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Priority analysis of factors affecting family planning practices among Ethiopians using a decision tree analysis

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Abstract

This study aimed to identify the priorities of the factors affecting family planning practices in Ethiopia, with the ultimate aim of providing evidence to the Ethiopian government and international organizations for establishing family planning policies or family planning-related project plans. Multi-stage, clustered, stratified random sampling was performed on a total of 35,479 men aged above 15 years and women of childbearing age (15–49 years) in two metropolitan cities and five regions of Ethiopia. The survey was conducted by face-to-face interview using Tablet PC, and 25,972 responses, excluding censored data were included in the final analysis. The collected data were first analyzed using the Pearson chi-square test, independent sample t-test, and F-test with the Tukey HSD method as a post-hoc. Second, a decision-making tree analysis was conducted to identify priority factors affecting the decision to implement family planning The primary factor affecting the family planning practice was 'spouse or sexual partner's support for family planning (P<.001)'. 'Region (p<.001)' was the second priority factor for both the group receiving 'support for family planning by spouse or partner' and the group not receiving it. The third priority factors appeared differed by region in both groups. It is necessary to establish family planning policy and program plans targeting both men and women, and participation of religious and community leaders is considered important in the establishment process. In addition, it is considered necessary to enhance the professionalism by dividing the education and evaluation process for HEW to provide high-quality counseling, education, and services on family planning at the community level. *(Afr J Reprod Health 2023; 27 [5s]: 46-57).*

Keywords: Family planning, Ethiopia, Decision Tree Analysis, rapid population growth

Résumé

Cette étude visait à identifier les priorités des facteurs affectant les pratiques de planification familiale en Éthiopie, dans le but ultime de fournir des preuves au gouvernement éthiopien et aux organisations internationales pour l'établissement de politiques de planification familiale ou de plans de projets liés à la planification familiale. Un échantillonnage aléatoire stratifié en grappes à plusieurs degrés a été réalisé sur un total de 35 479 hommes âgés de plus de 15 ans et femmes en âge de procréer (15 à 49 ans) dans deux villes métropolitaines et cinq régions d'Éthiopie. L'enquête a été menée par entretien en face à face à l'aide d'un Tablet PC, et 25 972 réponses, à l'exclusion des données censurées, ont été incluses dans l'analyse finale. Les données collectées ont d'abord été analysées à l'aide du test du chi carré de Pearson, du test t d'échantillon indépendant et du test F avec la méthode Tukey HSD comme post-hoc. Deuxièmement, une analyse de l'arbre décisionnel a été menée pour identifier les facteurs prioritaires affectant la décision de mettre en œuvre la planification familiale. Le principal facteur affectant la pratique de la planification familiale ait le soutien du conjoint ou du partenaire sexuel la planification familiale (P < .001) . Rion (p<.001) » était le deuxième facteur prioritaire pour le groupe recevant « un soutien à la planification familiale par le conjoint ou le partenaire » et le groupe ne le recevant pas. Les troisièmes facteurs prioritaires semblaient différer selon les régions dans les deux groupes. Il est nécessaire d'établir une politique de planification familiale et des plans de programme ciblant à la fois les hommes et les femmes, et la participation des chefs religieux et communautaires est considérée comme importante dans le processus d'établissement. En outre, il est jugé nécessaire d'améliorer le professionnalisme en divisant le processus d'éducation et d'évaluation pour HEW afin de fournir des conseils, une éducation et des services de haute qualité sur la planification familiale au niveau communautaire. *(Afr J Reprod Health 2023; 27 [5s]: 46-57).*

Mots-clés: Planification familiale, Éthiopie, Analyse par arbre de décision, Croissance démographique rapide

Introduction

Ethiopia is the second most populous country in the African continent. It is one of the fastest-growing countries in the world, with an annual growth rate of 2.6%[1]. According to the UN World Population Prospects, Ethiopia is projected to have a population of 210 million by 2050 if the current rate of population growth is maintained[2]. Unbalanced population growth could adversely affect the economic development of the country by increasing demand for resources such as food, housing, and healthcare, and putting pressure on infrastructure and public services[3].

Ethiopia is one of the top 40 poorest countries worldwide[4]. A rapid increase in Ethiopia's population could exacerbate food insecurity[5]. Additionally, it could result in rapid urbanization, which would strain urban resources and lead to environmental problems such as air and water pollution. Asfaw and Sime indicated that rapid urbanization in Ethiopia has led to environmental destruction and suggested the need for policies promoting sustainable urban development[6]. Furthermore, population surges could burden Ethiopia's healthcare system, especially in rural areas with limited healthcare access as compared to cities.

