

## Impact of Skip Generation Family Structure on Diabetes Mellitus Treatment Outcomes at a Primary Care Unit in Khon Kaen Province

### Abstract

**Background:** Self-care is an essential component of diabetes mellitus (DM) treatment and often depends heavily on family support. In skip generation families, children's grandparents are their primary caretakers, many of whom have chronic diseases such as DM. The objective of this study was to determine the proportion of DM patients receiving treatment at a primary care unit in Khon Kaen Province in the skip generation families and the effects of this family structure on clinical indicators of treatment outcomes. **Methods:** This was a prospective descriptive study in DM patients who visited a primary care unit in Khon Kaen Province from July to October 2019. Patients were asked to fill out a questionnaire interviewed, and demographic and clinical data were analyzed. **Results:** This study included 202 participants. We found that 11.4% of patients were in skip generation families, 91.3% of whom were elderly. We found no statistically significant association between family structure and either self-care practices or clinical indicators of treatment outcomes. **Conclusions:** Neither clinical indicators of treatment outcomes nor self-care practices differed between DM patients in skip generation families and those with other family structures. However, additional studies should be conducted to examine other possible factors, such as the age of the grandchildren of whom patients are the primary caretakers.

**Keywords:** *Diabetes mellitus, family characteristics, primary care*

### Introduction

Diabetes mellitus (DM) is global public health problem,<sup>[1]</sup> with the number of patients increasing around the world. It was estimated that in the year 2019, there will be approximately 463 million people with diabetes mellitus aged 20–79 years, most of whom are elderly.<sup>[2]</sup> Complications from DM can lead to premature death, and these elderly patients are especially vulnerable,<sup>[3]</sup> making lifestyle modifications and medication to control blood sugar levels in this population especially important.<sup>[4]</sup>

Caring of the patients with DM, which is chronic disease, consist of many components including patients care team and the patients themselves.<sup>[5]</sup> Self-care, a key component to blood sugar control in DM patients,<sup>[6,7]</sup> depends on many factors such as awareness of the disease and the patient's life context (consisting of family, work, and social support). Previous studies have found that the family members of DM patients influence their self-care practices<sup>[8]</sup> and that having adequate family support

is associated with better diet control and exercise habits in these patients.<sup>[9]</sup> At present, family structure varies greatly from household to household in Thailand, partly due to changing lifestyles and economic needs. Common families structures in Thailand include nuclear, extended, and skip generation families. Because economic development in Thailand has been concentrated in large cities, rural-to-urban labor migration is a common practice, often leaving children and the elderly at home. This leads to many children being raised by their grandparents, especially in the relatively poor regions of the north and northeast.<sup>[10]</sup>

The elderly is often ill-suited to be the primary caretakers of young children due to health deterioration and underlying disease. However, economic hardship and the resulting labor migration make this the most feasible option for many families.<sup>[11]</sup> Because of this, many of these elderly family members are "left behind" with chronic illness, negatively impacting their health.<sup>[12-14]</sup> Nowadays, there is no study evaluating the association between the family patterns and treatment outcomes

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: [WKHLRPMedknow\\_reprints@wolterskluwer.com](mailto:WKHLRPMedknow_reprints@wolterskluwer.com)

**How to cite this article:** Teprungsirikul K, Luvira V. Impact of skip generation family structure on diabetes mellitus treatment outcomes at a primary care unit in Khon Kaen province. *Int J Prev Med* 2022;13:118.

Kittima  
Teprungsirikul,  
Varisara Luvira

*Department of Community  
Medicine, Faculty of Medicine,  
Khon Kaen University, Khon  
Kaen, Thailand*

### Address for correspondence:

Dr. Varisara Luvira,  
Address Department of  
Community Medicine,  
Faculty of Medicine,  
Khon Kaen University,  
Khon Kaen, Thailand.  
E-mail: [varisara\\_111@yahoo.com](mailto:varisara_111@yahoo.com)

### Access this article online

**Website:**  
[www.ijpvmjournal.net/www.ijpvm.ir](http://www.ijpvmjournal.net/www.ijpvm.ir)

**DOI:**  
10.4103/ijpvm.IJPVM\_543\_20

### Quick Response Code:



of the diabetes mellitus patients. The study, thus, aim to investigated outcome of the patients in skip generation families receiving treatment for DM and whether family structure was related to their self-care practices or clinical indicators of treatment outcomes. This information may applicable in primary care units providing healthcare for (especially elderly) DM patients.

