



ASSOCIATION BETWEEN FAMILY-CENTERED CARE AND FAMILY INDEPENDENCE IN CARING FOR PATIENTS WITH DIABETES MELLITUS

Andi Safutra Suraya^{1*}, Andi Muhammad Rifqi Ismulail², Sitti Rojiyah Nur Insyirah Puhi³

¹Faculty of Health Sciences, Universitas Muhammadiyah Gorontalo, Jl. Prof. Dr. H. Mansoer Pateda No.Desa, Pentadio Timur, Telaga Biru, Gorontalo, Gorontalo 96181, Indonesia

²Faculty of Medicine, Universitas Muhammadiyah Gorontalo, Jl. Prof. Dr. H. Mansoer Pateda No.Desa, Pentadio Timur, Telaga Biru, Gorontalo, Gorontalo 96181, Indonesia

³Faculty of Psychology, Universitas Muhammadiyah Gorontalo, Jl. Prof. Dr. H. Mansoer Pateda No.Desa, Pentadio Timur, Telaga Biru, Gorontalo, Gorontalo 96181, Indonesia

*andisuraya90@gmail.com

ABSTRACT

Diabetes mellitus requires long-term management that depends not only on patients but also on the family's ability to provide support and care. Family-Centered Care (FCC) positions families as active partners in healthcare and may strengthen family independence. Family involvement is essential because most diabetes management occurs at home, including medication management, lifestyle modification, health monitoring, and complication prevention. This study aimed to analyze the association between FCC and family independence in caring for patients with diabetes mellitus at Limboto Public Health Center. This study employed a quantitative analytical observational design with a cross-sectional approach. A total of 110 family members of patients with diabetes mellitus were selected through purposive sampling from a population framework of 1,144 patients registered in 2025. FCC was the independent variable, while family independence was the dependent variable. FCC was operationalized using the 14-item Iceland-Family Perceived Support Questionnaire (ICE-FPSQ), while family independence was assessed using the 20-item CUIDAR Short Version. Respondent characteristics were analyzed descriptively, while the hypothesis was tested using a t-test of the simple linear regression coefficient at $\alpha=0.05$. Most respondents were female (77.3%), aged 26–35 years (31.8%), wives of patients (35.5%), and senior high school graduates (46.4%). Most patients had diabetes for less than five years (64.5%), with neuropathy as the most frequently reported complication (73.6%). FCC showed a positive and significant association with family independence ($B=1.343$; $SE=0.076$; $\beta=0.862$; $t=17.642$; $p<0.001$; 95% CI: 1.192–1.494). Better FCC was significantly associated with greater family independence. These findings reinforce the importance of integrating families into diabetes care. Primary nursing services should strengthen communication, education, emotional support, and family empowerment in a structured and sustainable manner.

Keywords: diabetes mellitus; family caregiver; family-centered care; family independence; family nursing

How to cite (in APA style)

Suraya, A. S., Ismulail, A. M. R., & Puhi, S. R. N. I. (2026). Association Between Family-Centered Care and Family Independence in Caring for Patients with Diabetes Mellitus. *Indonesian Journal of Global Health Research*, 8(5), 1205–1216. <https://doi.org/10.37287/ijghr.v8i5.2630>.

INTRODUCTION

Diabetes mellitus is a chronic disease that continues to impose an increasing global health burden (Suraya et al., 2024). The Global Burden of Disease Study 2021 estimated that approximately 529 million people were living with diabetes in 2021, with this number projected to increase to more than 1.31 billion by 2050. Type 2 diabetes mellitus (T2DM) is the predominant form and accounts for the majority of diabetes cases worldwide (Ong, 2023). This growing burden indicates that diabetes management requires long-term strategies that extend beyond clinical care to encompass the capacity of patients and their families to sustain daily care practices at home (Hidayati et al., 2024; Yulia et al., 2026).

Diabetes management encompasses medication use, dietary regulation, physical activity, health monitoring, recognition of signs of complications, and appropriate utilization of healthcare services. Most of these activities are carried out within the family environment (Jannah et al., 2023; Jannah et al., 2024). An umbrella review by Busebaia et al. demonstrated that families play an important role in supporting adherence to self-care management practices among patients with T2DM (Busebaia et

al., 2023). Among patients with diabetes living in rural areas, family support, family functioning, and family self-efficacy have also been associated with patients' ability to independently manage their condition (Tang et al., 2023). Zeren and Canbolat reported a strong correlation between family support and self-care levels among patients with T2DM (Zeren & Canbolat, 2023). Similarly, Zhu et al. found that family functioning may influence self-management behaviors through enhanced family support (Zhu et al., 2024)..

Evidence supporting the importance of family-based approaches is not limited to observational studies. A systematic review and meta-analysis by Zhang et al. of 23 studies involving 3,114 participants demonstrated that family-based interventions may improve glycemic control, self-care behaviors, self-efficacy, diabetes-related distress, and positive family support (Zhang et al., 2022). A meta-analysis by Teli et al. of 18 randomized controlled trials involving 2,815 participants also demonstrated that family-based diabetes management interventions significantly improved HbA1c levels among adults with T2DM (Teli et al., 2024). More recent evidence from Matrook et al. indicates that family-based interventions provide benefits for T2DM control, particularly during short-term follow-up and when the programs are delivered by nurses (Matrook et al., 2025).