While improving the access to healthcare is reported to be crucial for addressing Ethiopia's high rate of maternal and child mortality rates[7], the Ethiopian government recognizes the urgent need to address the problem of rapid population growth and has been implementing measures to expand access to family planning services. As a key strategy, the Ethiopian government is leading a global initiative, the Family Planning 2030 initiative, in collaboration with international organizations[8]. The initiative aims to expand access to family planning services and increase the contraceptive prevalence rate (CPR) from 36% in 2016 to 55% in 2030 to reduce the total fertility rate to 3.0.

In addition to the Ethiopian government, international organizations, such as the World Health Organization (WHO) and the United Nations (UN), and major international development cooperation organizations, such as the United States Agency for International Development (USAID), the United Nations Fund for Population Activities (UNFPA) and Korea International Cooperation Agency (KOICA), are continuing their efforts to improve access to family planning services in Ethiopia. The aim is to address the rapid population growth, which has been contributing to several national problems, including food insecurity, environmental deterioration, and limited access to healthcare and education[9]. For example, the "USAID's Transform: Primary Health Care Project" has expanded the access to family planning services in rural areas through community-based distribution and outreach[10]. The UNFPA has also implemented several programs in Ethiopia focused on improving the access to family planning services and reducing maternal mortality[11-12].

Despite the efforts of the Ethiopian government and various partner organizations, the total fertility rate of Ethiopia is still high at 4.2 as of 2020[13]. One reason is that the unmet needs for modern contraception vary widely across regions[14-15]. For example, between 2000 and 2016, contraceptive use increased more than six-fold in Amhara and South Nations, Nationalities, and Peoples' Region (SNNPR), while the contraceptive prevalence rate in Somali region has remained unchanged over the past 20 years[15]. Additionally, previous studies conducted in Ethiopia have identified the lack of access to modern contraception methods and cultural reasons as barriers to birth control or birth spacing. Beside this, compared to the Addis Ababa and Amhara region, women in the Afar and Somali region faced difficulty in using contraception due to religious reasons or opposition by partners or spouses[16]. Therefore, it is necessary to identify priorities in factors that determine family planning practice and share the results with the Ethiopian government and relevant organizations to devise appropriate interventions or cooperation project strategies.

The purpose of this study is to identify the priorities of the factors affecting family planning practices in Ethiopia. Specifically, it aims to identify the major factors influencing family planning practices and determine their priorities. Finally, the study results are expected to provide evidence to the Ethiopian government and

international development cooperation agencies for establishing family planning policies or family planning-related project plans.

Methods

Research design

This study was designed as a cross-sectional study to identify the factors affecting family planning practice in Ethiopia. The target country of this study was Ethiopia, and the target population was men aged above 15 years and women of childbearing age (15–49 years). This study was conducted from March 28, 2022, to May 3, 2022.

Participants

This study targeted seven regions in Ethiopia, two metropolitan cities (Addis Ababa and Dire Dawa), and five regions (Amhara, Oromia, Sidama, SNNPR, and Somali), which are target areas of the KOICA health project. Participants included men aged above 15 years and women of childbearing age (15–49 years) residing in the survey target areas. The participants were recruited based on the United Nations "Contraceptive Practice Rate" calculation criteria and the childbearing age standard[17].

Data sampling

This study's participant selection and data collection were conducted in the following order. First, the minimum sample size was calculated considering an odds ratio of 1.5, α probability = .01, power = 0.95, and 5% contingency.

Second, study participants were selected using multi-stage, clustered, stratified random sampling. Particularly, the participant selection method employed by the USAID to conduct the Ethiopia Demographic and Health Survey (EDHS) was used in study. About 5% of the total zones or districts in the seven regions in Ethiopia were selected randomly. After reviewing each zone or district for the feasibility of conducting the survey with regional health bureaus, the final zones or districts were selected by adjusting some zones or districts. Thereafter, six kebeles were randomly selected based on the percentage of urban and rural areas by district. Then, the samples were stratified and extracted according to the size of the kebele's population. However, the Dire Dawa area has only one district and the Addis Ababa area has no administrative area since it is the capital. Thus, the selection method mentioned above was not applicable in these two regions. After allocating the number of samples for each selected kebele, the survey began with the households located at the entrance of the selected kebele. If the member of the household did not meet the criteria for the study participant, the survey continued to the next household.