## Methods

This was a prospective descriptive study in DM patients who visited a primary care unit in Khon Kaen Province from July to October 2019. We included patients treated at a primary care unit in Khon Kaen who had been diagnosed with type 2 diabetes mellitus for at least 3 months and were willing to participate in the study, able to understand and communicate in Thai, and older than 18 years of age. Emergency patients, those who were unable to provide information, and those with brain or psychiatric disorders were excluded. Patients were enrolled in the study after providing written consent. Data regarding demographics and illnesses were obtained through interviews

with patients and examination of their medical records. This research was approved by the Khon Kaen University Office of Human Research Ethics Institutional Review Board (HE621113) approve on 11 September 2019.

We defined a skip generation family as one in which the grandparents and grandchildren live together, whereas the parents of the grandchildren do not live in the same household for at least 6 months. The clinical indicators of treatment outcomes in patients with DM are as follows: HbA1C <7% (7.5% in patients aged 65 years or over with comorbidity), low-density lipoprotein (LDL) cholesterol <100 mg/dL, high-density lipoprotein (HDL) cholesterol  $\geq$ 40 mg/dL for men or  $\geq$ 50 mg/dL for women, systolic BP <140 mmHg, diastolic BP <90 mmHg, body mass index 18.5–22.9 kg/m<sup>2</sup>, waist circumference <90 cm for men and <80 cm for women, abstinence from smoking, and lack of DM complications.

Analysis was performed using STATA 10. Descriptive and inferential statistics (Chi-square test and logistic regression

**Table 1: Demographic data by family type**

Demographic data	Nuclear family (n=70), n (%)	Extended family (n=109), n (%)	Skip generation family (n=23), n (%)
Sex			
Male	33 (47.1)	27 (24.8)	3 (13)
Female	37 (52.9)	82 (75.2)	20 (87)
Age group (years)			
30-39	2 (2.9)	1 (0.9)	0 (0)
40-49	4 (5.7)	5 (4.6)	0 (0)
50-59	22 (31.4)	17 (15.6)	2 (8.7)
60-69	20 (28.6)	37 (33.9)	5 (21.7)
70-79	21 (30.0)	40 (36.7)	12 (52.2)
$\geq$ 80	1 (1.4)	9 (8.3)	4 (17.4)
Level of education			
Primary school (incomplete)	1 (1.4)	3 (2.8)	1 (4.3)
Primary school	34 (48.6)	78 (71.6)	12 (52.2)
Junior high school	10 (14.3)	7 (6.4)	1 (4.3)
High school	12 (17.1)	9 (8.3)	5 (21.7)
High vocational certificate	4 (5.7)	3 (2.8)	0 (0)
Bachelor's degree	6 (8.6)	7 (6.4)	2 (8.7)
Master's Degree	1 (1.4)	1 (0.9)	0 (0)
PhD	0 (0)	0 (0)	0 (0)
Others	2 (2.9)	1 (0.9)	2 (8.7)
	0 (0)	0 (0)	0 (0)
Occupation			
Employed	37 (52.9)	45 (41.3)	5 (21.7)
Unemployed	33 (47.1)	64 (58.7)	18 (78.3)
Comorbidity			
Hypertension	50 (71.4)	87 (79.8)	21 (91.3)
Dyslipidemia	38 (54.3)	46 (42.2)	11 (47.8)
Gout	4 (5.7)	2 (1.8)	0 (0)
Others	18 (25.7)	18 (16.5)	6 (26.1)

analysis) were used to investigate relationships among variables. A *P* value <0.05 was considered statistically significant.

## Results

### Demographic data

The mean age of the 202 participants enrolled in this study was 65.87 years ( $\pm 10.08$  standard deviation), 68.8% were female, 59.6% were unemployed, and 61.4% had attained a primary education.

