Spatial Heterogeneity of Nuptiality Patterns in Ethiopia: A Decomposition Analysis

Dame Kedir[*1,2], Tariku Dejene[1], and Terefe Degefa[1]

* Corresponding Author

Abstract

Different geographic contexts are observed to impact the nuptiality patterns depending on factors like socioeconomic level, educational achievement, religious affiliation, and cultural factors. This study examines the factors that account for regional variations in nuptiality patterns in Ethiopia. Data from the Ethiopian Demographic and Health Surveys conducted in 2000 and 2016 were used. The likelihood of individuals entering their first marriage differed significantly depending on the regional variability of nuptiality patterns. Culturally, marriage typically occurs early and is nearly universal; however, this study revealed that there is a deviation from universal marriage patterns in Addis Ababa. No significant change in age at first marriage was observed between the two cohorts in all regions except Addis Ababa. In the Southern, Nations, Nationalities, and People (SNNP) and Harari regions, no change in the timing of the first marriage between the women birth cohorts. In Dire Dawa, the entry to first marriage was reversed and women residing in the Gambela region showed the highest postponement. National population policy effectively contributed to delaying marriage in the Gambela region. The regional heterogeneity in policy outcomes underscores the importance of considering sub-national factors when designing and evaluating demographic policies. The educational attainment, wealth index, and migration were merely the coefficient effects that explain the overall difference. Addressing inequalities in education achievements and wealth distribution promotes more equitable marriage practices across all regions.

[1] Center of Population Studies, College of Development Studies, Addis Ababa University

[2] College of Applied Natural Science, Department of Mathematics, Adama Science and Technology University

Email: d.kedir@yahoo.com

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1. Introduction

In developing nations, spatial variations in cultural practices and beliefs strongly influence the acceptance and practices of early marriage (Amoako et al. 2019). In the Kenyan context, regional variation in the prevalence of early marriage could result the differences in women's education, socioeconomic development, and ecological, and cultural variations (Ikamari 2023). Ethiopia stands out for having one of the elevated rates of early marriage within the sub-Saharan African region (Marshall et al. 2016). Similarly, variations in sociocultural, values, and traditions encourage early marriage in Ethiopia, particularly in the Amhara regional state, compared to other regional states (Setognal Birara et al. 2021). Overall, there has been a decline in child marriage and a rise in women's age at first marriage in Ethiopia; however, not all regions and population groups have seen these improvements (Irenso et al. 2022).

Different geographic contexts influence nuptiality patterns based on factors such as socioeconomic level, educational achievement, religious affiliation, and cultural traditions (Ambel et al. 2017; Gashaw 2019) Ethnic diversity, norms, and cultures contribute to variations in the timing and prevalence of marriage both within and between societies. Early marriage is widely practiced in many parts of the country, in Amhara and Tigray regions the rates of entry to early marriage are higher than the national average which is 68% (82 % of the women in Amhara, 79 % in Tigray, 64 % in Benshangul Gumuz, 64 % in Gambella and 46 % in Afar region (Alazbih et al. 2023). Particularly in Amhara, young women who had married typically lived in rural regions. This emphasizes the necessity of focusing on early marriage campaigns geographically (Erulkar 2013).

Previous studies in Ethiopia primarily focused on examining the determinants of age at first marriage at a specific point of time but regional disparity concerning change in the nuptiality patterns at different times was not examined (Masrie et al. 2019). Few studies have considered the spatial aspect of nuptiality among women in Ethiopia (Agegenehu et al. 2021; Arega et al. 2023; Setognal Birara et al. 2021). However, these studies have not focused on the trends of nuptiality across regional levels over time, based on a single survey. Additionally, studies concentrate solely on a specific region within the country, lacking national representation. This study utilizes spatial analysis because it has an additional advantage over separately analyzing spatial or temporal trends.

The analysis of identifying potential areas of cumulative incidence of marriage investigates any unusual patterns and clustering over time and ultimately helps to direct tailored programs and interventions to address regional disparities in nuptiality patterns. This article addresses the gaps in existing literature by utilizing nationally representative and internationally comparable data and performing spatial analysis of evolving trends in nuptiality patterns. The regional variation in nuptiality patterns across the nine regional states and two city administrations has rarely been investigated.

Some studies have been focused on examining regional variations of nuptiality patterns, trend analysis, and assessment of determinants of age at first marriage using snap-shots of data/survey. Our study, however, departed from these perspectives taking comparable two distinct birth cohorts, and the shift in age at first marriage and marital instability were contrasted among the regional states. In this study nuptiality patterns are defined as the timing, magnitude, and marital instability. Timing of marriage is measured by age at first marriage and magnitude of marriage is measured by cumulative incidence of the first marriage. Marital instability is the number of women who married more than once/remarried. What is more, the childhood and, much of the

youth years of the first cohort were lived in an era before 1993 when Ethiopia had no population policy and girls' education was limited. Whereas, the second cohort lived through a policy period-population policy, and the times were characterized by a regime change and a rise in girls' enrollment and improved access to reproductive health services. This study attempts to address this gap and believes that will open an avenue for future research that is rooted in inter-cohort comparison or comparison of experiences across different historical times. Furthermore, this study attempts to provide answers to the research questions related to spatial variations in nuptiality patterns with a specific focus on, What are spatial patterns of nuptiality between the two birth cohorts? What are the sources of the changes? Therefore, this study investigates the components that account for regional variability in nuptiality patterns.

1.1. Theoretical backgrounds of the study

The patterns of marriage can range greatly throughout cultures, historical periods, and geographic regions. According to Becker, the marriage market's supply and demand, the benefits and costs of marriage, and the economic resources and earning capacity of prospective partners all influence marriage patterns (Becker 1973). Likewise, the economic theory of marriage suggests that economic factors, including employment possibilities, income levels, and the costs of marriage, have an impact on patterns of marriage. Compared to economically low areas, marriage rates are greater in regions with stronger economies and more employment opportunities (Oppenheimer 1988). Divergent marriage patterns between areas result from geographic disparities in labor markets, economic situations, and resource distributions. Marriage is a deeply cultural occurrence intertwined with larger household, gender, and religious/spiritual belief systems (Schneider and Goody 1984).

Traditional marriage patterns can consequently vary depending on the geographic differences in social institutions, family structures, and

cultural values. Intersectional frameworks have been utilized more recently to comprehend how the various socioeconomic developments, including political, cultural, ecological, and historical, interact to shape regional variations in marriage patterns. These perspectives highlight how different social identities and systemic inequalities (such as those based on class, race, and gender) interact to create marriage patterns that are specific to a given area (Davis 2008; Crenshaw 2018). Regions' marriage patterns could be greatly influenced by cultural norms, customs, and religious beliefs. Different marriage practices resulted from regional variations in factors including gender roles, family structures, and social attitudes about marriage (Thornton and Fricke 1987). Demographic characteristics including population size, age distribution, and sex ratios affect marriage patterns, claims the demographic theory of marriage. Higher proportions of people who can get married may lead to higher marriage rates, but a skewed sex ratio could show distinct marriage patterns (Rao 2016; Witty 1982). Marriage trends can be influenced by the social, political, and legal institutions of a given area. In various geographic locations, factors such as social assistance programs, tax regulations, and marital laws can encourage or prohibit particular marriage habits (Cherlin 2004).