Third, the survey was conducted by face-to-face interview using Tablet PC by visiting each household of the kebele. The interview surveys were conducted by local survey data collectors, hired by Frontieri Consult PLC that conducted this survey, and took an average of 55 minutes to complete. The questionnaire's first page included information about the survey agency, the survey purpose, and the protection of personal information. The survey proceeded for participants who understood this information and provided informed consent. Consequently, 35,479 participants from 14,562 households responded to this survey, of which 25,972 responses, excluding censored data, were included in the final analysis.

Study instrument

The instrument used in this study was based on USAID's Ethiopia Demographic and Health Survey (EDHS) questionnaire, which was modified and supplemented for the purpose of this study. The questionnaire was developed through a meeting of four individuals with PhDs in public health and two public health professionals. The questionnaire included information on sociodemographic characteristics, quality of life, marital status, reproductive health status, sexual behavior, family planning, fertility preference, decision-making by gender, and participant's accessibility to information on family planning. The developed questionnaire was translated into Oromia, Sidama, and Somali, including Amharic, the official language of Ethiopia. It was translated by two professional translators hired by the Ethiopian company that conducted this survey. Thereafter,

two local experts who majored in and had experience in healthcare reviewed it by comparing it with its English version. Additionally, a preliminary survey of 789 people revealed that the confidence level, Cronbach's α, for each scale exceeded 0.6, confirming the questionnaire's reliability and validity. The final questionnaire was developed by modifying the unclear parts identified during the preliminary survey. Then, the survey supervisors and data collectors were trained in both English and the local language to accurately convey the meaning of each question to the survey participants.

Variables

In this study, the question "Did you or your spouse/partner use any method to delay or avoid getting pregnant over the last 13 months?" was asked to determine whether Ethiopians practiced family planning. "Yes" was coded as "1," and "No" was coded as "2."

The demographic and sociological characteristics of the participants comprised "age," "gender (male or female)," "marital status (single, married, divorced, separated, or bereaved)," "region of residence (Amhara, Addis Ababa, Dire Dawa, Oromiya, Sidama, Somali, or SNNPR)," "religion (Orthodox, Christian, Catholic, Muslim, traditional religion, or no religion)," and "income quartile (1st quartile-high income, 2nd quartile, 3rd quartile, or 4th quartile)." Their quality of life was assessed using the 5-item EuroQol-5-dimension (EQ-5D) scale; a score above 85 indicates a "good quality of life" and was coded as "1."

Participants' knowledge about family planning was assessed using 13 items, such as "female contraception, male contraception, intrauterine device (IUD), injectable, contraceptive implant, oral contraceptive, male condom, female condom, emergency contraception, standard day methods, lactational amenorrhea method, rhythm method, and withdrawal." If they knew more than seven items, they were considered to have a "high level of knowledge about family planning," coded as "1."

Participants' attitudes toward family planning comprised 11 items on a 5-point Likert scale with 5 points for "strongly agree" and 1 point for "strongly disagree." Considering the total score of 55 points, a score above 40 indicated a "high attitude toward family planning," which was coded as "0."

Participants' information accessibility was assessed using six questions, such as "whether they acquired information related to family planning at community events, whether they acquired information about the adverse reactions of contraception, whether they talked about family planning with health extension workers (HEW), whether they talked about an adverse contraceptive reaction from healthcare officials, and whether they were aware of places where contraceptive devices were available." "Yes" was coded as "1."

Support for family planning by surrounding people was assessed using three questions: "support for family planning by a spouse or sexual partner, support for family planning by friends, and support for family planning by colleagues at work and school." "Yes" was coded as "1."

Decision-making for family planning was assessed using three questions: the right to make decisions about the use of contraception (self, spouse or partner, or self together with spouse or partner), the right to make decisions about the non-use of contraception (self, spouse or partner, or self together with spouse or partner), and whether they can deny the unwanted sexual intercourse (yes, no, sometimes yes, or sometimes not).

Statistical analyses

The collected data was first analyzed using the Pearson chi-square test, independent sample t-test, and F-test to identify the differences in family planning practices according to the participants' characteristics. The F-test was performed using the Tukey HSD method as a post-hoc to analyze the differences between groups. Second, a decision-making tree analysis was conducted to identify priority factors affecting the decision to implement family planning. Statistical analyses were performed using IBM SPSS Statistics 26.0.

Ethical review

The Institutional Review Board (IRB) of the Ethiopian Public Health Association (EPHA) reviewed and approved this study

(EPHA/OG/633/22). Permission letters for the survey were also obtained from government agencies related to the research area, including the Federal Ministry of Health of Ethiopia.

