

Developing a Culturally Based Family-Centered Nursing Model for Emergency Prevention and Management among Families of Patients with Non-Communicable Diseases

Insana Maria*, Heryyanoor, Taufik Hidayat

Sekolah Tinggi Ilmu Kesehatan Intan Martapura, Samadi No.1, Jawa, Kec. Martapura, Kabupaten Banjar, Kalimantan Selatan 71213, Indonesia

*Corresponding Author's Email: maria.insana82@gmail.com

ABSTRACT

Introduction: Non-Communicable Diseases (NCDs) are a major cause of morbidity and mortality worldwide and may lead to emergencies requiring rapid family response. However, family preparedness for emergency prevention and management remains suboptimal and may be associated with family dynamics, individual capacity, and cultural values. **Objective:** This study aimed to evaluate a proposed culturally based Family-Centered Nursing (FCN) structural model for Emergency Prevention and Management (EPM) among families of patients with NCDs. **Methods:** A cross-sectional analytical design was applied using Partial Least Squares Structural Equation Modelling (PLS-SEM). A total of 210 primary caregivers of patients with NCDs were selected using proportional stratified random sampling. Data were collected using a structured questionnaire measuring Family Assessment, Individual Family Members Assessment, Culture Care, and EPM. Model evaluation included measurement and structural models. **Results:** Family Assessment and Individual Family Members Assessments were significantly and positively associated with culture care and EPM. Culture care was also significantly and positively associated with EPM. Specific indirect effects through culture care were significant and consistent with partial mediation. The model explained 55.3% of the variance in Culture Care and 70.9% of the variance in EPM. **Conclusion:** The findings provide preliminary support for the proposed culturally based FCN predictive model linking family and individual factors with EPM among families of patients with NCDs. Culture Care showed significant indirect associations with EPM, consistent with a partial mediating role. These findings support culturally sensitive, family-centered approaches in nursing practice. Further longitudinal or intervention-based research is needed to validate the model and evaluate its implementation and effectiveness.

Keywords: Culture Care; Emergency Prevention and Management; Family Centered Nursing; Non-Communicable Diseases

INTRODUCTION

Non-Communicable Diseases (NCDs) represent the primary cause of mortality worldwide, accounting for nearly 70% of all global deaths. Major contributors to this burden include cardiovascular diseases, diabetes mellitus, stroke, and hypertension. Globally, more than 38 million deaths each year are attributed to NCDs, with a disproportionate share occurring in low- and middle-income countries (LMICs) (Mendis *et al.*, 2022). Countries such as Indonesia face persistent challenges in addressing this burden due to limitations in healthcare resources, health system capacity, and preparedness for the long-term management of chronic diseases and their complications (Halle & Münzel, 2025; Kumar *et al.*, 2025).

Cardiovascular disease continues to be the leading cause of mortality worldwide, while the burden of neurological disorders, particularly stroke, has shown a steadily increasing trend, especially across Asian populations (Halle & Münzel, 2025; Li *et al.*, 2023). This growing burden highlights the urgent need to

Received: January 1, 2026 Received in revised form: August 16, 2026 Accepted: August 29, 2026

strengthen family preparedness in responding to emergencies related to non-communicable diseases. A national survey in Indonesia conducted through basic health research found that the prevalence of heart disease increased from 0.5% in 2013 to 1.5% in 2018 (Kemenkes RI, 2018), while provincial data from the South Kalimantan Health Office revealed a 45.7% increase in cases of NCDs such as heart disease from 2020 to 2023 (Dinas Kesehatan Provinsi Kalimantan Selatan, 2024). Furthermore, the prevalence of multimorbidity rises with age, from 3.5% in the youngest age group, 0–24 years, to as high as 80.4% in the oldest age group, ≥85 years (Jürisson *et al.*, 2021; Wang *et al.*, 2023). The high rate of NCDs increases the risk of emergency conditions such as acute stroke, heart attack, or severe hypoglycemia (Giménez & Manucha, 2021), which require rapid action to prevent disability or death. Consequently, family preparedness in managing such emergencies becomes a critical component in improving patient safety and maintaining the quality of life of individuals living with chronic diseases.

In Indonesia, families play an important role; families are crucial in providing care for members afflicted with NCDs (Yustisia *et al.*, 2023). This role inherently involves symptom monitoring, making care and medical decisions, and delivering initial treatment during emergencies, as is the responsibility of the family (Gawulayo *et al.*, 2021). Nevertheless, numerous studies indicate that familial preparedness remains inadequate, particularly in the identification of danger signs and the administration of first aid (Ge *et al.*, 2022). It is influenced by family function, the condition of individual family members, communication, social support, and the family's level of education. Furthermore, cultural factors have a significant impact on how families respond to illness (Parellangi *et al.*, 2023). Traditional beliefs, kinship systems, cultural healing practices, and social norms frequently serve as the foundation for medical care decisions, influencing when families seek medical attention (Marques *et al.*, 2022; Menon *et al.*, 2020). Using the wrong cultural practices can often make it more likely that treatment will be delayed and make emergency situations worse in NCDs.