The adaptations approach holds that variations in ecological factors, such as resource availability, and economic opportunities, can account for variations in nuptiality patterns (e.g., age at marriage/first marriage, and family structures) across different societies and regions. As cultures adjust to shifting environmental, technological, and social conditions, nuptiality patterns change (Sear and Coall 2011; Hillard Kaplan 1996). According to the diffusionist approach regional variability in nuptiality patterns is mostly caused by the ideas, practices, and cultural traits that have spread or diffused over various societies and geographical areas. On the other hand, nuptiality patterns are not solely the product of local adaptations to ecological circumstances; cultural features, and practices transmission between communities. Globalization, mass media, and technological improvements can accelerate the spread of culture and

cause nuptiality patterns in various locations to converge (Schneider and Goody 1984; Lesthaeghe 1983).

The theoretical framework is explained and clarified by the conceptual framework, making it more actual and actionable. Policies, laws, and broader societal changes can influence nuptiality patterns at the national level. Community-level factors that affect marriage patterns include social norms, local economic circumstances, and education. Individual characteristics that influence marriage decisions and timing include age, education, work status, financial stability, and personal preferences. Policymakers and researchers need to examine the interplay between national, community, and individual factors to fully understand the drivers of regional nuptiality patterns and design appropriately targeted interventions.

In reality, the nuptiality patterns seen frequently are the outcome of intricate interactions between institutional, structural, cultural, socioeconomic change, and demographic elements which can vary considerably across different regions and societies. These theoretical frameworks provide several perspectives to easily comprehend the regional variability of change in nuptiality patterns.

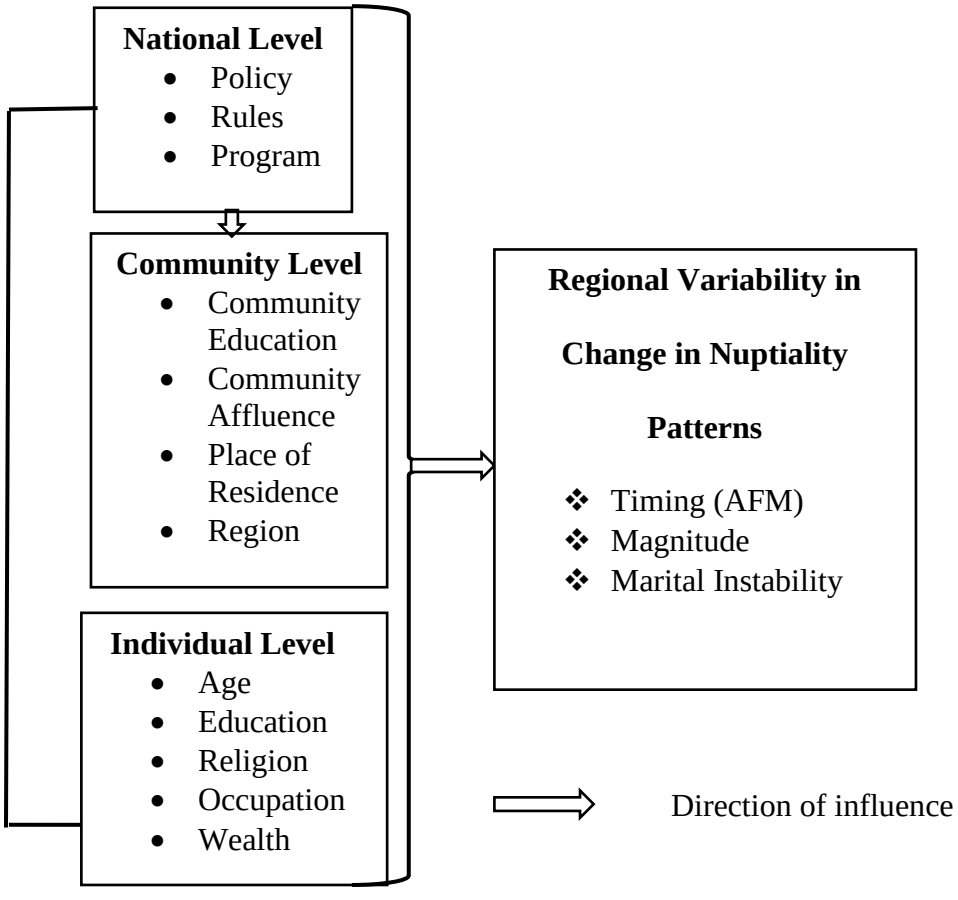

Figure 1: Conceptual framework showing regional variability of nuptiality patterns

Source: Developed by the researcher after reviewing related literature

2. Data and Methods

The study employed a repeated cross-sectional comparative study design and used pooled data drawn from the 2000 and 2016 Ethiopian Demography and Health Surveys (DHS). The study utilized two women birth cohorts one born between 1965 and 1969 from the 2000 (DHS), the other born between 1980 -1984 from 2016 (DHS). The weighted sample constitutes a total sample of 3,873 women where 1,804

respondents were from the first birth cohort (1965 –1969) and 2,069 respondents from the second birth cohort (1980 –1984). The data for the study was extracted from Ethiopian Demographic and Health Surveys (EDHS). Estimates of important health and demographic factors were designed to be provided by the EDHS sample for the whole nation, for urban and rural regions independently, and for each of Ethiopia's nine regions and two city administrations alone. The data was gathered using a two-stage, residence-stratified cluster sampling technique. At first, random selection was used to select enumeration areas (EAs) from both rural and urban areas. In stage two selection, every household belonging to the chosen EAs was listed. A preset number of homes per EA was selected from the list of homes in the second stage of the selection procedure. The spatial analyses of the nuptiality pattern of women residing in the nine regions and two city administrations were done. The Oaxaca decomposition analyses were used to investigate the sources of spatial heterogeneity of nuptiality patterns by using the second cohort across all the regions. The DHS data is freely accessible at: https://www.dhsprogram.com/data/dataset_admin/login_main.

The collective encounters of women play an essential role in identifying the trends of marriage incidence and understanding the factors that contribute to the variations among different regions in Ethiopia, both before and following the introduction of the national population policy and revised family code (2000). The DHS invests significant effort in ensuring that the dates of the key events, including marriages, are accurately reported through multiple data checks and procedures for reconciling discrepant reports and imputing missing information (MacQuarrie and Juan 2019). Like most dates, the date of marriage is recorded in DHS recode datasets in century month codes (CMC), the number of months since January 2000. Age at first marriage is calculated as the difference between the CMC of marriage and the CMC of birth date.

2.1. Variables and measurements

The outcome variable is the cumulative incidence of age at first marriage measured by the timing, magnitude, and marital stability among regional states and two city administrations. In this study, the term nuptiality pattern encompasses the timing and magnitude of cumulative incidence of marriage and the marital instability of women. The timing of marriage was assessed using the age of the women and the magnitude of marriage measured by the cumulative incidence of the history of marital union of the women. The cumulative incidence function (CIF) gives the proportion of women who have ever experienced an event at any given time. This property of CIF makes it desirable for analysis of first marriage over the instantaneous measure. The assessment of spatial heterogeneity in nuptiality patterns employs Oaxaca-Blinder decomposition analysis at individual and group-level characteristics. The descriptions of many variables are available in the standard recode manual of DHS (ICF 2018) and the specific descriptions variables and their measurements utilized for this study are shown in the table below Table 1.