Results

Demographic and sociological characteristics of study participants

The study included 25,972 participants, with 12,787 (49.2%) males and 13,185 (50.8%) females. About 25,706 participants were married, accounting for 99.9% of the sample. The areas of residence were in the following order: 10,486 (40.4%), 6,566 (25.3%), 4,856 (18.7%), 1,595 (6.1%), 1,135 (4.4%), and 449 (1.7%) from Oromiya, Amhara, SNNPR, Somali, Sidama, and Dire Dawa areas, respectively. Regarding the religion, 10,682 (41.1%), 10,248 (39.5%), 4,787 (18.4%), and 135 (0.5%) participants were Orthodox Christian, Muslim, Protestant, and Catholic, respectively. The income level was 9,110 (35.1%) in the fourth quartile, 6,369 (24.5%) in the first quartile (high income), 5,989 (23.1%) in the third quartile, and 4,503 (17.3%) in the second quartile. Poor quality of life was slightly higher with 13,472 (51.9%) participants.

Analyzing the differences in whether family planning is implemented by characteristics. Table 2 shows the differences in general characteristics between the groups that did and did not practice family planning in the last 13 months. There were statistically significant differences in age (=-14.92, p<.001), gender (=22.985, p<.001), regions of residence (=462.666, p<.001), religion (=1,234.697, p<.001), and income quartile (=74.620, p<.001) between the two groups.

Additionally, the Tukey HSD post-hoc analysis performed on the regions of residence, religion, and income quartile showed statistically significant differences between the groups. Considering the regions of residence, family planning practices were highest at 67.2% in Addis Ababa, followed by Amhara, Oromiya, SNNPR, Dire Dawa, Somali, and Sidama. Catholic had the highest level of family planning practice at 64.5%, followed by no religion, Ethiopian Orthodox, traditional religion, Christian, and Muslim. Family planning practices by income quartile were highest in the fourth quartile at 55.0%, followed by the third, second, and first quartiles (high income).

Table 1: Demographic and sociological characteristics of study participants (N=25,972)

Variables	N	%
Age (M±SD)	35.92±9.26	
Gender		
Male	12,787	49.2
Female	13,185	50.8
Marital status		
Unmarried	2	0.1
Married	25,706	99.0
Divorced	80	0.2
Separated	96	0.4
Bereaved	88	0.3
Region of residence		
Addis Ababa	885	3.4
Amhara	6,566	25.3
Dire Dawa	449	1.7
Somali	1,595	6.1
Oromiya	10,486	40.4
SNNPR	4,856	18.7
Sidama	1,135	4.4
Religion		
Orthodox Christian	10,682	41.1
Catholic	135	0.5
Protestant	4,787	18.4
Muslim	10,248	39.5
Traditional religion	112	0.4
No religion	8	0.0
Income quartile (n=25,971)		
1st quartile (high income)	6,369	24.5
2nd quartile	4,503	17.3
3rd quartile	5,989	23.1
4th quartile	9,110	35.1
Quality of life		
Good	12,500	48.1
Poor	13,472	51.9

Table 3 shows the differences in knowledge, attitude, accessibility, and surrounding people's support for family planning between the groups that did and did not practice family planning in the last 13 months. The two groups showed the statistically significant difference in the knowledge of family planning (=467.375, p<.001), attitudes toward family planning (=152.616, p<.001), whether the study participants acquired family planning information at community events

Table 2: Whether or not family planning has been practiced in the 13 months according to sociodemographic characteristics of study participant

	Whether family planning is practiced		χ^2/ t / F	p-value	Post-hoc
	Yes	**No**			
Age (M±SD)	35.11±8.61	36.82±9.85	-14.92	<.001***	
Gender					
Male	6,494 (50.8%)	6,293 (49.2%)	22.985	<.001***	
Female	7,088 (53.8%)	6,097 (46.2%)			
Marital status					
Unmarried	2 (100%)	0 (0%)	0.592	.668	
Married	13,445 (52.3%)	12,261 (47.7%)			
Divorced	43 (53.8%)	37 (46.3%)			
Separated	47 (49.0%)	49 (51.0%)			
Bereaved	45 (51.1%)	43 (48.9%)			
Region of residence					
Addis Ababa	595 (67.2%)	290 (32.8%)	462.666	<.001***	A
Amhara	3,763 (57.3%)	2,803 (42.7%)			B
Dire Dawa	125 (27.8%)	324 (72.2%)			C
Somali	17 (1.1%)	1,578 (98.9%)			D
Oromia	5,465 (52.1%)	5,021 (47.9%)			B
SNNPR	2,621 (54.0%)	2,235 (46.0%)			B
Sidama	996 (87.8%)	139 (12.2%)			E
Religion					
Orthodox Christian	6,364 (59.6%)	4,318 (40.4%)	1,234.697	<.001***	C
Catholic	58 (43.0%)	77 (57.0%)			E
Protestant	3,086 (64.5%)	1,701 (35.5%)			A
Muslim	4,005 (39.1%)	6,243 (60.9%)			F
Traditional religion	64 (57.1%)	48 (42.9%)			D
No religion	5 (62.5%)	3 (37.5%)			B
Income quartile (n=25,971)					
1st quartile (high income)	3,073 (48.2%)	3,296 (51.8%)	74.620	<.001***	D
2nd quartile	2,296 (51.0%)	2,207 (49.0%)			C
3rd quartile	3,205 (53.5%)	2,784 (46.5%)			B
4th quartile	5,008 (55.0%)	4,102 (45.0%)			A
Quality of life					
Good	6,484 (51.9%)	6,016 (48.1%)	1.727	.189	
Poor	7,098 (52.7%)	6,374 (47.3%)			

