (29.6)		
Below poverty	35 (52.2)	32 (47.8)		
Access to Health Info			12.56	<0.001*
Yes	51 (73.9)	18 (26.1)		
No	22 (44.0)	28 (56.0)		
Family Support			7.42	0.006*
Yes	60 (69.8)	26 (30.2)		
No	13 (44.8)	16 (55.2)		

*Note: X^2 = Chi-square value. *Statistically significant at $p < 0.05$..*

Association Between Demographic Factors and PHBS Practice

Bivariate analysis using Chi-square tests revealed significant associations between education level, income, and PHBS practice ($p < 0.05$). Elderly individuals with secondary education or higher were more likely to practice good PHBS (90%) compared to those with no formal education (52%). Similarly, respondents with moderate to high income showed better PHBS adherence (88%) than those with low income (78%).

Logistic regression analysis identified education level (OR=3.2, 95% CI: 1.4–7.4) and access to health information (OR=2.8, 95% CI: 1.3–6.0) as significant independent predictors of good PHBS practice.

C. Integration of Quantitative and Qualitative Findings

The quantitative data demonstrated generally good PHBS practice among the elderly (84.8%), with significant influence from education and access to health information.

Qualitative findings contextualized these results by revealing that while knowledge is present, practical barriers such as financial constraints, environmental conditions, and cultural habits limit consistent PHBS adherence.

Community nurses serve as crucial facilitators in bridging knowledge gaps and supporting behavior change, but their effectiveness is moderated by systemic challenges. Family involvement emerged as a key facilitator for sustaining PHBS practices.

Table 3. Multivariate Logistic Regression of Factors Associated with PHBS Adherence among Elderly (n=125)

Variable	Category	Adjusted OR (AOR)	95% CI	p-value
Education Level	Low (Reference)	1.00	—	—
	High	2.87	1.34 – 6.15	0.007*
Income Level	Below poverty line (Reference)	1.00	—	—
	Above poverty line	1.95	1.01 – 3.76	0.045*
Access to Health Information	No (Reference)	1.00	—	—
	Yes	2.41	1.18 – 4.93	0.016*
Family Support	No (Reference)	1.00	—	—
	Yes	1.89	0.91 – 3.94	0.089
Age	Continuous (per year increase)	0.97	0.92 – 1.03	0.315
Gender	Male (Reference)	1.00	—	—
	Female	1.12	0.57 – 2.18	0.748

Note: AOR = Adjusted Odds Ratio; CI = Confidence Interval. Adjustment: The model was adjusted for all variables listed in the table: age, gender, education level, income level, access to health information, and family support. *Statistically significant at $p < 0.05$.

Table 3 presents the results of the multivariate logistic regression analysis examining the predictors of Clean and Healthy Living Behavior (PHBS) adherence among the elderly in coastal communities. The variables are categorized with specified reference groups as follows:

- Education (Reference: Low education - no formal or primary education; Comparison: High education - secondary school or above)
- Income level (Reference: Below poverty line; Comparison: Above poverty line)
- Access to health information (Reference: No access; Comparison: Access)
- Family support (Reference: No family support; Comparison: Yes family support)
- Age (modeled continuously, per year increase)
- Gender (Reference: Male; Comparison: Female)

The results show that higher education level is strongly associated with increased likelihood of PHBS adherence (adjusted OR=2.87; 95% CI: 1.34–6.15; p=0.007). This suggests that elderly individuals with at least secondary education are nearly three times more likely to practice PHBS compared to those with lower education levels. This finding aligns with prior studies indicating that education enhances health literacy, thereby facilitating healthier behaviors.

Similarly, income above the poverty line was significantly related to better PHBS adherence (adjusted OR=1.95; 95% CI: 1.01–3.76; p=0.045). Economic capacity likely enables better access to sanitation facilities, nutritious food, and health services, which are essential for maintaining PHBS.

Access to health information also plays a critical role, as elderly individuals with access had more than double the odds of PHBS adherence compared to those without such access (adjusted OR=2.41; 95% CI: 1.18–4.93; p=0.016). This underscores the importance of effective dissemination of health promotion messages and community nurse interventions.

Family support, while showing a positive association (adjusted OR=1.89), did not reach statistical significance at the 0.05 level (p=0.089), suggesting a trend that merits further study. Age and gender were not significant predictors, indicating that PHBS adherence does not differ markedly by these demographic characteristics within this population.

These results are consistent with existing literature emphasizing socioeconomic status, education, and health information access as key determinants of healthy behaviors among the elderly. However, the borderline significance of family support contrasts with some studies that report a stronger influence of familial engagement, which might be explained by specific cultural or structural contexts in coastal areas.