Table 1: Description of variables and their measurement used in the analysis

Type	**Name and label**	**Description and measurement**	**Source**
Outcome (numeric)	Age at first marriage (v511)	Age at the start of the first marriage or union is calculated from the date of start of the first marriage or union and the date of birth of the respondent.	CFIID
Independent (categorical)	Birth cohort (v011)	Two groups of birth cohorts, that is, those born in the years 1965-1969 and 1980-1984 (v011).	C

Type	Name and label	Description and measurement	Source
Independent	Place of residence	Type of place of residence (1=Urban, 2=Rural) (v102)	CFIID
Grouping var.	Region (V024)	A region in which the respondent was interviewed	CFIID
Independent (categorical)	Educational level (v106)	Highest education level attended. 0=No education, 1=Primary, 2=Secondary, and 3=Higher.	CFIID
Independent (categorical)	Occupation (v717)	Respondents' occupation 0=Not working,1=Agricultural employed, 2=Industry employed	CFIID
Independent (categorical)	Religion (v130)	1=Christians (Orthodox, Protestant, and Catholic), 2=Muslim, 3=Others)	CFIID
Independent (categorical)	Household wealth (hv271)	A composite measure of household's cumulative living standard.(1=Lowest,2=Lower,3= Middle,4=Richer,5=Richest)	CFHHD
Independent (numeric)	Community affluence	Percentage of population living in a well-off household in a community (enumeration area)	CFHHD
Independent (numeric)	Community literacy	Percentage of population with at least a secondary level of education in a community (enumeration area)	CFHHD

C= Computed, CFIID = Computed from individual interview Data, CFHHD = Computed from Household Data

2.2. Data processing and analysis

Data processing and analysis were done using STATA 16.0 and R software. The analysis began with describing the characteristics of each

regional state and two city administrations by cohorts using the cumulative incidence curves. The change in magnitude was assessed using the cumulative incidence function of marriage among regional administrations. Since our interest is determining the factors that can explain spatial heterogeneity of nuptiality patterns among nine regional states, used multivariate decomposition analysis. The decomposition of regional disparity in nuptiality patterns refers to the process of examining and understanding the differences in the marriage patterns across the nine regional states and two city administrations, and how these patterns changed over time.

Spatial survival analysis combines elements of both spatial analysis and survival analysis to investigate how the timing and occurrence of marriage events vary across different regions that change with time. In survival analysis, censoring refers to situations where complete information about an event of interest is not available. It occurs when the event has not yet occurred for some individuals in the study, or when the event is known to have occurred but the exact time of occurrence is unknown. Multivariate decomposition analysis used to decompose components attributable to changes in the characteristics difference and the changes in response to behavior. Changes in the proportion of the population having specific social, economic, and demographic features as changing characteristics, whereas changes in the population's behavior are referred to as changing behaviors as a result of changing characteristics (Powers, Yoshioka, and Yun 2011).

Space and time are essential attributes that enable individuals to comprehend and interpret events and phenomena, enabling them to gain understanding and meaning from the world around them (Arega et al. 2023). The Oaxaca-Blinder Decomposition Approach was used to analyze the spatial and trends in the nuptiality patterns, specifically examining nuptiality patterns across different regional states. The decomposition analysis of both levels and change over time was conducted using the Stata command *mvdcmp* and regression tree

analysis from R software, which was used as a post-estimation command for various regression commands in the Stata. This method used Blinder Oaxaca decomposition focusing on changes between two birth cohorts over time and enabling decompositions pooled cross-section data. This approach is particularly suitable for evaluating interventions, policy changes, experiments with post-treatment follow-up, and facilitating before and after comparisons (Kröger and Hartmann 2021). In this study, spatial analysis serves as a powerful tool for understanding the relationship between socio-economic factors and marriage incidence across different geographical areas. Furthermore, the spatial analysis adds spatial dimension, allowing to uncover nuanced relationships between socio-economic factors and marriage incidence that may not be apparent through traditional analytical approaches. These studies, use the birth cohort of 1965-1969 as the first cohort and 1980-1984 as the second cohort.

3. Results

The findings of the study revealed that the hazard of getting married exhibited variability across the nine regional states and two city administrations, starting from the age of 10. This indicates that the likelihood of individuals entering into a first marriage differed significantly depending on regional variability within Ethiopia. Regarding the Southern, Nations, and Nationalities and Peoples' (SNNP) and Harari regions, there was almost no change between the birth cohorts in the timing of the first marriage. In Dire Dawa, the shift was reversed, that is, the second cohort had an earlier timing of entry to first marriage for ages below 20. After the age of 20, however, the rate of entry to first marriage was smaller for the second cohort than the first cohort. In Addis Ababa, Amhara, and Benishangul Gumuz, the rate of entry to the first marriage showed a delay starting from an early age. Further, entry to marriage in Addis Ababa didn't show universality and though, small in the magnitude, the change in the timing of first marriage among women residing in the Tigray region also showed a similar trend (Figure 2).

In Oromia and Gambella, the earliest early marriages remained the same for the two cohorts with lower rates of entry to marriage in Oromia. In these regional states, the entry to first marriage was postponed to later ages after the age of about 15 years. The fact that the graph reaches the maximum level after the age of 30 for women residing in the Gambela region showed that there was a higher proportion of postponement of entry to first marriage in the Gambela region. In Afar and Somali, a slight shift in the timing and rate of entry to first marriage was observed although almost all women still get married before the age of 20. The rate is, however, smaller for Somalis than for the Afar region (Figure 2).

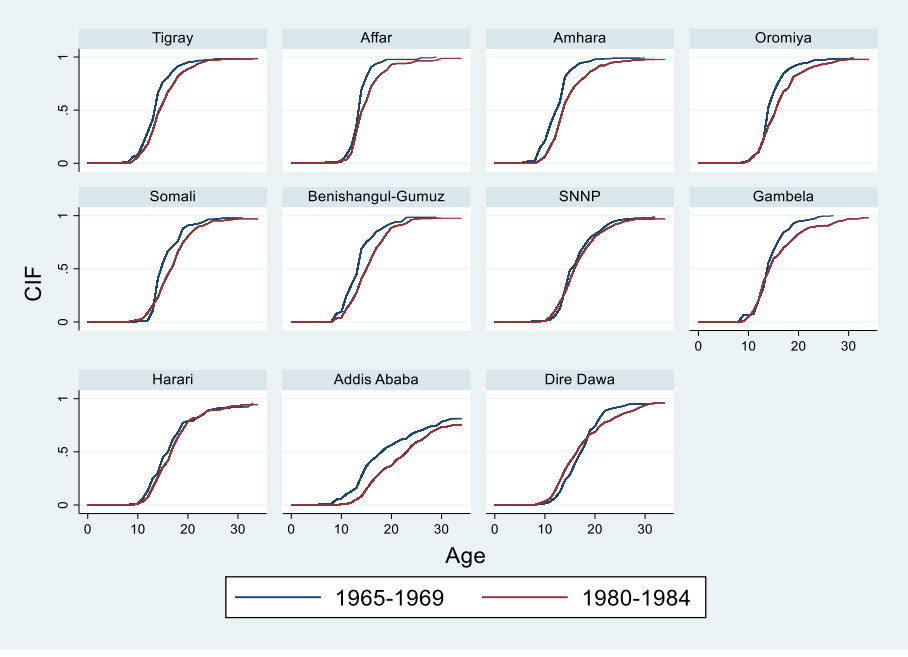

Figure 2: Spatial distribution of cumulative incidence of first marriage

The weighted sample constitutes a total sample of 3,873 women where 1,804 respondents were from the first birth cohort (1965 –1969) and 2,069 respondents from the second birth cohort (1980 –1984). The

largest proportion of incidence of marriage contributed by Oromia, Amhara, and SNNPR was 38.49, 24.51, and 21.98 from the first cohort, and (38.33, 23.16, and 20.47) from the second birth cohort, respectively. The study analyzed the cumulative incidence function to estimate the overall marriage patterns among nine regional states and two city administrations in Ethiopia. The cumulative incidence function provides the probability of experiencing a particular event, in this case, getting married, over a specified period.