Several interventional studies have further strengthened these findings. Mansour et al. demonstrated that family-centered education can improve medication adherence while reducing blood glucose and HbA1c levels (Mansour et al., 2023). Family-based interventions involving active participation from family members have also been shown to improve knowledge, medication adherence, self-management, self-efficacy, and glycemic control among patients with T2DM (Withidpanyawong et al., 2019). Among patients newly diagnosed with T2DM, family involvement in health education resulted in improvements in knowledge, health behaviors, quality of life, and glycemic control over long-term follow-up (Shi et al., 2016). A family empowerment approach combined with telenursing has also been shown to improve adherence to dietary regimens among patients with T2DM (Shahabi et al., 2022). Furthermore, a family-centered empowerment program has been reported to improve illness acceptance and self-management among patients with T2DM (Amani et al., 2025).

In nursing practice, family involvement can be systematically organized through the Family-Centered Care (FCC) approach (Suleman et al., 2026). FCC positions the family not merely as a patient's companion but as a partner in the healthcare process. This approach emphasizes communication, information sharing, emotional support, respect for family needs and values, participation, and collaboration throughout the care process. The development of the Iceland-Family Perceived Support Questionnaire (ICE-FPSQ) demonstrated that family support within nursing care can be conceptualized through two main components: cognitive and emotional support (Sveinbjarnardottir et al., 2012). The implementation of FCC is influenced by factors originating from nursing professionals, families, relationships between healthcare professionals and families, and the organizational healthcare system (Alqarawi & Alhalal, 2024).

The concept of patient- and family-centered care has also been examined across various chronic conditions. A systematic review by Allen et al. showed that patient- and family-centered care encompasses emotional and social involvement, empowerment of patients and families to participate in care processes, and the provision of care that is responsive to individual needs (Allen et al., 2022). In nursing contexts, nurse-led interventions involving education, information provision, communication, emotional support, and family engagement have demonstrated beneficial effects on various family-related outcomes (Kiwanuka et al., 2022). A review of patient- and family-centered care interventions further indicated that participation and information exchange are key components in establishing family-oriented healthcare services (Joo et al., 2024).

The assessment of FCC requires an instrument that is conceptually and psychometrically appropriate for the perspective of the respondents. A recent systematic review of family-focused care instruments identified several measurement tools that assess FCC from the perspectives of patients, family members, and healthcare professionals, emphasizing the importance of selecting

instruments appropriate to the clinical context (Benbelkheir et al., 2026). This issue is particularly relevant to the present study because the respondents are family members of patients; therefore, the family's perspective on professional support represents an important component of the assessment. Recent evidence also indicates that not all forms of family involvement produce the same consequences. A study involving 1,648 patients with T2DM found that supportive family behaviors were positively associated with self-management and glycemic control, whereas unsupportive family involvement did not demonstrate a similar pattern of benefit (Gu et al., 2026). Thus, the quality of family involvement is an important aspect that should be considered, rather than merely the presence of family members in the care process.

Although numerous studies have demonstrated the benefits of family support and family-based interventions, most investigated outcomes remain patient-oriented, including HbA1c, treatment adherence, self-management, and quality of life (Zhang et al., 2022; Amani et al., 2025). Evidence regarding family independence, defined as the family's capacity to continuously perform caregiving functions at home, remains limited, particularly in primary healthcare settings. Research conducted in the context of Puskesmas is therefore important because primary healthcare facilities occupy a strategic position in ensuring continuity of diabetes care and strengthening family empowerment. Based on this gap, this study aimed to analyze the relationship between Family-Centered Care and family independence in caring for patients with diabetes mellitus at Limboto Public Health Center (Puskesmas Limboto). The study hypothesized that higher-quality Family-Centered Care would be significantly associated with higher levels of family independence.

METHOD

Study Design

This study employed a quantitative approach using an analytic observational cross-sectional design. This design was selected because *Family-Centered Care* (FCC) and family independence were measured during a single observation period without intervention or manipulation of the study variables by the researchers. The cross-sectional design allows for the statistical assessment of associations between variables but does not permit definitive conclusions regarding causal relationships.

Study Setting

The study was conducted at Limboto Public Health Center (*Puskesmas Limboto*), Gorontalo Regency, Gorontalo Province, Indonesia. The study population frame was based on records of patients with diabetes mellitus registered in 2025.

Population and Unit of Analysis

The source population consisted of 1,144 patients with diabetes mellitus registered at Limboto Public Health Center in 2025. The unit of analysis was a family member who was directly involved in caring for a patient with diabetes mellitus. One primary family caregiver was recruited as the respondent to represent the family caregiving context for each patient.

Sample Size

Sample size adequacy was evaluated using a *power analysis* for linear regression with one predictor using G*Power 3.1. The parameters were set at a significance level of $\alpha = 0.05$, statistical power of 0.80, one primary predictor, and an assumed medium effect size of $f^2 = 0.15$. This configuration yielded a minimum required sample size of approximately 55 respondents. A total of 110 respondents were available and met the study eligibility criteria; therefore, the actual sample size exceeded the minimum requirement based on the power analysis. G*Power provides procedures for power analyses of linear regression and correlation, as developed by Faul et al. (Erdfelder et al., 2009).