(=382.845, p<.001), whether they acquired information about the adverse reactions of contraception (=897.410, p<.001), experience in family planning counseling with a HEW (=576.008, p<.001), whether they acquired information about contraceptives' adverse reactions from healthcare officials (=828.754, p<.001), whether they acquired information on managing adverse reactions of contraception (=576.008, p<.001), whether they were aware of the places where contraceptives were available (=1,004.750, p<.001), support by spouse or sexual partner for family planning (=4,486.906, p<.001), support by friends for family planning (=3,168.147, p<.001), and support by colleagues at work or school for family planning (=3,105.618, p<.001). Table 4 shows the difference in the right to make decisions about family planning between the groups that did and did not practice family planning in the last year. There were significant differences between the two groups in the following categories: the participant's right to make decisions about contraceptive use (=328.270, p<.001), right to make a decision to not use contraceptives (=327.767, p<.001), and whether they could refuse sexual intercourse (=319.442, p<.001).

Particularly, contraceptive use rates were highest when the person and her spouse or partner made decisions about both the use and non-use of contraception together (54.9%/54.8%). The Tukey post-hoc test revealed that the contraceptive use rates were highest when the decision was made by the person and her spouse or partner together, followed by decision by self and decision by spouse

Table 3: Whether or not family planning has been practiced in the 13 months according to the knowledge, attitude, information accessibility, and surrounding people's support about family planning of study participants

	Whether family planning is practiced		χ^2/ t / F	p-value
	Yes	**No**		
Knowledge about Family Planning				
High	6,368 (60.4%)	4,175 (39.6%)	467.375	<.001***
Low	7,214 (46.8%)	8,215 (53.2%)		
Attitude about Family Planning				
Positive (high attitude)	5,854 (48.2%)	6,289 (51.8%)	152.616	<.001***
Negative (low attitude)	7,728 (55.9%)	6,101 (44.1%)		
Information accessibility about Family Planning				
Acquisition of information about family planning at community events (n = 25,968)				
Heard before	6,285 (69.6%)	4,253 (40.4%)	382.845	<.001***
Never heard before	7,297 (47.3%)	8,133 (52.7%)		
Acquisition of information about contraceptives' adverse reactions				
Heard before	8,198 (61.3%)	5,174 (38.7%)	897.410	<.001***
Never heard before	5,384 (42.7%)	7,216 (57.3%)		
Experience of family planning counseling with a health extension worker				
Yes	7,455 (60.1%)	4,955 (39.5%)	576.008	<.001***
No	6,127 (45.2%)	7,434 (54.8%)		
Acquisition of information from healthcare officials about contraceptives' side effects				
Heard before	6,606 (63.2%)	3,853 (36.8%)	828.754	<.001***
Never heard before	6,976 (45.0%)	8,537 (55.0%)		
Acquisition of information about managing the adverse reactions of contraceptives				
Heard before	7,455 (60.1%)	4,955 (39.9%)	576.008	<.001***
Never heard before	6,127 (45.2%)	7,434 (54.8%)		
Awareness of places where contraceptives were available (n = 25,971)				
Yes	12,844 (55.8%)	10,165 (44.2%)	1,004.750	<.001***
No	738 (24.9%)	2,224 (75.1%)		
Support for family planning by surrounding people				
Support for family planning by a spouse or sexual partner				
Yes	12,516 (64.3%)	6,950 (35.7%)	4,486.906	<.001***
No	1,066 (16.4%)	5,440 (83.6%)		
Support for family planning by friends				
Yes	11,294 (64.4%)	6,246 (35.6%)	3,168.147	<.001***
No	2,288 (27.1%)	6,144 (72.9%)		
Support for family planning by work/school colleagues				
Yes	11,278 (64.3%)	6,273 (35.7%)	3,105.618	<.001***
No	2,304 (27.4%)	6,117 (72.6%)		