Table 2 shows that from the total sample, 40% of women reported remarried more than once in the first birth cohort, whereas 21% were in the second birth cohort at the national level. The magnitude of entry to remarriage was reduced by 19%. About 60% of women in the first cohort got married once and 79% in the second cohort. We found that women in latter birth cohorts were significantly less likely to remarry than those in former cohorts. The incidence of remarriage declined across all regional states except Dire Dawa city administrations. The Amhara, Tigray, and Afar regional states were the highest contributors to the incidence of remarriage to the overall marital dissolution in the first birth cohorts. Whereas, the second birth cohort includes Amhara, Tigray, and Gambela regional states. Dire Dawa, Somali regional states, and Addis Ababa were the least contributors to the incidence of remarriage to the overall marital dissolution in the first cohorts. Except for Tigray, Afar, Amhara, Gambela, and Benishangul-Gumuz, the rest of the regions and city administrations were smaller contributors to the incidence of remarriage to the overall marital dissolution in the second cohort.

In the first cohort, the Amhara region had the highest rate of marital instability. In contrast, in the second cohort, the Tigray region exhibited the highest rate of marital instability. In the first cohorts, Dire Dawa had the lowest incidence of marital instability. This indicates that marriages in Dire Dawa were relatively stable compared to other regions. Moving

on to the second cohort, Somali and Addis Ababa cities had the lowest incidence of marital instability.

Table 2: The percentage of women's marital instability and cumulative incidence of first marriage

Regions	Remarriage (%)			Incidence of marriage (%)		
	1965-1969 [n=1804]	1980-1984 [n=2069]	Difference	1965-1969 [n=1804]	1980-1984 [n=2069]	Difference
Tigray	0.58	0.36	-0.22	6.48	6.85	0.37
Afar	0.53	0.24	-0.29	1.35	0.69	-0.66
Amhara	0.62	0.42	-0.20	24.51	23.16	-1.35
Oromia	0.32	12	-0.20	38.49	38.33	-0.16
Somali	0.21	0.05	-0.16	1.51	2.36	0.85
Benishangul-Gumuz	0.45	0.23	-0.22	1.10	1.10	0.00
SNNP	0.30	0.15	-0.15	21.98	20.47	-1.51
Gambela	0.35	0.28	-0.07	0.31	0.25	-0.06
Harari	0.33	0.15	-0.18	0.22	0.24	0.02
Addis Ababa	0.22	0.08	-0.14	3.50	5.98	2.48
Dire Dawa	0.16	0.19	0.03	0.54	0.57	0.03
National	0.40	0.21	-0.19			

Generally, the rate of remarriage was reduced by 19% between the two cohorts at the national level. There is a similarity in the disparity between the rates of remarriage (-0.20) for the Amhara and Oromia regional states across the two different cohorts. Additionally comparing the rates of remarriage (-0.22) between Tigray and Benishangul-Gumuz regional states, there is consistent and similar difference observed across the two different cohorts. The Afar regional state has

experienced the highest reduction in remarriage rates (-0.29) compared to other regions and city administrations. The Gambela regional state has experienced the smallest reduction in the rate of remarriage (-0.07) compared to other regions and city administrations.

According to Table 2, the regional states of Afar, Amhara, Oromia, SNNP, and Gambela have experienced a reduction in the cumulative incidence of marriage. On the other hand, Tigray, Somali, Harari, Addis Ababa, and Dire Dawa have shown an increase in the cumulative incidence of first marriage. Benishangul-Gumuz regional state has experienced no change in the cumulative incidence of marriage between the two birth cohorts, which means that marriage rates remained relatively stable over time. Addis Ababa has experienced the highest rate of increment in the cumulative incidence of marriage compared to the other regions and Dire Dawa in Ethiopia. The SNNP and Amhara regional states have experienced the highest rate of decline in the cumulative incidence of marriage compared to other regions and city administrations. This indicates that marriage rates have been declining at a higher rate in these two regions. The spatial analysis of age at first marriage revealed no change between the two birth cohorts in all regions except Addis Ababa as depicted in the clustered regression tree analysis produced by R Software (**Figure 3**).

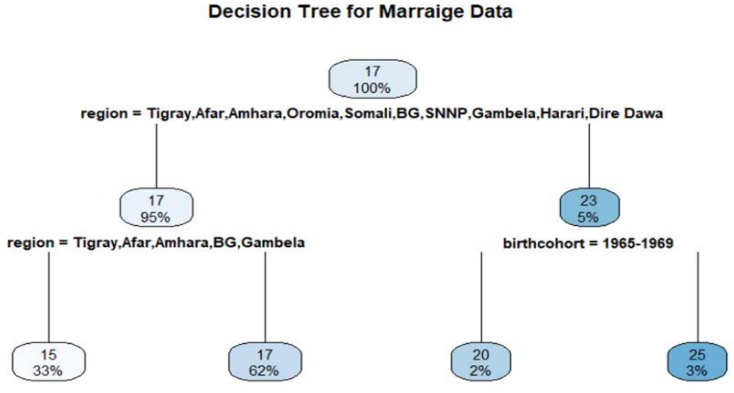

Figure 3*:* Regression tree of cumulative incidence of first marriage

3.1. Space-time analysis

Based on the space analysis using a regression tree (fig.3), all regions had spatial differences in age at first marriage. The result of clustered regression tree analysis showed that no spatial variation in age at first marriage was observed in all regions except Addis Ababa. The change was observed only in Addis Ababa. At the national level, the average age at first marriage is 17 years. However, when disaggregated by the regional states, the age at first marriage becomes 15 in Tigray, Afar, Amhara, Benishangul Gumuz, and Gambela indicating that practiced early marriage compared to 17 years in Oromia, Somali, SNNP, Harari, and Dire Dawa. Further, the average age at first marriage was 20 for the 1965 –1969 birth cohort and 25 for the 1980 –1984 birth cohort for Addis Ababa. This indicates a 5-year postponement in entry to the first marriage between the two birth cohorts, showing a trend towards later marriages over time.