Sampling Technique

Respondents were selected using purposive sampling, a non-probability sampling technique based on the eligibility of family members in relation to the objectives of the study. Eligible respondents were family members of patients with diabetes mellitus who were directly or routinely involved in the patient's care, were able to provide information regarding the patient's care and healthcare experiences, had adequate communication abilities, and were willing to participate in the study. Respondents with incomplete primary questionnaires were excluded from the analysis.

Study Variables

The independent variable was *Family-Centered Care*, whereas the dependent variable was family independence. Operationally, FCC represented family members' perceptions of the support provided by nursing professionals to the family. Family independence was operationalized as the competence of family members to perform caregiving activities for patients with chronic illness at home.

Family-Centered Care Instrument

Family-centered care was operationalized using the Iceland-Family Perceived Support Questionnaire (ICE-FPSQ). The ICE-FPSQ was developed based on the Calgary Family Intervention Model to assess family members' perceptions of support provided by nurses. The final version of the instrument consists of 14 items distributed across two dimensions, namely cognitive support (5 items) and emotional support (9 items). Each item is rated using a five-point Likert scale ranging from 1 (*almost never*) to 5 (*almost always*). The total score ranges from 14 to 70, with higher scores indicating greater perceived family support. The psychometric development of the ICE-FPSQ demonstrated excellent internal consistency, with a total Cronbach's α of 0.961, $\alpha = 0.881$ for cognitive support, and $\alpha = 0.952$ for emotional support (Sveinbjarnardottir et al., 2012). The instrument was considered appropriate for this study because the respondents were family members and the measurement focused on their perceptions of professional nursing support.

Family Independence Instrument

Family independence was operationalized as the competence of family caregivers to provide care at home and was measured using the CUIDAR Short Version/Caregiver Competence for Care Instrument. The instrument consists of 20 items rated on a four-point Likert scale ranging from 0 (*never*), 1 (*rarely*), 2 (*often*), to 3 (*almost always/always*), with total scores ranging from 0 to 60. The CUIDAR assesses six dimensions of caregiving competence: knowledge, referring to knowledge of caregiving needs; uniqueness, referring to the caregiver's personal condition and capabilities; instrumental-procedural competence, referring to the technical ability to provide care; enjoyment/well-being, referring to the minimum level of well-being required to perform caregiving activities; anticipation, referring to the ability to anticipate problems and warning signs; and relationship and social interaction, referring to the ability to utilize interpersonal relationships and social support networks. The short version of the CUIDAR has demonstrated content and construct validity as well as high internal consistency, with a Cronbach's α of 0.928. Recent applications among family caregivers of patients with chronic diseases have also employed the 20-item, six-dimension structure (Llorente Pérez et al., 2026). Higher scores indicate greater caregiving competence and, consequently, greater family independence in performing caregiving functions at home.

Data Collection

After eligible potential respondents had been identified, the researchers explained the study objectives, procedures, potential benefits, data confidentiality, and participants' rights. Respondents who agreed to participate provided informed consent before completing the instruments. Family and patient characteristics were collected using a structured characteristics form, whereas FCC and family independence were assessed using structured instruments. All data were checked for completeness before coding and statistical analysis.

Data Analysis

Descriptive analyses were performed to summarize the characteristics of the respondents and patients using frequencies and percentages. The primary analysis employed simple linear regression, with *Family-Centered Care* as the predictor variable and family independence as the outcome variable. In accordance with the study objective, inferential hypothesis testing was conducted using a *t*-test of the regression coefficient for *Family-Centered Care*. Statistical significance was determined at a significance level of 0.05, with $p < 0.05$ indicating rejection of the null hypothesis (H_0), whereas $p \geq 0.05$ indicated failure to reject H_0 . When the statistical software displayed a *p*-value of 0.000, it was reported as $p < 0.001$. To enhance the transparency and completeness of the regression analysis, the unstandardized regression coefficient (B), standard error (SE), standardized coefficient (β), *t*-value, *p*-value, and 95% confidence interval (CI) were reported. The values of B, SE, β , and the 95% CI were derived from the same regression model and were reported as estimates of the model parameters rather than as additional hypothesis tests.

RESULT

Respondent Characteristics

Table 1.
Respondent Characteristics by Age

Age group	f	%
17–25 years	17	15.5
26–35 years	35	31.8
36–45 years	21	19.1
46–55 years	24	21.8
56–65 years	11	10.0
>65 years	2	1.8

As shown in table 1, the largest proportion of respondents was in the 26–35-year age group, comprising 35 respondents (31.8%). This was followed by respondents aged 46–55 years (24; 21.8%), 36–45 years (21; 19.1%), and 17–25 years (17; 15.5%). Meanwhile, 11 respondents (10.0%) were aged 56–65 years, while those aged >65 years represented the smallest group, with 2 respondents (1.8%). Overall, most respondents were adults, particularly those aged 26–35 years.