Table 4: Whether or not family planning has been practiced in the 13 months according to the decision-making rights for family planning of study participants

	Whether family planning is practiced		**χ^2/ t / F**	**p-value**	**Post-hoc**
	Yes	**No**			
Right to make decisions about the use of contraception (n=25,967)					
Self	1,464 (46.6%)	1,681 (53.4%)	328.270	<.001***	B
Spouse or partner	772 (35.9%)	1,378 (64.1%)			C
Self together with spouse or partner	11,344 (54.9%)	9,328 (45.1%)			A
Right to make decisions about the non-use of contraception (n=25,967)					
Self	1,345 (45.6%)	1,606 (54.4%)	327.7670	<.001***	B
Spouse or partner	739 (36.0%)	1,316 (64.0%)			C
Self together with spouse or partner	11,496 (54.8%)	9,465 (45.2%)			A
Whether unwanted sexual intercourse can be denied or not					
Yes	7,007 (57.9%)	5,100 (42.1%)	319.442	<.001***	A
No	5,152 (49.9%)	5,182 (50.1%)			B
Sometimes yes, sometimes no	1,423 (40.3%)	2,108 (59.7%)			C

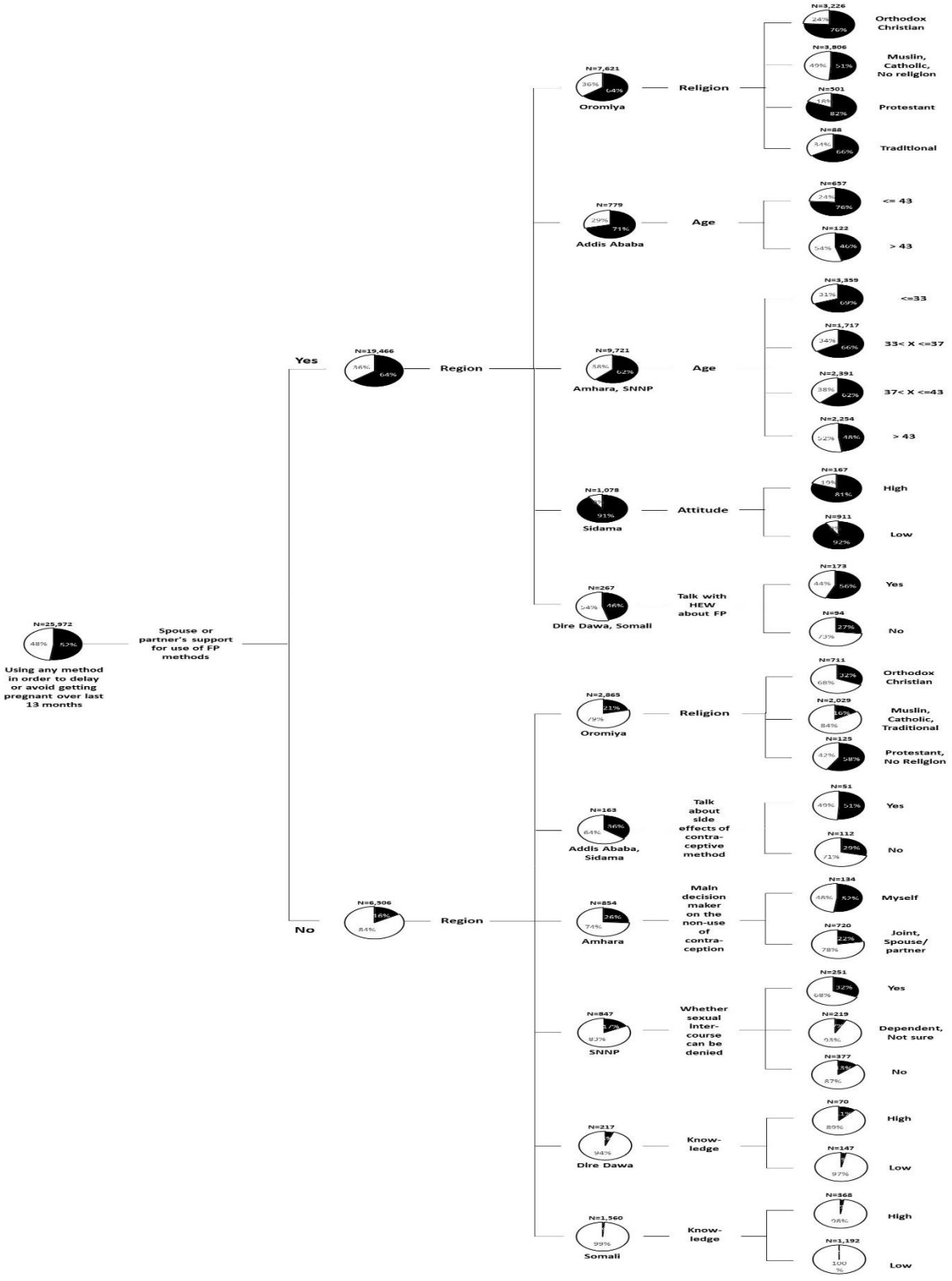

Figure 1: Results of the decision tree analysis

or partner. Figure 1 displays the results of the decision tree analysis. Consequently, the primary factor that influenced family planning practice was the spouse's or sexual partner's support for family planning (p <.001). After that, the factors that affect the practice of family planning were divided into those who did and did not receive "spouse's or partner's family planning support."

First, "Region of residence" (p <.001) was the second priority factor in the group that had "spouse's or partner's support for family planning (yes)." Especially the areas of [Oromiya], [Addis Ababa], [Amhara; SNNPR], [Sidama], and [Dire Dawa; Somali] were grouped for the priority nodes. The third priority factors were "religion" (p <.001), "age" (p <.001), "attitude" (p <.001), and "experience of counseling with a HEW" (p <.001). Among them, there was a difference in the family planning practice by age 43.

Next, "Region of residence" (p<.001) was also the second priority factor in the group that did not have "spouse's or partner's support for family planning (no)." The areas of [Oromiya], [Addis Ababa; Sidama], [Amhara], [SNNPR], [Dire Dawa], and [Somali] were grouped for the priority nodes. The third priority factors were "religion" (p<.001), "experience of discussing adverse reactions of contraceptives" (p<.001), "right to make decisions about the non-use of contraception" (p<.001), "whether unwanted sexual intercourse can be denied" (p<.001), and "knowledge" (p<.001).

Discussion

The main objective of this study is to determine the priority factors affecting the implementation of family planning in Ethiopia. It specifically aims to identify the factors that affect the practice of family planning and their priorities. The study results also aim ultimately to be used as evidence to the Ethiopian government and international development cooperation agencies for establishing family planning policies or family planning-related project plans.