A total of 54% of patients were in extended families, and 11.4% were in skip generation families. Compared to patients in nuclear and extended families, those in skip

generation families were more likely to be female, older, unemployed, and to have higher blood pressure [Table 1].

### Family structure, clinical indicators of diabetes mellitus treatment outcomes, and self-care practices

There were no differences in terms of clinical indicators of treatment outcomes or self-care practices of patients in nuclear, extended, and skip generation families, except for HCL level. The patients from extended family were associated with poor controls of HDL level (odd ration 0.48; 95% confidence interval, CI: 0.26–0.88) [Table 2].

We carried out a univariate analysis of six variables (i.e., age, gender, level of education, occupational status, comorbidity, and family pattern), for determining

**Table 2: Clinical indicators of treatment outcomes and self-care practices of patients with diabetes mellitus by family type**

Variable	Family type	Achieved outcomes		<i>P</i>
		Percent	Odd ratio	
HbA1C	Nuclear family	31.4	1	0.100
	Extended family	45.0	1.78 (0.95, 3.35)	
	Skip generation	52.2	2.38 (0.91, 6.22)	
Low-density lipoprotein (LDL)	Nuclear family	27.1	1	0.800
	Extended family	28.4	1.07 (0.55, 2.09)	
	Skip generation	21.7	0.75 (0.24, 2.29)	
High-density lipoprotein (HDL)	Nuclear family	61.4	1	0.056
	Extended family	43.1	0.48 (0.26, 0.88)	
	Skip generation	56.5	0.68 (0.27, 1.77)	
Systolic blood pressure	Nuclear family	67.1	1	0.811
	Extended family	67.9	1.03 (0.55, 1.96)	
	Skip generation	60.9	0.76 (0.29, 2.02)	
Diastolic blood pressure	Nuclear family	94.3	1	0.523
	Extended family	96.3	1.59 (0.38, 6.58)	
	Skip generation	100	1	
Body mass index	Nuclear family	41.4	1	0.810
	Extended family	37.6	0.85 (0.46, 1.57)	
	Skip generation	34.8	0.75 (0.28, 2.01)	
Waist circumference	Nuclear family	44.3	1	0.821
	Extended family	41.3	0.88 (0.48, 1.62)	
	Skip generation	47.8	1.15 (0.45, 2.97)	
Smoking	Nuclear family	91.4	1	0.285
	Extended family	95.4	1.95 (0.57, 6.65)	
	Skip generation	100	1	
Complications	Nuclear family	60.0	1	0.339
	Extended family	70.6	1.60 (0.85, 3.02)	
	Skip generation	65.2	1.25 (0.47, 3.34)	
Follow-up	Nuclear family	90.0	1	0.924
	Extended family	91.7	1.23 (0.44, 3.48)	
	Skip generation	91.3	1.17 (0.22, 6.06)	
Exercise	Nuclear family	34.3	1	0.883
	Extended family	35.8	1.07 (0.57, 2.01)	
	Skip generation	30.4	0.84 (0.30, 2.32)	
Medication compliance	Nuclear family	85.7	1	0.302
	Extended family	92.7	2.10 (0.79, 5.62)	
	Skip generation	87.0	1.11 (0.28, 4.44)	

HDL: High-density lipoprotein; LDL: Low-density lipoprotein

factors affecting HbA1C level of the patients. Several factors were significant factors for well-controlled HbA1C level, including age and occupational status. The significant prognostic factors determined by univariate analysis were then further analyzed via a multivariate analysis. There were no factors associated with well-controlled HbA1C level [Table 3].

### Discussion

This was the first study to examine the possible association between the skip generation family structure and DM treatment outcomes. We found that 11.4% of DM patients in the primary care unit we investigated were in skip generation families, most of whom were elderly. This contrasts with the findings of a 2012 survey, which found that 21% of Thai children aged 0–4 years were not living with their parents (a proportion that was even higher in the north and northeast).<sup>[10]</sup> This difference may be due to the fact that our study was conducted in the most economically prosperous province in the northeast region. Moreover, we did not collect information with regard to the age of the grandchildren. Often the parents of young children will work in other areas and eventually return when their children are older, making households with young children more likely to be skipping generation families.