Table 2.
Respondent Characteristics by Relationship to the Patient

Relationship to patient	f	%
Wife	39	35.5
Child	38	34.5
Parent	18	16.4
Husband	9	8.2
Other	6	5.5

As shown in table 2, the largest proportion of respondents were patients' wives (39; 35.5%), followed by children (38; 34.5%), parents (18; 16.4%), and husbands (9; 8.2%). Six respondents (5.5%) reported other relationships to the patient. Thus, most respondents were immediate family members, particularly wives and children.

Table 3.
Respondent Characteristics by Sex

Sex	f	%
Male	25	22.7
Female	85	77.3

As shown in table 3, most respondents were female (85; 77.3%), whereas 25 respondents (22.7%) were male.

Table 4.
Respondent Characteristics by Highest Educational Attainment

Educational attainment	f	%
Elementary school	6	5.5
Junior high school	18	16.4
Senior high school	51	46.4

Educational attainment	f	%
Bachelor's degree or higher	35	31.8

As shown in table 4, the largest proportion of respondents had completed senior high school (51; 46.4%), followed by those with a bachelor's degree or higher (35; 31.8%), junior high school (18; 16.4%), and elementary school (6; 5.5%). Thus, the majority of respondents had a secondary-level educational background.

Table 5.

Respondent Characteristics by Husband's Current Occupation

Husband's occupation	f	%
Civil servant	10	9.1
Private-sector/factory employee	9	8.2
Self-employed	27	24.5
Trader	31	28.2
Other	33	30.0

As shown in table 5, the largest occupational category among respondents' husbands was *other occupations* (33; 30.0%), followed by traders (31; 28.2%), self-employed individuals (27; 24.5%), civil servants (10; 9.1%), and private-sector/factory employees (9; 8.2%). These findings indicate considerable occupational diversity among respondents' husbands, with *other occupations* representing the largest category.

Table 6.

Respondent Characteristics by Wife's Current Occupation

Wife's occupation	f	%
Civil servant	11	10.0
Private-sector/factory employee	4	3.6
Self-employed	7	6.4
Trader	10	9.1
Other	78	70.9

As shown in Table 6, most respondents' wives were classified under *other occupations* (78; 70.9%). This was followed by civil servants (11; 10.0%), traders (10; 9.1%), self-employed individuals (7; 6.4%), and private-sector/factory employees (4; 3.6%). Thus, most wives were engaged in occupations outside the specified categories of civil servant, private-sector/factory employee, self-employed, or trader.

Table 7.

Patient Characteristics by Duration of Diabetes Mellitus

Duration of diabetes mellitus	f	%
<5 years	71	64.5
5–10 years	38	34.5
>10 years	1	0.9

As shown in table 7, most patients had been living with diabetes mellitus for <5 years (71; 64.5%). A further 38 patients (34.5%) had had diabetes for 5–10 years, whereas only 1 patient (0.9%) had had the condition for >10 years. Therefore, the majority of patients in this study had a diabetes duration of less than 5 years.

Table 8.

Patient Characteristics by Diabetes-Related Complications

Complication	f	%
Neuropathy	81	73.6
Visual impairment	31	28.2
Wound	10	9.1
Renal impairment	0	0.0
Other complications	7	6.4
No documented complications	7	6.4

Neuropathy was the most frequently reported complication, affecting 81 patients (73.6%). Visual impairment was reported in 31 patients (28.2%), wounds in 10 patients (9.1%), and other complications in 7 patients (6.4%). No patients had documented renal impairment (0.0%), while 7 patients (6.4%) had no documented complications. These findings indicate that neuropathy was the predominant complication among the patients included in this study. Because a patient could have

more than one type of complication (Jubair et al., 2026), the percentages across complication categories do not necessarily sum to 100%.

Hypothesis Testing

The hypothesis was tested using a *t*-test of the regression coefficient for *Family-Centered Care*.

Table 9.

Regression Coefficient for the Association Between Family-Centered Care and Family Independence

Predictor	B	SE	β	t	95% CI for B	p
<i>Family-Centered Care</i>	1.343	0.076	0.862	17.642	1.192–1.494	<0.001

The results showed that *Family-Centered Care* was positively associated with family independence, with an unstandardized regression coefficient of $B = 1.343$ ($SE = 0.076$). The *t*-test indicated that this coefficient was statistically significant ($t = 17.642$, $p < 0.001$). Because $p < 0.05$, the null hypothesis was rejected and the alternative hypothesis was supported. Thus, higher levels of *Family-Centered Care* were significantly associated with higher levels of family independence among families caring for patients with diabetes mellitus. The unstandardized coefficient ($B = 1.343$) indicates that a one-point increase in the FCC score was associated with an average increase of approximately 1.343 points in the family independence score, assuming the measurement scales remained constant. The 95% confidence interval for the regression coefficient ranged from 1.192 to 1.494 and did not include zero, further supporting the statistical significance of the observed association.

DISCUSSION

Association Between Family-Centered Care and Family Independence

The findings of this study demonstrated a positive and statistically significant association between *Family-Centered Care* (FCC) and family independence in caring for patients with diabetes mellitus at Limboto Public Health Center. The *t*-test of the regression coefficient yielded $B = 1.343$, $SE = 0.076$, $\beta = 0.862$, $t = 17.642$, $p < 0.001$, and a 95% CI of 1.192–1.494. The positive regression coefficient indicates that higher FCC scores were associated with higher family independence scores. This finding suggests that families who perceived higher-quality professional support tended to demonstrate greater capacity to provide care for family members with diabetes mellitus.