Friedman's Family Centered Nursing (FCN) Approach stresses the importance of health workers and families working together as the main unit of care (Barisone *et al.*, 2023; Imanipour & Kiwanuka, 2020). This is especially important in emergency situations that require a quick response. However, the implementation of FCN in Indonesia continues to face a number of challenges, including a lack of family knowledge, cultural values that influence decision-making, limited access to health services, and a lack of emergency preparedness training. To date, much research on FCN has focused on specific populations such as children, communities, or stable conditions (Seniwati *et al.*, 2023; Yusuf *et al.*, 2024). Research on the FCN model has also focused on chronic disease management, family support, and care outcomes (Clodig *et al.*, 2025; Santomauro *et al.*, 2025). Most of these models have not explicitly integrated cultural mediation in the context of emergency preparedness, particularly in families with members suffering from NCDs. The absence of explicit cultural mechanisms limits the adaptability of the FCN model in emergency situations, where decision-making patterns, family responses, and preparedness are heavily influenced by cultural values, which still represents a persistent scientific gap in this field.

Culture is a crucial factor that shapes the perception of illness, the selection of care practices, and the prioritization of actions by families in emergencies. The Culture Care Diversity and Universality theory by Leininger emphasized that nursing practice can only be effective if it is aligned with local cultural values, beliefs, and practices (Garcia *et al.*, 2025; Nguyen *et al.*, 2024). According to the FCN approach, the integration of cultural aspects of families with diverse cultures, religions, and strong social systems is crucial, especially in NCDs that have a high risk of experiencing acute conditions. Research related to families and NCDs shows that individual capacity and family function have a significant influence on the family's ability to face crisis conditions (Aza *et al.*, 2022; Nguyen *et al.*, 2024), but the mechanisms of the role of culture in this relationship have not been widely studied.

Based on these conditions, this study aimed to develop a culture-based FCN model to improve EPM in families with members with NCDs in South Kalimantan, Indonesia. In this study, EPM is the primary outcome, representing family preparedness for preventing, recognising, and managing emergencies related to NCDs. The proposed model integrates family assessment, individual family member assessment, and cultural care as key constructs contributing to EPM. This model was developed by integrating FCN with Madeleine

Leininger's Transcultural Nursing Theory. FCN emphasises the family as the primary unit in care delivery, while Transcultural Nursing Theory emphasises the importance of aligning care with the family's cultural values, beliefs, and practices. In this model, cultural care is positioned as a mediating construct linking family- and individual-level factors to EPM, enabling a more comprehensive understanding of how family characteristics and cultural context interact to shape family preparedness for NCD emergencies.

METHODOLOGY

Design

This study employs cross-sectional analytic research with a model development approach (Nursalam, 2020). The purpose of this design is to examine the relationship between family assessment, individual family member assessment, cultural care, and the prevention and emergency management of NCDs to develop a conceptual model of culture-based family nursing.

Population and samples

The study population consisted of families with a member diagnosed with a NCD, including heart disease, hypertension, diabetes mellitus, stroke, and other chronic non-communicable diseases diagnosed by healthcare professionals. The sample was selected using proportional stratified random sampling. A total of 210 respondents were selected based on an a priori power analysis using the G*Power application with a significance level of 0.05, a power of 0.80, and a medium effect size (Durmuş *et al.*, 2025). The sample size obtained met the minimum requirements for testing the developed structural model.

Inclusion criteria included families with a member diagnosed with an NCD for at least six months, living in the same household, having a family member acting as the primary caregiver, and willingness to participate in the study. Exclusion criteria included respondents with cognitive impairments that prevented them from completing the questionnaire independently, families with members experiencing acute conditions requiring intensive care at the time of data collection, and incomplete questionnaires.

Variables and Instruments

The research variables in this study consisted of four main constructs that were examined within the proposed culture-based FCN structural model. The first construct was Family Assessment, which encompassed seven dimensions: family functioning, physical environment, social environment, sociocultural factors, coping strategies, stress and well-being, and family structure. The second construct was the Individual Family Members Assessment, which comprised four dimensions: physical health, mental and emotional health, social relationships, and spirituality. The third construct was Culture Care, which encompassed four dimensions: cultural support, cultural values and beliefs, traditional care practices, and cultural sensitivity. The fourth construct was Emergency EPM, specified as the primary endogenous outcome construct. It comprised nine dimensions related to family readiness and role, emergency-related knowledge, attitudes towards emergencies, initial response, family coordination, rescue actions, and follow-up actions during emergencies. Together, these dimensions represented the family's capacity to prevent and manage NCD-related emergencies, including aspects relevant to Basic Life Support (BLS).