We found no differences in terms of self-care practices or clinical indicators of treatment outcomes among nuclear, extended, and skip generation families. This is consistent with the results of the previous reports. Adhikari *et al.*<sup>[15]</sup> found that the outmigration of elderly parents “adult children had a negative effect on the parent’s mental health but did not affect their physical health”. Ghimire *et al.*,<sup>[16]</sup> studied on the health outcomes of the “left-behind elderly patients,” also reported that no association between inverse health outcomes and the “left behind” status.<sup>[16]</sup> However, the research was not conducted among the elderly who had

to raise grandchildren because the parents of grandchildren departed to work in other countries.

The results of this study contrasted with those that found that family support (which is often poor in skip generation families) were related to better diet control and exercise practices in DM patients.<sup>[9]</sup> This difference may also be due to our lack of data collection with regard to the age of the grandchildren being cared for. Grandparents looking after young children often have poorer family support and a higher burden of care than those looking after older children.<sup>[17]</sup>

We found that patients in skip generation families were more likely to have well-controlled HbA1C, but this difference was not statistically significant. This may be due to the grandchildren being older, in which case patients would be more likely to have better family support.<sup>[9]</sup> However, patients raising young children are likely to be busier, causing them to neglect proper dietary practices. This situation may occur in an extended family. However, in a nuclear family type, some families may have one or two family members who are husband and wife. For this reason, the proportion of those controlling HbA1C is less.

There were no differences among groups in terms of exercise, with more than 30% of patients from all three family types exercising regularly (previous studies have found that approximately 30% of DM patients do not exercise regularly<sup>[18,19]</sup>). There was no difference between groups in terms of missing appointments for treatment or examination. This may be due to the fact that most patients lived close to the primary care unit in question, resulting in few travel issues.<sup>[20]</sup> None of the patients in skip generation families were smokers, which may be due to their desire to set a good example for their grandchildren and protect them from the negative health consequences of second-hand smoke.

This was the first study to examine issues in DM patients related to skip generation family structure and did not find any correlation between family type and self-care. Although the study was conducted in a region with a high proportion of skip generation families, the area in which the primary care unit is located has a relatively strong economy, making such families less common than in surrounding provinces. In addition, we did not gather data regarding the age the grandchildren being cared for, which can have a significant impact on the strain endured by the caregiver.

### Conclusions

We found that 11.4% of patients with diabetes mellitus receiving treatment at the primary care unit where the study was conducted were in skip generation families, most of whom were elderly. Skip generation family structure was neither correlated with clinical indicators of treatment outcomes nor self-care practices in DM patients.

**Table 3: Multivariate analysis of the factors affecting HbA1C of the patients**

Factors	Crude HR	Adjusted HR (95% CI)	P
Family pattern			0.209
Nuclear	1		
Extended	1.78	1.57 (0.81-3.05)	
Skip generation	2.38	1.64 (0.59-4.54)	
Age range			0.105
30-39	1		
40-49	0.06	0.06 (0.003-1.52)	
50-59	0.18	0.17 (0.01-2.13)	
60-69	0.32	0.25 (0.02-2.98)	
70-79	0.49	0.34 (0.03-4.13)	
>80	0.90	0.56 (0.04-8.43)	
Occupation			0.212
Employed	1		
Unemployed	2.11	1.42 (0.72-2.78)	

CI, confidence interval; HR, hazard ratio



## Acknowledgments

The authors thank (a) all of the participants for their willingness to attend this project and (c) Mr. Dylan Southard for assistance with the English-language presentation under the aegis of the English consultant KKU, Thailand.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