This finding is consistent with evidence regarding the importance of family involvement in diabetes management. Busebaia et al. concluded that families play an important role in supporting adherence to self-care management practices among patients with T2DM (Busebaia et al., 2023). Tang et al. also demonstrated that family support contributes to diabetes self-management through mechanisms involving family functioning and family self-efficacy (Tang et al., 2023). A strong association between family support and self-care has likewise been reported by Zeren and Canbolat (Zeren & Canbolat, 2023). Thus, the findings from Limboto Public Health Center are consistent with international evidence indicating that the capacity of families to support disease management represents an important component of diabetes care.

The findings of Zhu et al. provide further insight into this potential mechanism. Their study demonstrated pathways linking family functioning, family support, self-management behaviors, and quality of life among patients with T2DM (Zhu et al., 2024). These findings suggest that the family functions as an interconnected system; the ability of one family member to provide support is influenced by communication, role distribution, family functioning, and available family resources. In the present study, FCC may have provided a care environment in which families received information, support, and opportunities to participate, thereby facilitating the development of their caregiving capacity.

FCC as a Mechanism for Family Empowerment

FCC is fundamentally more than the presence of family members during healthcare encounters. It requires a partnership among healthcare professionals, patients, and families. The ICE-FPSQ

conceptualizes professional support for families through two primary components: cognitive and emotional support (Sveinbjarnardottir et al., 2012). Cognitive support enables families to acquire knowledge, understand health problems, consider available options, and develop strategies to address caregiving needs. Emotional support, meanwhile, may help families feel recognized, heard, and supported while performing their caregiving roles.

These mechanisms may help explain the positive association between FCC and family independence observed in this study. When families receive clear information about the disease, treatment, lifestyle modifications, health monitoring, and warning signs, they have a stronger knowledge base from which to make appropriate decisions and perform caregiving activities. At the same time, emotional support may strengthen families' confidence and readiness to cope with the demands of caregiving. Consequently, family-oriented care has the potential to transform the family's role from that of a passive recipient of instructions into an active partner in the care process.

This concept is consistent with the systematic review by Allen et al., which identified patient and family empowerment, emotional and social involvement, and responsiveness to individual needs as important elements of patient- and family-centered care (Allen et al., 2022). Kiwanuka et al. likewise demonstrated that nurse-led family interventions, particularly those involving education, communication, information provision, and emotional support, can improve various family-related outcomes (Kiwanuka et al., 2022). Meanwhile, Joo et al. identified participation and information sharing as two of the most frequently incorporated components of patient- and family-centered care interventions (Joo et al., 2024).

Consistency with Family-Based Interventions for Diabetes

The positive association identified in this study is also supported by evidence from interventional research. A meta-analysis by Zhang et al. demonstrated that family-based interventions can improve several diabetes-management outcomes, including positive family support, self-care behaviors, and self-efficacy (Zhang et al., 2022). Teli et al. reported beneficial effects of family-based interventions on HbA1c control among patients with T2DM (Teli et al., 2024), while Matrook et al. found more pronounced benefits in some interventions delivered directly by nurses (Matrook et al., 2025). These findings are particularly relevant to the context of Limboto Public Health Center because nurses are among the healthcare professionals who maintain ongoing contact with patients and their families. Nurses can not only provide information but also assess family capacity, caregiving barriers, role distribution, educational needs, and the family's ability to participate in health-related decision-making. Mansour et al. demonstrated that family-centered education improved medication adherence and glycemic indicators (Mansour et al., 2023). Withidpanyawong et al. found that interventions involving active participation by family members improved knowledge, family support, treatment adherence, self-management, and self-efficacy (Withidpanyawong et al., 2019). Shi et al. also reported that family involvement among patients newly diagnosed with T2DM produced long-term benefits in knowledge, attitudes, health practices, quality of life, and glycemic control (Shi et al., 2016). These findings suggest that family involvement may generate benefits through processes of learning and reinforcement of family capabilities. Therefore, the association between FCC and family independence observed in this study is supported by a substantial empirical foundation. Although this study used a cross-sectional design and did not evaluate an intervention, the findings are consistent with the possibility that a more family-oriented care environment is associated with greater family capacity to perform caregiving functions.

The Role of Empowerment and Technology in Strengthening Family Capacity

FCC can extend beyond face-to-face interactions. Shahabi et al. demonstrated that telenursing based on a family empowerment model improved dietary adherence among patients with T2DM (Shahabi et al., 2022). This finding suggests that nursing support for families can be sustained through remote communication, particularly to facilitate continuity of care after patients return home. Amani et al.

likewise demonstrated that a family-centered empowerment program improved illness acceptance and self-management among patients with T2DM (Amani et al., 2025). These findings reinforce the view that family involvement should extend beyond information provision to encompass empowerment processes that enable patients and families to identify problems, make decisions, develop skills, and evaluate the effectiveness of their actions. In primary healthcare settings, this approach could be implemented through family education, home visits, scheduled consultations, telephone or digital communication, and follow-up for families requiring more intensive support. However, implementation should take into account the resources available at the public health center and the individual needs of each family.