The research instrument was developed as a structured questionnaire based on the theoretical foundations underlying the four study constructs: Family Assessment, Individual Family Members Assessment, Culture Care, and Emergency EPM. Family Assessment was developed based on the FCN concept. It comprised seven dimensions: family functioning, physical environment, social environment, sociocultural factors, coping strategies, stress and well-being, and family structure. Individual Family Members Assessment was based on the family nursing concept of assessing the capacities and conditions of individual family members. It comprised four dimensions: physical health, mental and emotional health, social relationships, and spirituality. Culture Care was developed based on Madeleine Leininger's Transcultural Nursing Theory and comprised four dimensions related to cultural values and beliefs, traditional care practices, cultural sensitivity, and cultural support. EPM was developed based on concepts of family preparedness and emergency management relevant to families of patients with NCDs and comprised

nine dimensions covering family readiness and role, general and specialized emergency knowledge, attitudes towards emergencies, the family's initial response, family coordination, rescue actions, and follow-up actions during emergencies.

The initial item pool contained approximately five items for each conceptual dimension. Items were formulated to reflect the content of each dimension and adapted to the family and cultural context of NCD care. Two experts with educational backgrounds in community nursing conducted content validation. All items were independently assessed using a four-point rating scale to evaluate their relevance, clarity, and appropriateness to the intended construct and theoretical dimension. The experts also provided qualitative comments and recommendations regarding item wording and substantive content. Items considered inadequate or requiring improvement were revised based on the expert recommendations, whereas items considered unsuitable for representing the intended construct were removed. Following this process, four items were retained for each dimension, resulting in a final instrument comprising 96 items across 24 conceptual dimensions.

The response format was determined according to the content of each domain. Perception- and attitude-based items were assessed using a five-point Likert scale (Jebb *et al.*, 2021). In contrast, knowledge items used response formats appropriate to the knowledge domain, including objective response options for specific emergencies and BLS knowledge.

The revised instrument was subsequently pilot-tested among 30 respondents with characteristics similar to those of the target study population. The pilot test assessed the readability, clarity, and comprehensibility of the items as part of a preliminary face-validity assessment. Item performance was evaluated using corrected item-total correlation, while internal consistency was assessed using Cronbach's alpha (Çebi & Reisoğlu, 2023). All retained items met the predetermined corrected item-total correlation criterion of >0.361 . Cronbach's alpha values for the constructs in the pilot test ranged from 0.853 to 0.912, while the overall instrument reliability was 0.88. These results supported the instrument's preliminary adequacy and internal consistency for use in the main study.

For the main analysis, responses to the four items within each conceptual dimension were summed to generate a dimension-level score. These dimension-level scores were subsequently used as indicators of the corresponding higher-level constructs in the PLS-SEM analysis. Thus, the individual questionnaire items were not entered directly as indicators in the final PLS-SEM model. Seven dimension-level indicators represented Family Assessment, Individual Family Members Assessment by four indicators, Culture Care by four indicators, and EPM by nine indicators, resulting in 24 dimension-level indicators across the four constructs.

Data Collection

Data collection was conducted directly in respondents' residential communities across 12 regencies/cities in South Kalimantan. One primary caregiver/respondent was recruited from each participating family; therefore, the family was considered the unit of analysis. Each family contributed only one respondent to the dataset.

Before completing the questionnaire, trained researchers and enumerators explained the study objectives, data collection procedures, voluntary nature of participation, and respondents' rights. Respondents who understood the information and agreed to participate provided written informed consent. The questionnaire was administered using a self-administered approach. For respondents who required assistance, such as older adults or those with reading difficulties, the enumerator read the questions aloud without explaining, interpreting, or influencing the respondent's answers. Each questionnaire session required approximately 30–45 minutes.

The questionnaire collected information on respondent characteristics, including age, sex, educational attainment, occupation, ethnicity, family income, and family history of NCDs, in addition to the study constructs. During data collection, the authors maintained confidentiality, anonymity, privacy, and respondent

autonomy. The analytical dataset did not include identifying information, and questionnaires were coded to protect respondents' identities. Participation was voluntary, and respondents could decline or withdraw without coercion or pressure. The authors checked completed questionnaires for completeness before including them in the analysis.

Data Analysis

Data were analyzed using partial least squares structural equation modeling (PLS-SEM) in Smart PLS. PLS-SEM was selected to evaluate the measurement properties of the constructs and the hypothesized structural associations within the proposed model. Given the study's cross-sectional design, the results were interpreted in terms of associations among constructs rather than causal effects, intervention effectiveness, or prospective model performance.

Before PLS-SEM estimation, the four questionnaire items within each conceptual dimension were summed to generate a dimension-level score. These dimension-level scores were subsequently used as dimension-level indicators of the corresponding higher-level constructs. Thus, the final PLS-SEM measurement model comprised seven indicators for Family Assessment, four indicators for Individual Family Members Assessment, four indicators for Culture Care, and nine indicators for EPM. Accordingly, the 96 questionnaire items were aggregated into 24 dimension-level indicators representing the four higher-level constructs.

