Dibaba and Charkos
Contraception and Reproductive Medicine (2025) 10:10
https://doi.org/10.1186/s40834-024-00328-1

Contraception and Reproductive Medicine

RESEARCH

Open Access

Challenges in reducing grand multiparity rates in Ethiopia: an analysis of 2019 EDHS data using a multilevel model approach

Diriba Dibaba[1] and Tesfaye Getachow Charkos[2*]

Abstract

Background One of the Sustainable Development Goals (2030) focuses on reducing the total fertility rate. Reducing grand multiparity in Ethiopia remains a challenge. Understanding the underlying factors that contribute to this issue is crucial for explaining why grand multiparity remains prevalent despite various health interventions and socio-economic progress.

Methods A community-based cross-sectional study was conducted using data from the Ethiopian Demographic and Health Survey 2019. Multilevel multivariable logistic regression analysis was employed to model the hierarchical data. The final findings were presented as adjusted odds ratios (AOR) with 95% confidence intervals (CI). A p-value < 0.05 was considered statistically significant.

Result The trend analysis of grand multiparity in Ethiopia over 19 years shows no significant change (linear trend = 1.23, $p = 0.27$). The prevalence slightly decreased from 72% in the 2000 EDHS to 66.3% (95% CI: 65.7 – 66.96%) in the 2019 mini EDHS. Additionally, the highest prevalence of grand multiparity was observed among illiterate women (79.7%), those from poor households (54.8%), non-family planning users (77.5%), and residents of the Oromia (15.8%) and SNNPR (15.4%) regional states. Significant individual-level factors associated with grand multiparity include wealth index, marital status, maternal education, non-use of family planning, use of short-acting family planning, age at first birth < 18 years, and short birth intervals. At the community level, rural residency was significantly associated with grand multiparity.

Conclusion This study emphasizes the need for targeted interventions to address the socio-economic and reproductive factors driving grand multiparity, especially in rural areas and among disadvantaged populations. To improve maternal and child health outcomes, we recommend that the government focus on lowering fertility rates through need-based family planning services and promoting the well-being of women of reproductive age.

Keywords Trend, Magnitude, Grand multiparity, Reproductive age, Multilevel, Ethiopia

What is already known on this topic

- Grand multiparity in Ethiopia has remained high, as shown by data from the four Demographic and Health Surveys (DHS) conducted between 2000 and 2016.

*Correspondence:
Tesfaye Getachow Charkos
tesfayegch@gmail.com
[1] Department of Public Health, Madda Walabu University, Bale-Goba, Ethiopia
[2] Department of Public Health, Adama Hospital Medical College, Adama, Ethiopia

What this study adds

- No significant change in grand multiparity rates was observed for the past five EDHS surveys (2000–2019).
- The prevalence of grand multiparity is notably higher, exceeding 80%, among disadvantaged women, including those who are illiterate, come from the poorest families, and do not use family planning methods.

How this study might affect research, practice, or policy

- The government should implement targeted interventions addressing the identified factors to reduce grand multiparity rates and improve maternal and child health outcomes.

Introduction

Grand multiparity is a significant public health concern in developing countries, particularly in sub-Saharan Africa [1], including Ethiopia [2].]. It is a high-risk pregnancy condition where the mother, fetus, or newborn are more likely to experience morbidity or mortality during pregnancy [3–6], delivery, or the postpartum period [7–9]. Similar to infectious diseases, grand multiparity remains a major public health challenge in underdeveloped nations, where its prevalence ranges from 10 to 71% [8, 10–13]. Several factors contribute to this high prevalence, including inadequate healthcare service coverage, illiteracy, women's disempowerment, and economic challenges. In contrast, in many industrialized countries, grand multiparity is becoming less of a concern, with a much lower prevalence of 2–4% [3, 14, 15]. In 2019, the global fertility rate was 2.5, a decline from 3.2 live births per woman in 1990. However, Sub-Saharan Africa experienced an increase, reaching 4.6 in 2019 [8, 16].