The Role of Healthcare Professionals in Family-Centered Care

The quality of FCC implementation depends substantially on the preparedness of healthcare professionals and the organizational context in which care is delivered. A systematic review by Alqarawi and Alhalal indicated that the implementation of FCC by nurses is influenced by nurse-related characteristics, family characteristics, the quality of healthcare professional–family relationships, and organizational factors (Alqarawi & Alhalal, 2024). This suggests that improving family independence cannot be achieved simply by asking families to become "more involved"; healthcare professionals must also create conditions that enable meaningful participation. In diabetes care at public health centers, nurses can identify the family member most involved in caregiving, assess information needs, explain treatment goals, discuss barriers faced by the family, and provide opportunities for family members to participate in care planning. This approach is consistent with evidence that nurse-led interventions involving families can improve family-related outcomes (Kiwanuka et al., 2022) and that information sharing and participation are important components of family-centered care (Joo et al., 2024). However, effective implementation of FCC requires appropriate measurement. In their systematic review of 15 family-focused care instruments, Benbelkheir et al. emphasized that measurement instruments should be appropriate to the respondents' perspective, clinical context, and specific FCC construct being assessed (Benbelkheir et al., 2026). The present study adopted the family members' perspective; therefore, measuring perceived professional support from the family's perspective was appropriate for evaluating the quality of FCC.

Interpretation of Respondent Characteristics

Most respondents in this study were women (77.3%), while the most common family relationships were wives (35.5%) and children (34.5%). These characteristics indicate that caregivers in the sample predominantly came from the patient's immediate family. Withidpanyawong et al. reported that involvement of spouses and female family members may represent an important component of successful family-based diabetes interventions (Withidpanyawong et al., 2019). However, this study did not examine differences in family independence according to sex or family relationship. Therefore, these characteristics should be interpreted solely as features of the study sample and not as evidence that female caregivers or wives have greater family independence. Most respondents had completed senior high school (46.4%), followed by those with a bachelor's degree or higher (31.8%). Zhu et al. reported that educational attainment was associated with self-management behaviors among patients with T2DM (Zhu et al., 2024). Education may theoretically influence an individual's ability to understand health information; however, education was not examined as a predictor of family independence in the present study. Therefore, such an association cannot be directly inferred from the current findings.

Clinical Context and Complexity of Patient Care

A total of 64.5% of the patients had been living with diabetes for less than five years. This indicates that most families in the sample were at a relatively early stage of the chronic disease trajectory. During this period, families need to establish sustainable disease-management routines, understand treatment regimens, implement lifestyle modifications, and recognize potential complications. Neuropathy was the most frequently documented complication in the sample (73.6%), followed by visual impairment (28.2%) and wounds (9.1%). The presence of complications increases the

complexity of home-care needs and may increase patients' dependence on family assistance. Evidence from family-based interventions suggests that family involvement can support various aspects of disease management and self-care behaviors (Zhang et al., 2022; Matrook et al., 2025). However, this study did not examine diabetes duration or complications as predictors of family independence. Therefore, these clinical characteristics are presented only to provide context regarding the potential caregiving burden and should not be interpreted as evidence that neuropathy or diabetes duration causes changes in family independence.

Implications of the Findings in Light of Current Evidence

The findings of this study become particularly relevant when considered alongside recent evidence regarding the quality of family involvement. Gu et al. demonstrated that supportive family involvement was positively associated with self-management and glycemic control, whereas unsupportive family behaviors did not demonstrate the same benefits (Gu et al., 2026). This finding emphasizes that family involvement alone is insufficient; the form, quality, and manner of involvement must also be appropriately structured. For FCC, this implies that nurses should help families develop supportive behaviors rather than simply increase the frequency of family involvement. Interactions characterized by excessive control, criticism, or conflict may have different consequences from support that provides information, encouragement, recognition, and assistance tailored to patients' needs (Busebaia et al., 2023; Gu et al., 2026). Accordingly, the findings of this study can be understood within a framework in which FCC provides a healthcare process that may strengthen the quality of family involvement. Effective communication, cognitive support, emotional support, collaboration, and empowerment are components that may help families develop greater capacity for independent caregiving (Sveinbjarnardottir et al., 2012; Benbelkheir et al., 2026).

Implications for Nursing Practice

The findings support the integration of a *Family-Centered Care* approach into routine diabetes care at public health centers. Nurses should identify the primary family caregiver, assess family capabilities and needs, and involve family members in care planning and evaluation. Education should be directed not only toward patients but also toward family members who are directly involved in diabetes management. Educational content may include treatment, diet, physical activity, recognition of complications, foot care, health monitoring, and indications for seeking healthcare services. Evidence from family-based studies indicates that education, empowerment, emotional support, and active family involvement may produce better outcomes than care that does not adequately consider the family context keluarga (Zhang et al., 2022; Amani et al., 2025). Public health centers may also consider family follow-up through home visits and telenursing, particularly for families facing complex caregiving needs (Shahabi et al., 2022). Family caregiving competence or independence may be considered as an additional outcome of nursing care for chronic disease management.