Given the promising positive change in the age at first marriage seen in Addis Ababa, the reasons for the differential progress in the change in age at first marriage were assessed using Addis Ababa as a counterfactual in our analysis. Labeling Addis Ababa as a counterfactual is due to its observed changes in age at first marriage that provide a comparative framework for evaluating changes in nuptiality patterns across Ethiopia's diverse regions and Dire Dawa. As such, the decomposition analysis focused on the mean difference in age at first marriage among various regions and Addis Ababa for the second birth cohort. For this purpose, Amhara, Oromia, Afar, and Somali regional states were selected. The underlying reason for the selection of the Amhara and Oromia regions has to do with their large size of population, and that of the Afar and Somali regions is due to their highest fertility levels. Decomposition analysis compares mean differences in age at first marriage between Addis Ababa and the selected regions (Amhara, Oromia, Afar, and Somali) for the second birth cohort (1980 – 1984).

Table 3: Decomposition of the proportion of married at age 15, 20, and 25 among regions, Ethiopia

	Amhara Region Vs. Addis Ababa City					
	At Age 15		**At Age 20**		**At Age 25**	
Decomposition	Coef.	P-val	Coef.	P-val	Coef.	P-val
Amhara	56.55	0.000	86.04	0.000	95.16	0.000
Addis Ababa	8.08	0.002	35.32	0.000	55.52	0.000
Difference	48.47	0.000	50.72	0.000	39.64	0.000
Explained	-0.25	0.990	28.42	0.448	7.84	0.844
Education	13.84	0.025	28.52	0.010		
Wealth	12.82	0.020				
Constant	42.49	0.045				
Unexplained	48.72	0.021	22.30	0.554	31.79	0.428
Decomposition	**Oromia Region Vs. Addis Ababa City**					
	At Age 15		**At Age 20**		**At Age 25**	
	Coef.	P-val	Coef.	P-val	Coef.	P-val
Oromia	35.29	0.000	81.45	0.000	92.14	0.000
Addis Ababa	8.08	0.002	35.32	0.000	55.52	0.000
Difference	27.23	0.000	46.13	0.000	36.61	0.000
Explained	7.26	0.591	21.84	0.365	9.31	0.717
Education	12.23	0.024	26.24	0.007		
Wealth	12.35	0.011				
Unexplained	19.95	0.147	24.28	0.320	27.31	0.293
Wealth	2.39	0.045				
Decomposition	**Somali Region Vs. Addis Ababa City**					
	At Age 15		**At Age 20**		**At Age 25**	
	Coef.	P-val	Coef.	P-val	Coef.	P-val
Somali	22.98	0.002	74.47	0.000	92.59	0.000
Addis Ababa	8.08	0.002	35.32	0.000	55.52	0.000
Difference	14.90	0.057	39.15	0.000	37.07	0.000
Explained	27.38	0.210	-2.60	0.947	-9.82	0.813
Education	15.27	0.026	31.00	0.012		
Wealth	34.36	0.043				
Unexplained	-12.48	0.589	41.75	0.294	46.90	0.263
Migration					10.73	0.047
Decomposition	**Afar Region Vs. Addis Ababa City**					
	At Age 15		**At Age 20**		**At Age 25**	
	Coef.	P-val	Coef.	P-val	Coef.	P-val
Afar	48.66	0.000	87.50	0.000	94.73	0.000
Addis Ababa	8.08	0.002	35.32	0.000	55.52	0.000
Difference	40.58	0.000	52.18	0.000	39.21	0.000

Explained	29.51	0.177	-1.05	0.978	-9.56	0.814
Education	14.38	0.029	29.69	0.012	23.73	0.055
Wealth	33.65	0.047				
Unexplained	11.07	0.620	53.23	0.173	48.77	0.235
Education			-40.21			
Decomposition	**Other Regions Vs. Addis Ababa City**					
	At Age 15		**At Age 20**		**At Age 25**	
	Coef.	P-val	Coef.	P-val	Coef.	P-val
Other Regions	32.56	0.000	77.03	0.000	92.85	0.000
Addis Ababa	8.08	0.002	35.32	0.000	55.52	0.000
Difference	24.48	0.000	41.71	0.000	37.32	0.000
Explained	5.26	0.069	16.14	0.496	0.24	0.992
Education	10.75	0.024	23.84	0.005	19.34	0.033
Wealth	15.63	0.013				
Unexplained	19.22	0.157	25.57	0.287	37.09	0.147

3.2. Spatial heterogeneity in cumulative incidence of first marriage

3.2.1. Decomposition at the age of 15

About 56.55% of women in the Amhara region and 8.08% of women in Addis Ababa married at age 15. This implies the proportion of women getting married at age 15 is approximately 7 times higher in the Amhara region compared to Addis Ababa. When we compare Addis Ababa and Amhara regional states at age 15 for the birth cohorts, almost all the differential factors in the proportion of married women explained by coefficient effects (48.72/48.47=100%) reveal that the variables included in the analysis (represented by coefficients) explained the vast majority of the variation in age at first marriage between the two regions. About 42.49% of the difference in the proportion of married women is attributed to other factors that are not accounted for by the coefficients. No significant characteristic difference was noted in the main decomposition. The differences in educational (13.84/48.47=28.5%) and wealth index (12.82/48.47=26.44%) were the primary factors contributing to the variations in the age at first marriage between the two regions.

In Oromia and Addis Ababa, the proportion of women married at age 15 is 35.29%, and 8.08%, respectively. This means the proportion of

women married in the Oromia region is approximately 27.23% greater than in Addis Ababa. The overall difference of 27.23% in the proportion of married women is explained by detailed decomposition attributed to the wealth (12.35/27.23 = 45.35%) and educational achievements (12.23/27.23 = 44.9%) of women. Likewise, wealth has a coefficient effect to converge the gap between the proportions of married in the two regions at age 15. Among the total difference about 8.78% of the discriminatory effects were contributed by the wealth index as a response to behavior change. The result of the decomposition analysis compared between the Somali region and Addis Ababa yielded a difference of 0.057, which is considered insignificant. Therefore, there was no decomposition result report at age 15. Regarding Afar and Addis Ababa the proportion of married women at the age of 15 was 48.66% in Afar as compared to Addis Ababa. The cumulative incidence of entry to the first marriage by Afar women was 40.58% higher than that of Addis Ababa women.

The overall difference in entry to first marriage is mainly attributed to the wealth and educational attainment of the women. Among the total difference in the proportion of married women, 82.92% is explained by the wealth index, and 35.43% by educational achievements at the age of 15. Furthermore, when we compare other regional states with Addis Ababa, we see that 32.35% of the women in (Tigray, Gambela, Benishangul Gumuz, SNNP, Harari, and Dire Dawa) and 8.08% of the women in Addis Ababa got married at age 15. Collectively, other regions are 3 times higher than the capital in entry to the first marriage. The overall difference of 24.48% was attributed merely to the characteristics differences resulting from the level of educational achievements of women (10.75/24.48 = 43.91) and wealth (15.63/24.48 = 63.84%).

3.2.2. Decomposition at the age of 20

The proportion of married women is 86.04% for the Amhara region and 35.32% for Addis Ababa city. The women from the Amhara region

enter their first marriage at a rate of 50.72% higher than women in Addis Ababa who enter their first marriage at the age of 20. It suggests that women in the Amhara region are more likely to be married, and they tend to enter their first marriage at a higher rate compared to women in Addis Ababa, specifically at the age of 20. The main contributor to the overall difference in the proportion of married women was education. The Level of educational achievement of the women was the only variable that explains the overall difference of 56.23%. The cumulative incidence of the first marriage to the women living in the Oromia region was 81.45% compared to Addis Ababa (35.32%). The proportion of women residing in the Oromia region who enter their first marriage is higher by 46.13% of women residing in the capital city of the country. Women's educational achievement was the only attribute that explain the overall difference of 56.88% (26.24/46.13).