The analysis comprised evaluation of the measurement model and the structural model. The measurement model was assessed to evaluate the reliability and validity of the construct indicators. Convergent validity was assessed using outer loadings and Average Variance Extracted (AVE). Outer loading values of ≥ 0.70 and AVE values of ≥ 0.50 were considered indicative of adequate convergent validity. Internal consistency reliability was evaluated using Cronbach's alpha and Composite Reliability (CR), with values of ≥ 0.70 considered acceptable. Discriminant validity was assessed using the heterotrait–monotrait ratio (HTMT), with values below 0.85 used as the primary criterion (Fauzi, 2022; Hair & Alamer, 2022).

The structural model was evaluated by examining the path coefficients (β), which represented the direction and magnitude of the associations among the constructs. The coefficient of determination (R^2) was used to assess the proportion of variance in each endogenous construct explained by its predictor constructs. Predictive relevance was assessed using the Q^2 statistic, with values greater than zero interpreted as evidence of predictive relevance under the applied PLS-SEM procedure. The Standardized Root Mean Square Residual (SRMR) was also examined as an approximate model-fit indicator; however, it was not used as the sole basis for judging the overall adequacy of the predictive model.

The authors performed statistical inference using a bootstrapping procedure with 5,000 resamples. Bootstrapping was used to estimate standard errors, t -statistics, p -values, and 95% confidence intervals for the direct structural associations and specific indirect effects. Statistical significance was assessed using a two-sided threshold of $p < 0.05$. The authors examined indirect associations through Culture Care using bootstrapped specific indirect effects and their corresponding confidence intervals.

Ethical Consideration

The study received ethical approval from the Ethics Committee of Intan Martapura College of Health Sciences, Indonesia with references number 051/KE/YBIP-SI/VI/2025 on 23rd June 2025.

RESULTS

The majority of the 210 respondents in this study were female (72.9%) and aged 41 to 50 (34.8%). The most common role in the family was that of a family member (77.6%), with only a small percentage serving as head of the family. The majority of respondents (79.5%) worked in the private sector and were of Banjar ethnicity (74.3%). Almost half of respondents (46.2%) had a high school diploma, and the majority of family incomes (63.8%) were in the other category, with a diverse distribution and less than the minimum wage. Hypertension was the most common degenerative disease reported by family members (49%), followed by stroke and heart disease in smaller proportions. According to Table 1, the respondents' socio-demographic characteristics are as follows:

Table 1: Socio-demographic Sharacteristics of Respondents (n=210)

Characteristics	Category	Frequency	Percentage (%)
Gender	Man	57	27.1
	Woman	153	72.9
Age	< 21 years	14	6.7
	21–30 years	43	20.5
	31-40 years	36	17.1
	41–50 years	73	34.8
	> 50 years	44	21.0
The Role of the Family	Family members	163	77.6
	Head of family	42	20.0
	Other	5	2.4
Work	Unemployed	16	7.6
	Civil Servant	24	11.4
	Private	167	79.5
	Other	3	1.4
Ethnic Group	Banjar	156	74.3
	Java	42	20.0
	Other	12	5.7
Education	Elementary School/Equivalent	43	20.5
	Junior High School/Equivalent	30	14.3
	High School/Equivalent	97	46.2
	Diploma	11	5.2
	Bachelor's degree (S1)	27	12.9
	Master's degree (S2)	2	1.0
Income	< IDR. 3500	62	29.5
	> IDR. 3500	14	6.7
	Other	134	63.8
Disease History	Heart	22	10.5
	Hypertension	103	49.0
	Diabetes Mellitus	19	9.0
	Stroke	28	13.3
	Other	38	18.1

The descriptive analysis showed that the Family Assessment Dimensions had mean scores ranging from 3.73 to 4.19, with all dimensions categorized as high. Family function had a mean score of 3.90 (SD = 1.35), while physical and social environment scores were 3.73 (SD = 1.07) and 4.19 (SD = 1.42), respectively. The dimensions of coping strategies, along with stress and well-being, were similarly classified in the high category, with mean values of 3.94 (SD = 1.15) and 4.00 (SD = 1.04), respectively. All dimensions of the Individual Family Members Assessment were also in the high category, with mean values between 3.75 and 3.87. The physical health dimension has a mean of 3.75 (SD = 1.33), followed by mental and emotional health with a mean of 3.85 (SD = 1.18). The social relationship dimension shows a mean of 3.83 (SD = 1.48), while spirituality is also high with a mean of 3.78 (SD = 1.12). These results indicate that family members are in relatively satisfactory physical, emotional, and spiritual condition. Variables Culture Care shows a diversity of categories. The cultural support dimension is in the high category with a mean of 3.78 (SD = 1.06). However, the dimensions of cultural values and beliefs (mean = 3.23; SD = 1.26), traditional practices (mean = 3.39; SD = 1.05), and cultural sensitivity (mean = 3.47; SD = 1.07) are in the medium category. This finding illustrates that, although cultural support is relatively strong, the internalization of cultural values and traditional practices has not fully dominated family care behaviors. This data indicates a pattern of integration between modern and traditional cultures in family health practices. In the prevention and emergency management variable for NCDs, the family readiness dimension has a mean of 3.63 (SD = 1.34), and the family role dimension has a mean of 3.53 (SD = 1.28), both of which are in the high category. This finding indicates that families have psychological readiness and an active role in dealing with emergency conditions. The general knowledge dimension (mean = 2.53; SD = 1.38) fell into the moderate range, while the specific knowledge of basic life support (mean = 1.96; SD = 1.44) fell into the low range. These findings indicate that although families are well prepared, their specific knowledge regarding emergency measures, particularly basic life support, remains very limited. The following is a statistical description of the research variables, as shown in Table 2:

Table 2: Statistical Description of Research Variables

Variables and Dimensions	Mean	SD	Category
Family Assessment			
Family functions	3.90	1.35	High
Physical environment	3.73	1.07	High
Social environment	4.19	1.42	High
Socio-cultural	3.69	1.02	High
Coping strategies	3.94	1.15	High
Stress and well-being	4.00	1.04	High
Family structure	4.09	1.17	High
Individual Family Members Assessment			
Physical health	3.75	1.33	High
Mental and emotional health	3.85	1.18	High
Social relations	3.83	1.48	High
Spirituality	3.78	1.12	High
Culture Care			
Cultural support	3.78	1.06	High
Cultural values and beliefs	3.23	1.26	Moderate
Traditional practices	3.39	1.05	Moderate
Cultural sensitivity	3.47	1.07	Moderate
Emergency Prevention and Management			
Family Readiness/Health	3.63	1.34	High
General knowledge	2.53	1.38	Moderate
BLS-specific knowledge	1.96	1.44	Low
The role of the family	3.53	1.28	High

SD = Standard Deviation

All indicators had outer loadings above 0.70, and AVE values ranged from 0.741 to 0.828, exceeding the recommended threshold of 0.50. Composite reliability values ranged from 0.919 to 0.950, while Cronbach's alpha values ranged from 0.880 to 0.928. These results indicated adequate internal consistency and convergent

validity across the four constructs. The results of the convergent validity and construct reliability assessments are presented in Table 3.

Table 3: Convergent Validity and Construct Reliability

Construct	Dimensions	Loading Factor	AVE	Cronbach's Alpha	Composite Reliability
Family Assessment (FA)	Family functions	0.773	0.781	0.923	0.947
	Physical environment	0.846			
	Social environment	0.801			
	Socio-cultural	0.949			
	Coping strategies	0.929			
	Stress and well-being	0.939			
	Family structure	0.931			
Individual Family Members Assessment (IFM)	Physical health	0.928	0.741	0.880	0.919
	Mental and emotional health	0.714			
	Social relations	0.866			
	Spirituality	0.918			
Culture Care (CC)	Cultural support	0.943	0.828	0.928	0.950
	Cultural values and beliefs	0.755			
	Traditional practices	0.966			
	Cultural sensitivity	0.958			
Emergency Prevention and Management (EPM)	Family readiness	0.874	0.791	0.912	0.933
	The role of the family	0.937			
	General knowledge	0.911			
	Specialized knowledge	0.923			
	Attitude towards emergencies	0.905			
	The family's initial response	0.921			
	Coordination in the family	0.784			
	Knowledge of rescue actions	0.932			
	Follow-up actions during an emergency	0.908			

AVE = Average Variance Extracted

The discriminant validity assessment using the Heterotrait–Monotrait Ratio (HTMT) showed that all HTMT values were below the recommended threshold of 0.85. The highest HTMT value was between Culture Care and Emergency EPM at 0.787, while the lowest was between Family Assessment and Individual Family Members at 0.679. As all HTMT values were below 0.85, the findings supported adequate discriminant validity, indicating that the constructs were empirically distinct from one another. The results of the HTMT assessment are presented in Table 4:

Table 4: Discriminant Validity

Construct	Culture Care (CC)	Family Assessment (FA)	Individual Family Members (IFM)	Emergency Prevention and Management (EPM)
Culture Care (CC)	–	0.699	0.738	0.787
Family Assessment (FA)	0.699	–	0.679	0.734
Individual Family Members (IFM)	0.738	0.679	–	0.752
Emergency Prevention and Management (EPM)	0.787	0.734	0.752	–

The SEM-PLS analysis produced a structural model that visually presents the loading factor values for each indicator, the path coefficients among constructs, and the R^2 -square value for the endogenous construct. All indicators exhibit loading factor values exceeding 0.70, thereby satisfying the criteria for convergent validity. The R^2 -square value indicates that Family Assessment and Individual Family Members explain 55.3% of the variation in the Culture Care construct. In comparison, 70.9% of the variation in the emergency prevention and management construct is accounted for by the three exogenous constructs: Family Assessment, Individual Family Members, and Culture Care. This model highlights that familial and individual factors significantly influence cultural care practices, which are crucial to enhancing the family's capacity to manage NCD-related emergencies. The following image illustrates the Model of Structural Family-Centered Nursing Culture-Based (PLS-SEM).