CONCLUSION

Family-Centered Care was positively and significantly associated with family independence in caring for patients with diabetes mellitus at Limboto Public Health Center. The t-test of the regression coefficient yielded $B = 1.343$, $SE = 0.076$, $\beta = 0.862$, $t = 17.642$, $p < 0.001$, and a 95% CI of 1.192–1.494. These findings indicate that higher FCC scores were associated with higher levels of family independence. The findings support strengthening family involvement in primary diabetes care through cognitive and emotional support, effective communication, education, participation, and family empowerment.

REFERENCES

- Allen, D., Scarinci, N., & Hickson, L. (2022). Effects of Patient- and Family-Centered Care for Young Adults With Chronic Health Conditions and Their Family Members: A Systematic Review. *Emerging Adulthood*, 10(3), 689–701. <https://doi.org/10.1177/2167696819883458>
- Alqarawi, N., & Alhalal, E. (2024). Factors affecting family-centered care practice by nurses: A

- systematic review. *Journal of Pediatric Nursing*, 78, 158–171. <https://doi.org/10.1016/j.pedn.2024.06.008>
- Amani, N., Nazari, A. M., Sanaie, N., Abbasi, A., & Borhani, F. (2025). Effects of family-centered empowerment program on illness acceptance and self-management of patients with type 2 diabetes: a randomized controlled trial. *Scientific Reports*, 15(1), 21615. <https://doi.org/10.1038/s41598-025-05833-0>
- Benbelkheir, B., Canga-Armayor, A., Alfaro-Diaz, C., Canga-Armayor, N., Pueyo-Garrigues, M., Svavarsdottir, E. K., & Esandi, N. (2026). Instruments to Assess Family Focused Care in Nursing Clinical Practice: A Systematic Review of Psychometric Properties. *Journal of Clinical Nursing*, 35(1), 7–32. <https://doi.org/10.1111/jocn.70016>
- Busebaia, T. J. A., Thompson, J., Fairbrother, H., & Ali, P. (2023). The role of family in supporting adherence to diabetes self-care management practices: An umbrella review. *Journal of Advanced Nursing*, 79(10), 3652–3677. <https://doi.org/10.1111/jan.15689>
- Erdfelder, E., FAul, F., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>
- Gu, S., Zhang, N., Shen, F., Zhou, Y., Yang, W., Song, B., & Wang, X. (2026). The Relationships Among Family Involvement, Diabetes Self-Management and Glycaemic Control in Patients With Type 2 Diabetes: A Cross-Sectional Study. *Journal of Advanced Nursing*, 82(3), 2203–2215. <https://doi.org/10.1111/jan.17066>
- Hidayati, N., Widyawati, I. Y., Suarilah, I., Astuti, T. P., Tsanifiandi, F., & Suraya, A. S. (2024). Diagnostic Accuracy of Artificial Intelligence-Based Systems for Detecting Diabetic Retinopathy: A Systematic Review. *Indonesian Journal of Global Health Research*, 7(1), 21–36. <https://doi.org/10.37287/ijghr.v7i1.4011>
- Jannah, F., Safutra Suraya, A., Erindia, F., Nurwahidah, N., & Chayatush Sholichah, A. (2023). The Benefits of Telehealth on Quality of Life of People Living with Type 2 Diabetes Mellitus: A Literature Review. *Fundamental and Management Nursing Journal*, 6(2), 69–77. <https://doi.org/10.20473/fmnj.v6i2.48692>
- Jannah, F., Sriyono, S., Armini, N. K. A., & Suraya, A. S. (2024). Use of Insole Design Footwear To Prevent Risk of Foot Ulcers in Diabetes Patients: a Systematic Review. *Indonesian Nursing Journal of Education & Clinic (INJEC)*, 9(2), 109–121. <https://doi.org/10.24990/injec.v9i2.670>
- Joo, Y., Jang, Y., & Kwon, O. Y. (2024). Contents and effectiveness of patient- and family-centred care interventions in adult intensive care units: A systematic review. *Nursing in Critical Care*, 29(6), 1290–1302. <https://doi.org/10.1111/nicc.13105>
- Jubair, S. D. A., Damansyah, H., & Suraya, A. S. (2026). Analisis Faktor Risiko Kejadian Infeksi Luka Pada Pasien DM Tipe 2 Di Rumah Sakit Umum Daerah Toto Kabila. 8(Dm), 2806–2818. <https://doi.org/10.61878/bnj.v8i2.925>
- Kiwanuka, F., Sak-Dankosky, N., Alemayehu, Y. H., Nanyonga, R. C., & Kvist, T. (2022). The evidence base of nurse-led family interventions for improving family outcomes in adult critical care settings: A mixed method systematic review. *International Journal of Nursing Studies*, 125, 104100. <https://doi.org/10.1016/j.ijnurstu.2021.104100>
- Llorente Pérez, Y. J., Herrera Herrera, J. L., Oyola López, E., Romero Guzmán, I. R., & Franco Zuluaga, X. E. (2026). Self-Efficacy and Caregiving Competence in Family Caregivers of Patients Undergoing Renal Replacement Therapy: A Correlational Study. *Nursing Reports (Pavia, Italy)*, 16(2). <https://doi.org/10.3390/nursrep16020073>
- Mansour, M., Parizad, N., & Hemmati Maslakkpak, M. (2023). Does family-centred education improve treatment adherence, glycosylated haemoglobin and blood glucose level in patients with type 1 diabetes? A randomized clinical trial. *Nursing Open*, 10(4), 2621–2630. <https://doi.org/10.1002/nop2.1522>
- Matrook, K. A., Whitford, D. L., Smith, S. M., McGilloway, S., Piyasena, M. P., & Cowman, S. (2025). Family-based interventions for adults with type 2 diabetes mellitus: A systematic review and meta-analysis. *Primary Care Diabetes*, 19(2), 111–119. <https://doi.org/10.1016/j.pcd.2025.01.006>