The proportion of married women was 74.47% in the Somali region as compared to women in Addis Ababa at age 20. The proportion of married women in the Somali region was 39.15% higher than that of Addis Ababa. This significant regional difference in the proportion of married women was obtained only because of a change in educational achievement (31/39.15 = 79.18%) in the Somali region. About 87.50% of women in the Afar region and 35.32% of women in Addis Ababa married at the age of 20. In the Afar region, 87.50% of women were married, while in Addis Ababa, only 35.32% of women did so. This indicates a significant difference in marriage patterns between these two regions.

The proportion of married women in the Afar region was 52.18% higher than that of Addis Ababa. Here components of endowments and discriminatory effects contribute to the overall changes in marriage. The level of educational plays a significant role in harnessing a large proportion of married women (26.69/52.18 = 51.15%) at the age of 20. We also found that coefficient effects, if education is as effective in Afar as that of Addis Ababa, more Afar women would postpone

marriage to a later age than 20 than what would have been expected. The proportion of married women in other regions is 77.03% as compared to in Addis Ababa (35.32%). The proportion of married women in other regions was 41.71% higher than in Addis Ababa. The gap was obtained merely through the educational achievements of married women in other regions than that of Addis Ababa. About 57.16% of the overall difference in the proportion of married women is explained dominantly by the educational achievements of other regions.

3.2.3. Decomposition at the age of 25

Most women of the Amhara region (95.16%) and slightly more than half (55.52%) of Addis Ababa married by age 25. The majority of women in the Amhara region (95.16%), married by the age of 25. Slightly more than half (55.52%) of the women, got married by the same age. The proportion of married women in the Amhara region is approximately 39.64% higher than that of Addis Ababa. At age 25 we observed that the two regions had significant differences in the proportion of married women, though, insignificant results in terms of endowments and coefficients effects. The proportions of married women in Oromia and Addis Ababa were 92.14%, and 55.52%, respectively.

The proportion of married women in the Oromia region is 36.61% higher than that of Addis Ababa. This huge difference is not explained well, because of characteristics differences and coefficient effects loss of significance at the same age. About 92.59% of women were married in the Somali regional state. The difference between the groups was 37.07%. All the endowments and coefficient effects except migration that explain the total differences were insignificant at the age of 25. The discriminatory effects of migration for women in the Somali region accounted for 10.73% of the total difference in the proportion of married women. From the total difference of 37.07% in the proportion of married women, 28.95% of this difference is contributed by the coefficient effects of migration.

The proportion of married women in the Afar region is 94.73%. The total difference between the two regions was 39.21%. The total difference, (23.73/39.21 = 60.52%) contributed by educational achievements of the women. From the total difference of 39.21% of the level of educational achievements of women in the Afar region contributed approximately (23.73/39.21 = 60.52%). The level of educational attainment was a significant factor contributing to the difference in the proportion of married women between the two groups. Regarding other regions and Addis Ababa city, the proportion of married women in the other regions was 92.85% at the age of 25. The overall difference between the two groups is 37.32%. Both explained and unexplained characteristics lost total significance at this particular age. However, the components of explained characteristics were significantly contributed by women's educational achievements approximately (19.34/37.32 = 51.82%) from the total difference between the two groups.

4. Discussion

This study compares the spatial heterogeneity of nuptiality patterns of the Ethiopian women using selected birth cohorts, with the identification of components and sources of the changes in the nuptiality patterns among nine regional state and two city administrations. Factors such as cultural traditions, religious beliefs, economic conditions, and levels of women's education influence the magnitude and timing of marriage. The probability of individuals entering the first marriage differed significantly based on regional variability. The country's diverse geographical and cultural landscape has contributed to variations in marriage patterns across different regions.

In Ethiopia, marriage is universal and occurs early (Gurmu and Etana 2014)**.** Similarly, the result of this study revealed that marriage is early and almost universal in all regions except in Addis Ababa in both birth cohorts**.** Among the regions where there is little change in the timing of

first marriage between the two birth cohorts, this indicates a resilience of traditional marriage practices despite broader societal changes. The stability in the timing of first marriage between birth cohorts in the SNNP and the Harari region suggests traditional marriage patterns have remained relatively consistent over time in these areas. Similarly, the median age at first marriage for women has shown a relatively stable between the two cohorts in Indonesia (Ministry of Health Indonesia 2018). This consistency influenced by factors such as strong adherence to persistent traditions and cultural norms, gradual changes in women's education social norms, and gradual shifts in gender roles and economic conditions that remained relatively stable over the years.

The reversal of the shift in marriage timing in Dire Dawa indicates that the earlier timing of marriage ages below 20 in the second birth cohort reflects persistent cultural values or economic factors that encourage early marriage. The smaller rate of entry to first marriage after the age of 20 could reveal a shift in societal attitudes toward marriage, increased educational opportunities, or changing economic conditions that lead individuals to delay marriage. The delay in the entry rate to first marriage starting from an early age in Addis Ababa, Amhara, and Benishangul Gumuz regions indicates a significant shift in marriage patterns compared to the first cohorts. The rate of entry into first marriage has decreased in sub-Saharan Africa, but the extent of the change differs among the various nations and areas on the continent (Bongaarts, Mensch, and Blanc 2017). The Shifts in the average age at marriage, often trend toward later ages, and economic conditions, social norms, and cultural attitudes that affect decisions about marriage indicate the sign of nuptiality transition.

In Addis Ababa, marriage didn't show universality. Likewise, the increasing prevalence of non-marital cohabitation in Botswana, particularly among the educated urban population, suggests a departure from the traditional universal marriage pattern. According to studies, the percentage of never-married people in Ghana has been rising,

particularly among women and people who live in urban areas (Takyi and Gyimah 2007; Chimbiri 2007). This shows that, especially among some demographic and socioeconomic groups, the nuptiality pattern has been changing, with a rise in non-marital partnerships or delayed marriage in addition to an increasing diversity of marriage patterns.

The observation of a similar trend, although to a smaller degree, in the Tigray region suggests that this shift might not be exclusive to certain areas but could be indicative of broader societal changes or trends across Ethiopia. There has been consistency in the occurrence of early marriages in both Oromia and Gambella regions, with Oromia having lower rates of marriage entry compared to Gambella. This suggests that early marriage practices have remained relatively stable in the two regions. Additionally, a higher proportion of women residing in the Gambela region postpone their entry into first marriage beyond 30 compared to other regions of the country. Understanding why women in the Gambela region are delaying marriage entry could provide valuable insights into the dynamics of marriage and family formation in that specific context. However, Tessema, 2020 revealed that the Gambela region is one of the regions with the high-risk area of early marriage in the country.