Concerning the characteristics of the study participants, the areas of residence were in the following order: Oromiya (40.4%), Amhara (25.3%), SNNPR (18.7%), Somali (6.1%), Sidama (4.4%), and Addis Ababa (3.4%), which is similar to the regional population of the Ethiopian Central Statistics Authority, indicating a statistically significant regional distribution of the study participants[18]. In other words, the proportion of the population between regions of the study participants is appropriate. Concerning religion, 41.1% and 39.5% participants were Orthodox and Muslims, respectively. Previous studies have indicated religion to be a major factor influencing family planning practices[19-20]. The religious distribution of the participants in this study was similar to the EDHS data and appears to represent the religious distribution of the population.

The priority analysis was conducted using the decision tree analysis for the factors affecting family planning practice. Consequently, "support for family planning by spouse or partner" was the most important priority. An existing study on Ethiopian family planning reported that the level of support for contraception depends on men's knowledge and attitude[21]. A policy approach is required to alter the knowledge and attitude of men toward family planning to enhance the level of support provided by them. In other words, it is essential to promote a positive attitude towards family planning by involving both men and women when carrying out a project to improve and promote awareness of family planning. The Ethiopian government should develop and implement comprehensive policies on family planning that address the needs of both men and women and should be based on evidence-based approaches that have been proven to be effective in increasing family planning uptake.

Second, region was the second priority in family planning. Particularly, the factors affecting family planning practices differed by region. In the Oromiya region, religion was high in its priority. This is because the Oromiya region is the most populous in Ethiopia, where a wide variety of tribes and religions coexist[22]. Therefore, the influence of religion on family planning practices may have been relatively high in the Oromiya region compared to other regions. Previous studies have shown significant influences of religion on family planning practices. Particularly, Muslims did not meet their family planning needs at 35% compared to other religions[23]. Therefore, it is important to

engage local religious and community leaders, who have played key roles in each region, in developing family planning policies or related project plans. In addition, it will be important that there are parallel attempts of the Ethiopian government to promote positive perceptions and attitudes toward family planning among them, reflecting the context of the community. It would be helpful to address all cultural or social barriers that may prevent community members from accessing family planning services.