- Ong, K. L. (2023). Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet* (London, England), 402(10397), 203–234. [https://doi.org/10.1016/S0140-6736\(23\)01301-6](https://doi.org/10.1016/S0140-6736(23)01301-6)
- Shahabi, N., Kolivand, M., Salari, N., & Abbasi, P. (2022). The effect of telenursing training based on family-centered empowerment pattern on compliance with diet regimen in patients with diabetes mellitus type 2: a randomized clinical trial. *BMC Endocrine Disorders*, 22(1), 36. <https://doi.org/10.1186/s12902-022-00953-4>
- Shi, M., Xu, M.-Y., Liu, Z.-L., Duan, X.-Y., Zhu, Y.-B., Shi, H.-M., Jiang, B., Zhang, X.-M., & Yu, X.-H. (2016). Effectiveness of family involvement in newly diagnosed type 2 diabetes patients: a follow-up study. *Patient Education and Counseling*, 99(5), 776–782. <https://doi.org/10.1016/j.pec.2015.12.018>
- Suleman, R. P., Febriyona, R., Gobel, I. A., & Andi Safutra Suraya. (2026). The Relationship between Family Support and Compliance with Taking Medication in Diabetes Mellitus Patients in the Working Area of the Tungoi Health Center. *International Journal of Health, Economics, and Social Sciences (IJHESS)*, 8(2), 1418–1425. <https://doi.org/10.56338/mppki.v6i2.3023>
- Suraya, A. S., Ninuk, D. K., Herdina, M., & Ira, S. (2024). A systematic review of efficacy on larva debridement in diabetic foot ulcers. *Healthcare in Low-Resource Settings*, 12(2), 63–74. <https://doi.org/10.4081/hls.2024>
- Sveinbjarnardottir, E. K., Svavarsdottir, E. K., & Hrafnkelsson, B. (2012). Psychometric development of the Iceland-Family Perceived Support Questionnaire (ICE-FPSQ). *Journal of Family Nursing*, 18(3), 328–352. <https://doi.org/10.1177/1074840712449203>
- Tang, R., Luo, D., Li, B., Wang, J., & Li, M. (2023). The role of family support in diabetes self-management among rural adult patients. *Journal of Clinical Nursing*, 32(19–20), 7238–7246. <https://doi.org/10.1111/jocn.16786>
- Teli, M., Thato, R., Hasan, F., & Rias, Y. A. (2024). Effectiveness of Family-Based Diabetes Management Intervention on Glycated Haemoglobin Among Adults With Type 2 Diabetes: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Biological Research for Nursing*, 26(2), 315–333. <https://doi.org/10.1177/10998004231218887>
- Withidpanyawong, U., Lerkiatbundit, S., & Saengcharoen, W. (2019). Family-based intervention by pharmacists for type 2 diabetes: A randomised controlled trial. *Patient Education and Counseling*, 102(1), 85–92. <https://doi.org/10.1016/j.pec.2018.08.015>
- Yulia, Y., Andi, S. S., Nia, P., Alfian, B. I., Neisya, P. S., Nanik, L., & Nurul, I. (2026). Keperawatan berbasis bukti: Promosi dan Pencegahan untuk Penyakit Tidak Menular (PTM). In Achmad Wahdi (Ed.), Dewa Publishing. Dewa Publishing.
- Zeren, F. G., & Canbolat, O. (2023). The relationship between family support and the level of self care in type 2 diabetes patients. *Primary Care Diabetes*, 17(4), 341–347. <https://doi.org/10.1016/j.pcd.2023.04.008>
- Zhang, H., Zhang, Q., Luo, D., Cai, X., Li, R., Zhang, Y., Lu, Y., Liu, J., Gu, J., & Li, M. (2022). The effect of family-based intervention for adults with diabetes on HbA1c and other health-related outcomes: Systematic review and meta-analysis. *Journal of Clinical Nursing*, 31(11–12), 1488–1501. <https://doi.org/10.1111/jocn.16082>
- Zhu, L., Pan, Z., Shen, F., Shen, Y., & Zhang, W. (2024). Effects of family support system on the self-management behaviour of patients with T2DM: a multi-centre cross-sectional study in community settings. *Family Practice*, 41(2), 114–122. <https://doi.org/10.1093/fampra/cmae010>