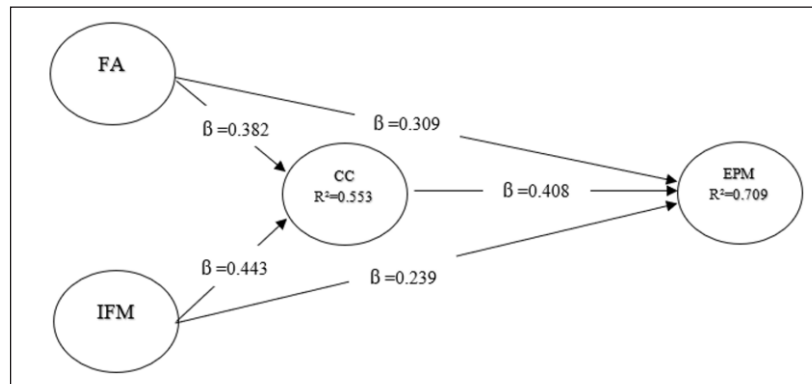


Figure 1: Structural Model of the Proposed Culturally Based Family-Centered Nursing Model for Emergency Prevention and Management (PLS-SEM)

Standardized path coefficients (β) are shown on the arrows. R^2 values indicate the proportion of variance explained in the endogenous constructs. FA = Family Assessment; IFM = Individual Family Members Assessment; CC = Culture Care; EPM = Emergency Prevention and Management.

The dependent construct in this model is Emergency EPM, operationalized as the family's reported capacity to prevent and manage emergencies among family members with NCDs. The structural model analysis showed significant positive associations among the study constructs. Family assessment was positively associated with culture care ($\beta = 0.382$, $t = 8.610$, $p < 0.001$) and EPM ($\beta = 0.309$, $t = 5.764$, $p < 0.001$). Individual family members were also positively associated with culture care ($\beta = 0.443$, $t = 9.499$, $p < 0.001$) and EPM ($\beta = 0.239$, $t = 4.607$, $p < 0.001$). Culture Care showed a significant positive structural association with EPM ($\beta = 0.408$, $t = 8.100$, $p < 0.001$). These findings indicate that Family Assessment, Individual Family Members, and Culture Care were significantly associated with EPM within the proposed structural model. The specific indirect effects were subsequently examined to assess the mediating role of culture care. The path coefficients and significance results of the structural model are presented in Table 5.

Table 5: Path Coefficients and Significance of Structural Model

Relationship between variables	Path Coefficient (β)	Std. Dev.	t -Statistics	p -value	95% CI
Family Assessment → Culture Care	0.382	0.044	8.610	<0.001	0.294–0.468
Individual Family Members → Culture Care	0.443	0.047	9.499	<0.001	0.348–0.531
Family Assessment → Emergency Prevention and Management	0.309	0.054	5.764	<0.001	0.202–0.414
Individual Family Members → Emergency Prevention and Management	0.239	0.052	4.607	<0.001	0.139–0.342
Culture Care → Emergency Prevention and Management	0.408	0.050	8.100	<0.001	0.302–0.502

Note: β = standardized path coefficient; Std. Dev. = standard deviation; CI = confidence interval.

Specific indirect effect analysis showed that culture care significantly mediated the association between family assessment and EPM ($\beta = 0.156$, $t = 5.769$, $p < 0.001$, 95% CI [0.105, 0.211]). Culture care also significantly mediated the association between individual family members and EPM ($\beta = 0.181$, $t = 7.013$, $p < 0.001$, 95% CI [0.130, 0.231]). Because the corresponding direct associations remained statistically significant, these findings were consistent with partial mediation.

Table 6: Specific Indirect Effects

Relationship between variables	Path Coefficient (β)	SE	t -Statistics	p -value	95% CI
Family Assessment → Culture Care → Emergency Prevention and Management	0.156	0.027	5.769	<0.001	0.105–0.211
Individual Family Members → Culture Care → Emergency Prevention and Management	0.181	0.026	7.013	<0.001	0.130–0.231

Note: β = standardized indirect effect; SE = standard error; CI = confidence interval.

The structural model explained 55.3% of the variance in culture care ($R^2 = 0.553$; adjusted $R^2 = 0.548$) and 70.9% of the variance in emergency prevention and management (EPM) ($R^2 = 0.709$; adjusted $R^2 = 0.704$). These values indicate that Family Assessment and Individual Family Members jointly accounted for 55.3% of the variance in Culture Care. In contrast, Family Assessment, Individual Family Members, and Culture Care accounted for 70.9% of the variance in EPM. The Q^2 values were 0.450 for Culture Care and 0.541 for EPM. Both values were greater than zero, indicating the model's predictive relevance for the endogenous constructs under the applied PLS-SEM assessment. The R^2 and Q^2 results are presented in Table 7.