**Received:** 16 Jan 18 **Accepted:** 21 Sep 21

**Published:** 20 Sep 22

## References

1. Arredondo A, Azar A, Recamán AL. Diabetes, a global public health challenge with a high epidemiological and economic burden on health systems in Latin America. *Glob Public Health* 2018;13:780-7.
2. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, *et al*. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9<sup>th</sup> edition. *Diabetes Res Clin Pract* 2019;157:107843. doi: 10.1016/j.diabres.2019.107843.
3. Saeedi P, Salpea P, Karuranga S, Petersohn I, Malanda B, Gregg EW, *et al*. Mortality attributable to diabetes in 20-79 years old adults, 2019 estimates: Results from the International Diabetes Federation Diabetes Atlas, 9<sup>th</sup> edition. *Diabetes Res Clin Pract* 2020;108086. doi: 10.1016/j.diabres.2020.108086.
4. Mediavilla Bravo JJ. Guidelines for the management of diabetes mellitus type 2. *Semergen* 2014;40(Suppl 4):11-8.
5. Molayaghobi NS, Abazari P, Taleghani F, Iraj B, Etesampour A, Zarei A, *et al*. Overcoming challenges of implementing chronic care model in diabetes management: An action research approach. *Int J Prev Med* 2019;10:13.
6. Modarresi M, Gholami S, Habibi P, Ghadiri-Anari A. Relationship between self care management with glycemic control in type 2 diabetic patients. *Int J Prev Med* 2020;11:127.
7. Sperl-Hillen J, Beaton S, Fernandes O, Von Worley A, Vazquez-Benitez G, Hanson A, *et al*. Are benefits from diabetes self-management education sustained? *Am J Manag Care* 2013;19:104-12.
8. Rosland AM, Heisler M, Choi HJ, Silveira MJ, Piette JD. Family influences on self-management among functionally independent adults with diabetes or heart failure: Do family members hinder as much as they help? *Chronic Illn* 2010;6:22-33.
9. Wen LK, Shepherd MD, Parchman ML. Family support, diet, and exercise among older Mexican Americans with type 2 diabetes. *Diabetes Educ* 2004;30:980-93.
10. Jampaklay A, Tangchonlatip K, Richter K, Nanthamongkolchai S, Lucktong A, Prasithima C. The Impact of Internal Migration on Early Childhood Wellbeing and Development. Bangkok: Mahidol University; 2016.
11. Giles J, Mu R. Elderly parent health and the migration decisions of adult children: Evidence from rural China. *Demography* 2007;44:265-88.
12. Li T, Wu B, Yi F, Wang B, Baležentis T. What happens to the health of elderly parents when adult child migration splits households? Evidence from rural China. *Int J Environ Res Public Health* 2020;17:1609.
13. Falkingham J, Qin M, Vlachantoni A, Evandrou M. Children's migration and lifestyle-related chronic disease among older parents 'left behind' in India. *SSM Popul Health* 2017;3:352-7.
14. Evandrou M, Falkingham J, Qin M, Vlachantoni A. Children's migration and chronic illness among older parents 'left behind' in China. *SSM Popul Health* 2017;3:803-7.
15. Adhikari R, Jampaklay A, Chamrathirong A. Impact of children's migration on health and health care-seeking behavior of elderly left behind. *BMC Public Health* 2011;11:143.
16. Ghimire S, Singh DR, Nath D, Jeffers EM, Kaphle M. Adult children's migration and well-being of left behind nepalese elderly parents. *J Epidemiol Glob Health* 2018;8:154-61.
17. Umemura T, Jacobvitz D, Messina S, Hazen N. Do toddlers prefer the primary caregiver or the parent with whom they feel more secure? The role of toddler emotion. *Infant Behav Dev* 2013;36:102-14.
18. Nelson KM, Reiber G, Boyko EJ. Diet and exercise among adults with type 2 diabetes: Findings from the third national health and nutrition examination survey (NHANES III). *Diabetes Care* 2002;25:1722-8.
19. Morrato EH, Hill JO, Wyatt HR, Ghushchyan V, Sullivan PW. Physical activity in U.S. adults with diabetes and at risk for developing diabetes, 2003. *Diabetes Care* 2007;30:203-9.
20. Syed ST, Gerber BS, Sharp LK. Traveling towards disease: Transportation barriers to health care access. *J Community Health* 2013;38:976-93.