TFR for the Somali region is higher (6.9) compared to the Afar region (5.5), and it's interesting to note that the rate of marriage before age 20 is smaller for Somali than in the Afar region (Central Statistical Agency (CSA) [Ethiopia] and ICF 2016). The smaller rate of marriage before age 20 among Somali women despite higher TFR, shows differences that could result from cultural norms regarding marriage age, variations in education and economic opportunities, differences in family structures, and variations in the prevalence of early marriage practices.

In the first birth cohort, 40% of women reported to have remarried more than once, whereas in the second birth cohort, decreased to 21%. Understanding the trends provides an understanding of the dynamics of

marriage and family structure over time and informs policies and interventions supporting individuals in different stages of marital transition in Ethiopia. The incidence of remarriage decreased across all regional states and, it remained stable or potentially increased in Dire Dawa. These potential factors could be cultural norms and attitudes towards divorce and remarriage, economic conditions, support services for divorced individuals, and variations in legal frameworks regarding marriage and divorce.

The rates of remarriage (-0.20) for Amhara and Oromia, and (-0.22) for Tigray and Benishangul-Gumuz regional states across two different cohorts indicate a stable pattern over time. According to the study, Senegal's remarriage rate has been mostly constant over time, with very small differences observed between birth cohorts. For women, the proportion who had remarried by the age of 40 for both the 1938–1942 and 1948–1952 birth cohorts was almost 60% (Lambert et al. 2015). This consistent pattern implies that there may be underlying structural or cultural factors specific to these regions that influence remarriage patterns. The Afar regional state stands out with the highest decline in remarriage rates (-0.29), indicating a substantial decrease in the incidence of remarriage over time in this region. On the other hand, the Gambela regional state experienced the smallest reduction in the rate of remarriage (-0.07), suggesting a more modest decline compared to other regions and city administrations. It's interesting to note that between the two cohorts, Addis Ababa experienced the highest rate of increment in the cumulative incidence of marriage compared to other regions and Dire Dawa. This finding contradicts a previous study, where women retreat from marriage and spend most of their reproductive years being unmarried in Addis Ababa (Gurmu and Mace 2021). Addis Ababa, the capital and largest city in Ethiopia, attracts people from diverse backgrounds and regions, which may contribute to a higher overall marriage rate.

4.1. Space-time decompositions at different age

The findings from clustered regression trees analysis reveal that there are spatial differences in age at first marriage across all regions in Ethiopia. However, the analysis suggests that changes in age at first marriage observed in Addis Ababa, there is no significant change in age at first marriage observed in the other regions. This means that while there are spatial differences in marriage age across regions, these differences have remained relatively stable over time within each region, except for Addis Ababa, where changes are evident.

The disaggregated data on the average age at first marriage provides valuable insights into regional variations in marriage patterns across Ethiopia: Tigray, Afar, Amhara, Benishangul Gumuz, and Gambela have lower average ages at first marriage (around 15 years), indicating the prevalence of early marriage practices in these regions. On the other hand, Oromia, Somali, SNNP, Harari, and Dire Dawa regions exhibit higher average ages at first marriage (17 years), suggesting a tendency towards later marriages in these areas. The average age at first marriage in Addis Ababa increased from 20 years for the 1965-1969 birth cohorts to 25 years for the 1980-1984 birth cohorts. This 5-year postponement in entry to first marriage indicates a shift towards later marriages among individuals born in more recent years in the capital city. Similarly, women residing in Addis Ababa face a lower risk of entering early marriage compared to other regions of Ethiopia (Tessema 2020b).

In the Amhara region, approximately 56.55% of women marry at the age of 15. In Addis Ababa, only about 8.08% of women marry at the age of 15. This substantial gap underscores the importance of understanding regional variations in marriage practices and social norms. Similarly, the Amhara region has the greatest rate of early marriage, with 50% of females getting married at the age of 15 and 80% at 18 (Abera et al. 2020). This shows early marriage is highly prevalent. There are insignificant total characteristic differences noted between the regions except for component differences. This implies the overall

structures or patterns are similar, and that specific elements contributing to those structures vary between the two regions. The difference in educational attainment contributes approximately 28.5% to the variation in the age at first marriage between Amhara and Addis Ababa. The difference in wealth index contributes approximately 26.44% to the variation in the age at first marriage between the two regions. Educational attainment and wealth index are indeed significant factors contributing to the differences in age at first marriage between the Amhara region and Addis Ababa. Sub-Saharan Africa has significant geographical variance in marriage trends, which can be attributed to factors such as household affluence and female education levels (Shapiro and Gebreselassie 2014).

The detailed decomposition of the proportion of married women revealed that; the overall difference in the proportion of married women between the Oromia region and Addis Ababa city is 27.23%. Approximately the overall difference (12.35/27.23 = 45.35%) explains differences in the wealth index and (12.23/27.23 = 44.9%) explains differences in the educational achievements between the two regions. This analysis indicates that both wealth and educational achievements play significant roles in explaining the observed differences in the proportion of married women between the Oromia region and Addis Ababa.

The variables that were included in the analysis did not have a significant role in explaining the difference in the proportion of married women between Addis Ababa and the Somali region. Cultural norms, religious views, or other contextual factors specific to these areas may have a greater influence on the differences in marriage rates between the two regions at age 15. This could imply that unaccounted factors might be more influential in shaping marriage patterns in these two regions, other than demographic and socioeconomic considerations. The cumulative incidence of entry to first marriage for women in Afar is 40.58% higher than for women in Addis Ababa. These figures

highlight a significant disparity in marriage rates between the Afar region and Addis Ababa, with Afar women marrying at a much higher rate and at an earlier age compared to women in Addis Ababa.

Like that of the Oromia region and Addis Ababa city both the wealth and educational achievements of women play significant roles in explaining the observed differences in the proportion of married women between the two regions. The overall difference in the proportion of women marrying at the age of 15 between other regional states (including Tigray, Gambela, Benishangul Gumuz, SNNP, Harari, and Dire Dawa), and Addis Ababa is 24.48%. This difference is primarily attributed to two factors: women's educational achievements (10.75/24.48 = 43.91) and wealth index (15.63/24.48 = 63.84%). Addressing inequalities in education and wealth distribution could be key to promoting more equitable marriage practices across regions. The proportion of married women between the Amhara region and Addis Ababa is significant: In the Amhara region, approximately 86.04%, and in Addis Ababa, 35.32% of women are married at the age of 20. This substantial difference suggests notable variations in marriage patterns and possibly reflects differences in cultural norms, socio-economic factors, and urban-rural dynamics between the two areas.

Women in the Oromia region enter their first marriage at a rate that is 46.13% higher than women in the capital city which is at the age of 20. Furthermore, women's educational achievement is the sole attribute that explains the overall difference, accounting for 56.88% of the variation. The proportion of married women in the Somali region is 39.15% higher than that of women in Addis Ababa which is at the age of 20. This significant regional difference in the proportion of married women is attributable solely to changes in educational achievement, accounting for 79.18% of the variation. This is aligned with the economic theory of marriage, which postulates that educated women would value advancing their careers over marriage since they see less financial gain

from it. Higher-educated females tend to marry later and at a lower rate than other regions (Oppenheimer 1988).