Perinatal outcome problems are more prevalent in low- and middle-income countries compared to high-income countries [8, 17, 18]. Evidence shows that grand multiparity increases the incidence of various medical and obstetric complications, including anemia, birth asphyxia, preterm birth, low birth weight, macrosomia, stillbirth, and elevated perinatal mortality rates [4, 5, 19]. Studies conducted in developing countries suggest that adverse perinatal outcomes are significantly more common in grand multiparity compared to multiparity [1, 6, 20, 21].]. One of the United Nations Sustainable Development Goals (SDGs) for 2030 [22] is to reduce the total fertility rate by providing need-based family planning services and promoting the well-being of women of reproductive age [21].

Several studies suggest that grand multiparity (GMP) is associated with various factors, including young age at first marriage [13], low socioeconomic status [23–25], polygamous marriage [24], husband preference, culture, religion, and rural residence [4, 8, 11, 13, 19]. The high prevalence of GMP in sub-Saharan Africa is further attributed to limited access to modern contraceptives [25–30], low literacy rates [1, 12, 31], inadequate media exposure [2, 13], and low health awareness levels [9, 32].

Reducing grand multiparity remains a challenge in Ethiopia, where its prevalence has been inconsistently reported in previous studies [12, 13]. Since most previous studies in Ethiopia [2, 12, 13, 33] used a small sample size, their findings may not be generalizable to the entire population. Therefore, the first aim of this study was to determine the prevalence of grand multiparity (GMP) at the national level, using nationally representative data from the Ethiopian Demographic and Health Surveys (EDHS) from 2000 to 2019. Additionally, we aimed to assess trends in prevalence across different socio-demographic and economic groups through stratified analysis. The second aim was to identify individual- and community-level factors associated with GMP. This investigation will provide valuable insights to guide future health interventions, ensuring they are better tailored to address the root causes of grand multiparity and help reduce its prevalence in underdeveloped areas.

Methods

Study setting and design

This study was based on EDHS data collected from 2019, which was a nationwide representative cross-sectional study. The data were collected every five years from all regional states of Ethiopia, and it was freely available online at https://dhsprogram.com/.. The survey questionnaire includes information about population, health, and other important indicators. The study subjects were selected based on two-stage stratified sampling techniques. Each region was divided into urban and rural areas, creating 21 sampling strata. A total of 305 enumeration areas (EAs) were independently selected. Implicit stratification and proportional allocation were ensured by sorting the sampling frame within each stratum by administrative units and using probability proportional to size selection in the first stage (26). The study population consisted of women who had at least one live birth during the study period. A total of 21,861 women were included in this study. In addition, to assess trends in the prevalence of grand multiparity (GMP) over the past 19

years, we utilized pooled prevalence data from multiple EDHS surveys conducted between 2000 and 2019.

Study variables

The dependent variable in this study was grand multiparity (yes or no). The independent variables include place of residence, maternal age, education status, wealth index, current marital status, polygamous marriage status, religion, community media exposure, maternal age at first birth, preceding birth interval (months), type of contraceptive used, and place of delivery. Community-level variables were religion, place of residence, and community media exposure status.

Operational definition

Grand multiparty: is defined as five births or more following a gestational age of 28 weeks or a fetal weight of 1000 gm or more (1).

Multiparity: is defined as 2–4 five births following a gestational age of 28 weeks or a fetal weight of 1000 gm or more).

The birth interval: of reproductive-age women was categorized as a short birth interval (birth interval less or equal to 36 months) and a normal birth interval (greater than 36 months) (29).