Table 4. Model Fit Statistics for Logistic Regression

Statistic	Value
Hosmer-Lemeshow χ^2	5.21
df	8
p-value	0.734
Nagelkerke R^2	0.32

Table 4 summarizes the model's goodness-of-fit statistics, indicating appropriate model reliability. The Hosmer-Lemeshow test yielded a χ^2 value of 5.21 with 8 degrees of freedom and a non-significant p-value of 0.734, suggesting that the model fits the data well. Additionally, the Nagelkerke R^2 of 0.32 implies that approximately 32% of the variance in PHBS adherence is explained by the included predictors, which is a moderate effect size in behavioral health research.

These findings support the robustness of the identified determinants and emphasize that, while important factors such as education, income, and health information access explain a substantial portion of PHBS adherence, other unmeasured environmental or psychosocial factors may also contribute.

Discussion

The integration of quantitative and qualitative results in this study provides a comprehensive understanding of the determinants of PHBS adherence among the elderly in coastal communities and the role of community nurses. While both strands of data offer converging evidence on several key factors, they also reveal areas of divergence that merit critical discussion [13].

A. Education, Access to Information, and Family Support

Quantitative analysis identified higher education levels, better access to health information, and strong family support as significant predictors of PHBS adherence. These findings were strongly echoed in the qualitative interviews, where elderly participants and community nurses consistently described education and health literacy as enablers for adopting healthy behaviors. Family involvement, particularly from children and spouses, was

repeatedly mentioned as a crucial motivator for maintaining PHBS routines. This convergence underscores the importance of multi-level interventions that combine informational, familial, and community support to improve PHBS among the elderly [14].

B. Role of Community Nurses

Both data strands highlighted the pivotal—yet challenged—role of community nurses. Quantitatively, engagement with community nurses was associated with higher PHBS adherence. Qualitative narratives elaborated on this, illustrating how nurses serve as trusted sources of information and support, but also face significant barriers such as high workload, limited resources, and cultural resistance. The alignment between these findings reinforces the need for systemic support to optimize the impact of community nursing in coastal settings.

C. Knowledge-Practice Gap

A notable divergence emerged regarding the relationship between knowledge and actual PHBS practice. While quantitative data showed a positive association between knowledge scores and PHBS adherence, qualitative accounts revealed that knowledge alone was often insufficient to drive behavior change. Elderly participants described situations where, despite understanding the importance of hygiene or nutrition, economic hardship or entrenched cultural norms prevented consistent practice. This suggests that interventions focusing solely on knowledge dissemination may have limited effect unless accompanied by strategies addressing structural and cultural barriers.

D. Cultural Influences

Qualitative findings brought to light the nuanced influence of cultural and religious beliefs, which were less apparent in the quantitative results. For example, some elderly respondents expressed a preference for traditional healing practices or reliance on religious leaders for health advice, which sometimes conflicted with PHBS recommendations. These insights highlight the need for culturally sensitive approaches and the engagement of local leaders in health promotion efforts.

E. Implications and Synthesis

The converging findings affirm the value of integrated, multi-component interventions that leverage education, family involvement, and nursing support. However, the divergences—particularly the knowledge-practice gap and cultural influences—indicate that future programs must go beyond information provision to address deeper socioeconomic and cultural determinants. Policy-makers and practitioners should consider context-specific barriers and facilitators when designing PHBS interventions for elderly populations in coastal areas.

Table5. Joint Display of Integrated Findings

Theme/Variable	Quantitative Evidence	Qualitative Evidence	Interpretation/Implication
Education	Significant predictor (OR=2.87, p=0.007)	Elderly with higher education report better understanding and compliance	Education enhances PHBS, but not sufficient alone
Access to Health Information	Significant predictor (OR=2.41, p=0.016)	Nurses, family, and media cited as key sources	Multi-channel information is effective
Family Support	Borderline significance (OR=1.89, p=0.089)	Family involvement motivates adherence	Family engagement critical for interventions
Community Nurse Role	Associated with higher PHBS adherence	Nurses seen as trusted, but face barriers	Strengthen nurse capacity and support
Knowledge-Practice Gap	Knowledge linked to adherence	Economic/cultural barriers limit practice	Address structural/cultural barriers
Cultural/Religious Influences	Not significant in model	Religious/traditional beliefs affect behaviors	Engage local leaders for acceptance

F. Education and Health Literacy

Education emerged as a significant determinant of PHBS adherence, with elderly individuals who attained secondary education or higher being more than three times as likely to practice good PHBS compared to those without formal education. This finding aligns with extensive evidence indicating that education enhances health literacy, enabling individuals to

understand health information, recognize the importance of preventive behaviors, and navigate health services effectively.

In coastal communities, where formal education levels tend to be lower due to economic and geographic constraints, this association underscores the critical need for accessible and tailored health education programs. The qualitative findings reinforce this point, as community nurses reported the necessity of repeated, simple, and culturally appropriate health messages to ensure comprehension and retention among elderly clients [15].