Table 7: R-Square and Q-Square Values of Endogenous Constructs

Endogenous Construct	R^2	Adjusted R^2	Q^2
Culture Care (CC)	0.553	0.548	0.450
Emergency Prevention and Management (EPM)	0.709	0.704	0.541

The SRMR was 0.090. This value was below the commonly used threshold of 0.10, indicating a relatively small discrepancy between the observed and model-implied correlation matrices. However, given the predictive orientation of PLS-SEM and the study's cross-sectional design, SRMR was interpreted as a supplementary model-fit indicator rather than the sole basis for determining overall model adequacy. The SRMR result is presented in Table 8.

Table 8: Standardized Root Mean Square Residual (SRMR)

Component	Mark	Eligibility Limit	Interpretation
SRMR	0.090	< 0.10	Feasibility and Fit Model

DISCUSSION

The findings of this study support the proposed structural relationships among Family Assessment, Individual Family Members Assessment, Culture Care, and Emergency EPM. Family Assessment and Individual Family Members Assessment were positively associated with Culture Care and EPM, while Culture Care was also positively associated with EPM. The model demonstrated meaningful explanatory capacity for the endogenous constructs, and the predictive relevance assessment further supported the usefulness of the proposed structural relationships within the study sample. These findings suggest that family-level, individual, and cultural factors are meaningfully related to families' reported capacity to prevent and manage emergencies among family members with NCDs. From a family-centered nursing perspective, the family is an important unit of assessment and care because family functioning and family members' participation may shape how care-related decisions and responses to health problems are organized (Karam *et al.*, 2021; Ocloo *et al.*, 2020). Previous studies have similarly emphasized the importance of family involvement in chronic disease care and health-related decision-making.

The positive association between family assessment and culture care indicates that family functioning, social environment, and coping-related characteristics relate to how culturally informed care is represented within the family (Bloemberg *et al.*, 2026; Kurniawati & Kusumo, 2023). Families with more supportive physical and social environments, effective coping strategies, stable family structures, and better overall functioning may have greater capacity to incorporate cultural values, beliefs, and practices into caregiving. This interpretation is consistent with previous research indicating that family functioning can shape culturally grounded patterns of care and health-related decision-making (Hohashi, 2019; Senghor, 2021). Other studies have also highlighted the role of cultural values and family social structures in health behaviors and decisions regarding health-service utilization (Opara *et al.*, 2024; Perusset, 2025). Therefore, the findings support considering culture as an integral dimension of family care rather than solely an external contextual factor.

Individual family member assessment was also positively associated with both culture care and EPM. This finding suggests that the characteristics and capacities of individual family members are related to how families organize culturally appropriate care and respond to emergencies. Individual capacities, including physical, emotional, social, and knowledge-related aspects assessed in the present model, may form an important component of family-level preparedness. In family nursing, caregivers and other family members may participate in recognizing health problems, making decisions, and coordinating responses when an

emergency occurs. Previous studies have reported that individual and family capacities are relevant to chronic disease management and preparedness for emergency events (He *et al.*, 2022; Yilmazel, 2023). These findings support the importance of considering individual family members within a broader family-centered assessment rather than viewing the family solely as a single homogeneous unit.

Culture Care also showed a significant positive association with EPM and demonstrated significant specific indirect associations in the pathways from Family Assessment and Individual Family Members Assessment to EPM. Because the corresponding direct associations remained statistically significant, these findings were consistent with partial mediation within the tested structural model. These results provide empirical support for the proposed integration of family-centered nursing and Leininger's transcultural nursing theory. From a theoretical perspective, the findings suggest that cultural care is not merely a contextual characteristic but is statistically connected to the relationship between family-related factors and EPM. This interpretation is consistent with Leininger's emphasis on the importance of cultural values, beliefs, and practices in shaping culturally congruent nursing care (Almeida *et al.*, 2021; McFarland & Eipperle, 2008; Ruschel *et al.*, 2012). Previous studies have also emphasized the relevance of culturally informed approaches in health care, particularly in culturally diverse communities (Bautista-Gomez *et al.*, 2024; Castro *et al.*, 2018; Thompson *et al.*, 2025).

The structural model demonstrated meaningful explanatory capacity for culture care and EPM, indicating that the combination of family, individual, and cultural constructs accounted for a substantial proportion of the observed variation in the endogenous constructs. The predictive relevance assessment also indicated that the proposed model had predictive relevance within the present dataset. These findings suggest that integrating family, individual, and cultural dimensions provides a useful framework for understanding variation in family emergency prevention and management (Astuti *et al.*, 2025; Corbin *et al.*, 2021; Davis *et al.*, 2025). However, these findings should be interpreted within the study's cross-sectional and predictive orientation. The explanatory and predictive statistics do not establish causal effects or demonstrate the effectiveness of the proposed nursing model as an intervention. Further longitudinal and intervention-based studies are therefore needed to examine whether implementation of the proposed model can improve family emergency prevention and management outcomes.