Third, age was another priority factor for family planning practice; the age of 43 divided the family planning practice as yes or no. Women aged below 43 were more likely to practice family planning. According to the WHO, the fertile age at which pregnancy is most likely is 15–49 years, a decrease in fertility rate is observed among women aged above 40 years, and a sharp decrease in the probability of pregnancy to about 5% is observed after 40~44 years of age[24]. In other words, the results of the present study revealed that women aged below 43 years were more interested in family planning and different factors that influenced their decision to practice appeared to be associated with their fertility.

Fourth, Health Extension Workers (HEWs) played a crucial role in family planning practices. HEW is a job in Ethiopia's primary healthcare sector that conducts household visits to provide counseling and education on sexual and reproductive health, maternal and child health, family planning practices, and etc. According to the study results, family planning practices increased by 56.1% when individuals discussed family planning practices with HEWs but decreased by 73.4% when no discussions were held. Previous studies have shown that HEWs are significantly effective in increasing access to family planning services for community residents, increasing the use of family planning contraceptives, and reducing maternal and infant deaths, especially among vulnerable family planning populations[25]. In other words, even when the results of this study and existing studies are linked together, it can be seen that HEWs are the key players in the practice of family planning. In particular, considering the result of the study -the use of family planning services increased from 2014 to 2018, but there was no qualitative growth in family planning, a policy approach using HEWs should be strengthened. Currently, the Ethiopian government is actively using HEWs as the key component of their primary healthcare system and HEWs are committed to improving family planning practices by providing various family planning services, including an introduction to family planning, guidance on family planning methods, and counseling at the community level. In the future, the Ethiopian government should hire more HEWs with sufficient compensation and deploy them based on the identification of each community's needs. To ensure that they are able to provide high-quality services such as in-depth consultation regarding the pros and cons of modernized family planning methods at the community level, the government should strengthen their training and evaluation processes for HEWs in detail to increase their expertise. In line with the current trend in which digital health is in the spotlight to achieve sustainable development goals (SDGs) and Universal Health Coverage[27], the Ethiopian government is also trying to use digital technology to improve the healthcare delivery system[28]. Following this trend, the Ethiopian government should actively consider the need to produce digitized audio-visual education materials related to reproductive health, maternal and child health, and family planning for existing and new HEWs to increase their expertise sustainably and efficiently.

This study has several limitations. First, it was designed and conducted as a cross-sectional study. In other words, there is a limitation in identifying causal relationships associated with family planning. Second, this study results cannot be generalized to all the Ethiopian regions because the survey was not conducted in all the regions. The sample size was adequate to represent the population based on the central limit theorem; however, a bigger sample size is required in future studies. Third, this study was conducted in person during COVID-19, which may have resulted in non-sampling errors in the survey.

However, this study is a baseline survey of the 'SHaPE 2 Project' funded by KOICA, and it will be easy to see how the priorities of these factors change by conducting additional investigations as interventions proceed in the future. Additionally, it

is meaningful that it can be used as a basis for establishing family planning policies of the Ethiopian government and family planning-related business plans for international development cooperation agencies.

Conclusion

The purpose of this study is to identify the factors influencing Ethiopians' family planning practice and the priorities of those factors by using decision tree analysis. Ethiopia faces many challenges, including food insecurity, environmental deterioration, and limited access to healthcare and education due to a rapidly growing population. Despite working with various international organizations such as the WHO, USAID and KOICA, the country still has a high total fertility rate. While previous studies have focused mainly on identifying factors that affect whether or not family planning is practiced by local residents, especially women of childbearing age, in one or two regions of Ethiopia, the present study not only identified the factors that affect the family planning practices of women of childbearing age and men aged 15 or older residing in 7 regions in Ethiopia, but also by identifying the priorities of those factors, which can be used as evidence for policy development to promote the family planning practice by the Ethiopian government and international development cooperation agencies in the future. As a result of the above study, it is necessary to develop comprehensive policies and programs targeting both men and women to promote family planning practices effectively. Additionally, the involvement of religious and community leaders of each region in the establishment of family planning policies or related project plans is essential. Furthermore, it is necessary to increase the professionalism of HEWs by dividing the training and evaluation process in detail to provide high-quality education and services on family planning at the community level. Future study should include all regions of Ethiopia with a bigger sample size to generalize the results of the present study.

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