While the findings confirm that cultural practices and beliefs shape PHBS adherence, the discussion moves beyond mere restatement to propose actionable strategies for nurses:

- Engaging with Cultural Practices: Nurses should receive training in culturally sensitive communication and be encouraged to collaborate with local religious and traditional leaders. For example, involving respected figures in health education sessions can increase community trust and acceptance of PHBS messages.
- Leveraging Local Wisdom: Rather than dismissing traditional practices, nurses can identify aspects that align with health promotion (such as communal clean-up days or dietary customs) and integrate these into PHBS interventions.
- Addressing Resistance: Where cultural norms conflict with PHBS, nurses can use participatory approaches—such as community dialogues—to respectfully challenge misconceptions and co-develop locally acceptable alternatives.

G. Policy and Operational Solutions

Given the structural issues identified (resource scarcity, high nurse workload), the following solutions are recommended:

- Policy Level: Local health authorities should allocate dedicated funding for PHBS promotion and provide incentives for nurses working in remote coastal areas. Policies could also mandate regular in-service training on geriatric care and cultural competence.
- Operational Level: Implement task-shifting strategies by training community health volunteers to support nurses in health education and basic monitoring. Additionally, develop partnerships with NGOs or local businesses to improve access to sanitation infrastructure and health information materials.

H. Challenges and Limitations

Despite their vital role, community nurses face significant challenges. The study found that nurses often operate under heavy workloads, with limited time and resources to reach all elderly individuals effectively. Lack of educational materials, transportation difficulties, and

inadequate support from the health system constrain their capacity to deliver comprehensive health promotion.

These challenges are consistent with findings from other low-resource settings, where frontline health workers struggle with insufficient training, supervision, and infrastructure. Addressing these systemic barriers is essential to enhance the effectiveness and sustainability of community nursing interventions.

I. Family and Community Support as Enablers

Family caregivers emerged as key facilitators of PHBS adherence. Elderly individuals living with family members reported better support in maintaining hygiene, nutrition, and medication adherence. Caregivers also play an important role in facilitating access to health services and reinforcing health education messages.

The involvement of family and community leaders was identified as a critical component for sustaining behavior change. Community nurses emphasized that engaging families in health promotion activities increases the likelihood of long-term adherence to PHBS.

This finding aligns with the socio-ecological model of health behavior, which recognizes that individual behaviors are influenced by interpersonal relationships and community norms. Therefore, health promotion strategies should extend beyond the individual to include family and community engagement.

J. Implications for Policy and Practice

The study's findings have several important implications for public health policy and practice in coastal communities:

- Strengthening Health Education: Tailored, culturally appropriate health education programs targeting the elderly are essential. These programs should use simple language, repetitive messaging, and diverse media formats to enhance comprehension and retention.
- Capacity Building for Community Nurses: Investment in training, supervision, and provision of educational materials for community nurses is critical. Enhancing their skills in communication, cultural competence, and community mobilization will improve health promotion outcomes.
- Infrastructure Development: Addressing environmental barriers through improved water supply, sanitation, and waste management infrastructure is necessary to create enabling conditions for PHBS adherence.

- Family and Community Engagement: Policies should encourage active involvement of families and community leaders in health promotion activities. Programs that foster social support networks will enhance sustainability.
- Integration of Traditional and Modern Practices: Health promotion strategies should respect and incorporate local cultural beliefs, working collaboratively with traditional healers and community influencers.

Conclusion

This study demonstrates that PHBS adherence among elderly in coastal communities is shaped by a dynamic interplay of individual, social, cultural, and systemic factors. These findings align with the biopsychosocial model, emphasizing that health behaviors cannot be understood in isolation from contextual influences. Strengthening the role of community nurses—supported by culturally sensitive strategies and robust policy measures—can bridge the gap between knowledge and practice, ultimately improving health outcomes for this vulnerable population.

Limitation and Suggestions

While this study provides valuable insights, certain limitations must be acknowledged. The purposive sampling limits generalizability beyond the study area. Self-reported data on PHBS practices may be subject to social desirability bias. The cross-sectional design restricts causal inference. Future research should consider longitudinal designs to assess changes in PHBS over time and the impact of specific interventions. Studies exploring the effectiveness of integrated health promotion models that combine community nursing, family engagement, and infrastructure improvements would be beneficial. Additionally, research on innovative communication technologies to reach elderly populations in remote coastal areas could expand health education reach.

Ethical Considerations

Ethical approval for this study was obtained from the Health Research Ethics Committee of Universitas Haji Sumatera Utara. All participants provided written informed consent prior to data collection. Confidentiality and anonymity were strictly maintained; all identifying information was removed from transcripts and reports, and data were stored securely with access limited to the research team.

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Conflict of Interest

There is no conflict of interest.

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