The findings have implications for nursing education, practice, and health-service development. In nursing education, integrating culturally based emergency-preparedness concepts may support the development of nurses' competencies in family assessment, individual family-member assessment, and culturally responsive care. In clinical and community practice, the proposed structural model may provide a conceptual and empirical basis for developing family-centered approaches to emergency prevention and management among families of patients with NCDs. Such approaches may incorporate family functioning, individual family-member characteristics, and culturally relevant values into assessment and health education. At the health-system level, the findings highlight the potential importance of family-based preparedness training and stronger linkages between families, community health services, and other relevant health resources. However, these implications should be regarded as practice considerations rather than evidence of intervention effectiveness, because the present study did not evaluate the model's implementation as an intervention.

This study contributes to family nursing scholarship by integrating family-level, individual, and cultural dimensions within a single structural framework for understanding EPM among families of patients with NCDs. In particular, the findings provide empirical support for significant indirect associations involving culture care and demonstrate how cultural care can be incorporated into a family-centered nursing model. Rather than establishing causal mechanisms, the present findings provide a basis for further empirical investigation of the proposed relationships. Future longitudinal and intervention studies are warranted to examine the temporal relationships among the constructs and determine whether implementing the proposed model can improve family emergency prevention and management outcomes.

Limitations

This study has several limitations. First, the cross-sectional design limits the ability to establish temporal or causal relationships among the study constructs. Therefore, the structural associations identified in this

study should not be interpreted as evidence of causality or intervention effectiveness. Second, self-reported questionnaires may have introduced response and social desirability biases. Third, the cultural context represented in this study reflects the characteristics of the participating communities in South Kalimantan, which may limit the transferability or generalizability of the findings to populations with different cultural and social contexts. Finally, although PLS-SEM was appropriate for evaluating the proposed structural relationships and predictive relevance within the present dataset, further studies using longitudinal and intervention-based designs are needed to examine the model's temporal stability, external validity, and practical effectiveness.

Future Scope

Future research will refine and validate a family-centered, culturally based nursing model through qualitative exploration and intervention-based studies. Qualitative studies involving families and nurses can better understand contextual, cultural, and practical needs, serving as a foundation for refining the model and its intervention components. Subsequently, quasi-experimental studies or randomized controlled trials will be needed to evaluate whether the implemented interventions enhance family preparedness for emergencies and the capacity of families caring for patients with non-communicable diseases to prevent and manage emergencies. Long-term follow-up studies could also assess the sustainability of these outcomes and the feasibility of integrating this model into routine family and community nursing practice.

CONCLUSION

This study provides empirical support for the proposed structural relationships among Family Assessment, Individual Family Members Assessment, Culture Care, and Emergency EPM among families of patients with non-communicable diseases. Family Assessment and Individual Family Members Assessment were positively associated with Culture Care and EPM, while Culture Care was positively associated with EPM. Significant specific indirect associations through Culture Care were also identified, with the corresponding direct associations remaining significant, consistent with partial mediation within the tested structural model.

The findings support an integrated consideration of family, individual, and cultural dimensions in understanding family capacity for emergency prevention and management. The proposed model may provide a basis for culturally responsive, family-centred nursing assessment and health education. However, the cross-sectional design precludes causal interpretation or conclusions regarding intervention effectiveness. Longitudinal and intervention-based studies are therefore needed to evaluate the proposed model further and determine its effectiveness in practice.

CRedit Authorship Contribution Statement

I.M: Conceptualization, investigation, writing the original draft, writing—review and editing, supervision, and project administration. **H.R:** Contributed to conceptualization, methodology, formal analysis, writing the original draft, writing—review and editing, and supervision. **T.H:** Contributed to investigation, writing—original draft, writing—review and editing, and supervision. All authors have reviewed and approved the final version of the manuscript.

AI Assistant Declaration

During the preparation and revision of this manuscript, the authors utilized AI-based language tools to assist with language editing, enhance clarity and readability, and refine the organization and presentation of the text. AI was not used to generate research data, perform statistical analyses, or make scientific or methodological decisions. All content generated or suggested by AI tools has been critically reviewed, verified, and revised by the authors as appropriate. The authors bear full responsibility for the accuracy, integrity, originality, and final content of this manuscript.

Conflict of Interest

The authors declare that they have no competing interests.

ACKNOWLEDGEMENT

The authors would like to express their gratitude to the Ministry of Higher Education, Science, and Technology, Directorate General of Research and Development of the Republic of Indonesia, for funding this research through the BIMA Grant under the Regular Fundamental Research scheme. The authors would also like to express their gratitude to the Head of Stikes Intan Martapura, the Head of the Research and Community Service Unit, and the students who were involved and assisted in this research process. Furthermore, the authors would like to thank the village heads in the Regency or City areas, as well as the respondents, staff, and general assistants who have assisted in various stages of this research.

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