If education in Afar was as effective as in Addis Ababa, Afar women would be more likely to postpone marriage to a later age, potentially beyond 20 years old, compared to what is currently observed. This finding highlights improving educational opportunities and achievements in the Afar region could lead to positive outcomes such as delaying marriage, which can have various socio-economic benefits for individuals and communities. The efforts to enhance education access and quality in Afar could therefore contribute to positive social change and empowerment for women. Approximately, 57.16% of the overall difference in the proportion of married women is predominantly explained by differences in the educational achievements in other regions compared to those in Addis Ababa. The Amhara region and Addis Ababa reveal significant differences in the proportion of women marrying by age 25. In the Amhara region, an overwhelming majority of women (95.16%), and Addis Ababa, slightly more than half of women (55.52%) married by the age of 25. On the other hand, a small percentage of women in the Amhara region marry after the age of 25, with only 4.84% falling into this category. This indicates a strong cultural norm or social pattern where marriage tends to occur at younger ages in the region.

About 44.48% of women in Addis Ababa who marry after the age of 25 indicate that a significant portion of women in the city marry at later stages. In the Oromia region, approximately 92.14% of women are married by the age of 25. In Addis Ababa, approximately 55.52% of women marry by the age of 25, which reveals that a much higher proportion of women in the Oromia region marry at younger ages compared to women in Addis Ababa. The influence of migration is the only significant contributor to the observed differences in marriage rates in the Somali region at this particular age. Programs and policies aimed at changing nuptiality patterns in the Somali region might need

to emphasize managing migration and addressing the socioeconomic factors that influence population mobility. From the total difference of 39.21% in the proportion of married women, the level of educational achievements in the Afar region contributed approximately 60.52% to this difference (23.73/39.21). This indicates that educational attainment significantly contributes to the difference in marriage rates between the Afar region and Addis Ababa.

Generally, the Amhara region has the highest proportion of married women compared to other regions, particularly Addis Ababa at the age of 15. This underscores the significant demographic difference between rural and urban areas in Ethiopia. Oromia region has the smallest difference in the proportion of married women compared to Addis Ababa by the age of 15 among the regions analyzed. This suggests that, relative to other regions, there is less disparity in the prevalence of early marriage between Oromia and Addis Ababa at this age. Afar region has the highest proportion of married individuals compared to the other regions, particularly compared to Addis Ababa at the age of 20. The Somali region has the smallest difference in the proportion of married women compared to Addis Ababa by the age of 20 among the regions analyzed. The Amhara and Afar regions have the highest proportion of married women compared to other regions at the age of 25. The Oromia region has the smallest difference in the proportion of married women compared to Addis Ababa by the age of 25 among regions analyzed. This indicates the significant influence of education and economic factors on the marriage patterns among women in Ethiopia. The necessity of investigating spatial heterogeneity in change in nuptiality patterns is to underscore the importance of considering local contexts and specific challenges in different regions when developing policies and programs aimed at improving the well-being of women and girls.

This study compared two birth cohorts among nine regional states and two city administrations, as the first cohort lived in an era where Ethiopia had no population policy and girls' education was limited.

Whereas, the second cohort lived through a policy period -population policy, and the times were characterized by a regime change and a rise in girls' enrollment and improved access to reproductive health services. Further, assuming that the first birth cohort represents the absence of population policy and the second cohort represents women's experience within police presence. This study uses Addis Ababa as a point of reference or counterfactual to better understand and contextualize the changes in nuptiality patterns across Ethiopia's various regions. The analysis of policy intervention revealed that there was hardly any variation between the birth cohorts in the Southern, Nations, and Nationalities and People (SNNP) and Harari regions, which meant the policy contribution was found to be negligible.

However, when disaggregated by the regional states, the age at first marriage becomes 15 in Tigray, Afar, Amhara, Benishangul Gumuz, and Gambela indicating that practiced early marriage compared to 17 years in Oromia, Somali, SNNP, Harari, and Dire Dawa. Further, the average age at first marriage was 20 for the 1965 –1969 birth cohort and 25 for the 1980 –1984 birth cohort for Addis Ababa. This indicates a 5-year postponement in entry to the first marriage between the two birth cohorts, showing a trend towards later marriages over time.

In Southern, Nations, and Nationalities and People (SNNP) and Harari regions, there was almost no change between the birth cohorts showing policy contribution is insignificant. Dire Dawa policy did nothing to influence the reversal of marriage patterns for ages below 20, however, contributed after the age of 20. Contrarily, beginning at relatively early ages, the policy reforms implemented in Addis Ababa, Amhara, and Benishangul Gumuz caused a delay or postponement in the age at which people were entering their first marriage. In Addis Ababa, there is a deviation from universal marriage patterns due to effective policy implementation which almost holds for the Tigray region. In Oromia, the earliest early marriages remained similar for the two birth cohorts due to policy. In Gambela, the policy is very effective in postponing

marriage beyond the age of 30. The policy seems to have successfully encouraged marriage to happen beyond the age of 20 in the Somali and Afar regions, but it had less of an effect on completely preventing early marriage before 20.

4.2. Strengths and limitations of the study

The main strength of this study is the use of nationally representative data, which was collected using the standard and validated data collection tools. Additionally, we used an advanced model spatial analysis that accounts for understanding geographic variation in age at first marriage. However, this study is not free from limitations. Because of the secondary nature of the data, factors such as parents' knowledge of the best marital age and knowing someone who is accused of early marriage have not been included in the analysis. Besides, due to the cross-sectional nature of the data, we are also unable to show the cause-and-effect relationship. Secondly, the study does not include men. Despite these limitations, this study's finding contributes to the existing literature by exploring the spatial pattern of marriage and its determinants which provides evidence to target intervention programs in high-risk areas and populations in Ethiopia.

5. Conclusion and recommendation

In the past, marriage was early and universal in Ethiopia. However, when disaggregated spatially marriage is not universal in Addis Ababa. Women residing in the Gambela region postpone entry to first marriage beyond the age of 30. In Southern Nations, Nationalities, and Peoples' (SNNPR) and Harari region traditional marriage patterns remained relatively consistent over time. The incidence of remarriage reduced across all regional states between the two birth cohorts except for Dire Dawa. The Afar regional state is one of the regions with the highest decline in remarriage rates. The Gambela region has the smallest decline in the rate of remarriage.

In the Benishangul-Gumuz no change in the cumulative incidence of marriage. The SNNP and Amhara regional states show the highest rate of reduction in marriage rates. The change in average age at first marriage is seen in Addis Ababa. The educational attainment of women, wealth index, and migration are the only coefficient effects that explain the overall difference in the proportion of married women Addressing inequalities in education achievements and wealth distribution key to promoting more equitable marriage practices across all regions. Generally, this study found that there is spatial heterogeneity in nuptiality patterns among all regions. Understanding regional variations in change in nuptiality patterns is essential for policymakers and researchers to develop targeted interventions and policies that address the specific needs and challenges related to marriage and family formation.

The national population policy contributed little changes in nuptiality patterns in SNNP and Harari region. The regional heterogeneity in policy outcomes underscores the importance of considering sub-national factors when designing and evaluating demographic policies. The lack of adequate data limited an examination of the pathways through which the covariate influences change in nuptiality patterns in each of the regions, because this required longitudinal data, and EDHS used cross-sectional data. Due to a lack of sufficient resources, including money and time, the cultural concerns surrounding the change in nuptiality patterns were not investigated. Future research should look for pathways and examine how the different covariates interact with one another.

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