Data analyses

Descriptive statistics, mean ± standard deviation was used for continuous normally distributed variables. While frequency (percentage) was used for categorical variables. The trend analysis was tested using the extended Mantel Haenszel χ^2 test for the linear trend. The EDHS data's nested structure within regions required an intra-class correlation (ICC) test to assess cluster variability. A multilevel logistic regression analysis was conducted with four models [34]: the null model (without explanatory variables), Model II (with individual-level variables), Model III (assessing community-level variables and their association with grand multiparity), and Model IV (combining both individual and community-level variables to evaluate their joint effect on grand multiparity). The final model examined the independent

Table 1 Socio-demographics, sexual and reproductive characteristics of the reproductive age women from the Ethiopian Demographic Health survey of 2019

Variables	Category	Multipara *n* (%)	Grand multipara *n* (%)	*P*-value
Age of the mothers	< 24	11,587 (16.02)	77(0.53)	< 0.001
	25–29	2492 (33.86)	771,451 (10.01)	
	30–34	1585 (21.24)	2901 (0.53)	
	35–39	1174 (1.51)	3666 (25.28)	
	40–44	564 (7.66)	3501 (24.14)	
	45–49	387 (5.51)	2905 (20.03)	
Place of residency	Urban	2272 (30.87)	2158 (14.88)	< 0.001
	Rural	5088(62.13)	12,343 (85.12)	
Religion	Orthodox	2777 (37.73)	3710 (25.58)	< 0.001
	Catholic	68 (0.92)	123 (0.85)	
	Protestant	1414 (19.21)	3197 (22.05)	
	Muslim	3029 (41.15)	7235 (49.89)	
	Traditional	72 (0.98)	236 (1.63)	
Marital Status	Others	957 (13)	1424 (9.82)	< 0.001
	Currently married	6403 (87)	13,077 (90.18)	
Preceding birth interval	Normal	4850 (65.90%)	5635 (38.86)	< 0.001
	Short birth Interval	2510 (34.10%)	8866 (61.14)	
Polygamy status of the mother	Not polygamy	24 (0.33)	57 (0.39)	0.441
	Polygamy mother	7336 (99.67)	14,444 (99.61)	
Age of mother at first birth	above 18 years	4096 (55.65)	5212 (35.94)	< 0.001
	Below 18 years	3264 (44.35)	9289 (64.06)	
Exposure to media	No	5268 (71.58)	10,869 (74.82)	< 0.001
	Yes	2092 (28.42)	3632 (25.05)	
Place of delivery	Home	1321 (17.95)	1405 (9.69)	< 0.001
	Health Facilities	6039 (82.05)	13,096 (90.31)	

Others*: Divorced/widowed /separated

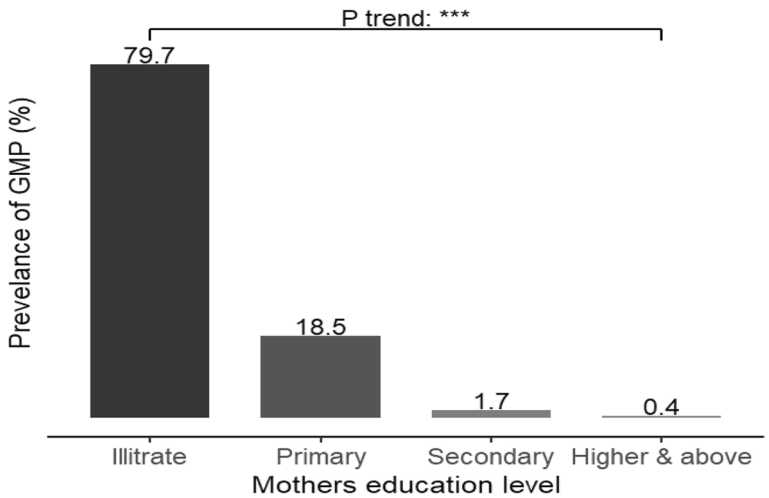

Fig. 2 The prevalence of grand multiparity across the educational levels of mothers. (***: indicates that a significant trend exists; as the educational level increases, the prevalence of grand multiparity decreases)

effects of these variables on grand multiparity, with results reported using 95% confidence intervals (CI) and *p*-values. A *p*-value less than 0.05 was considered statistically significant. A analysis was performed uisng STATA (version 17) and R program (version 4.4.1).

Results

Socio-demographic characteristics of study participants

In this study, a total of 21,861 women were included in the analysis from EDHS 2019 data. The mean age (± SD) of the women was 34.6 ± 7.6 years, of this 25.28% of the grand multipara women aged between 35 and 39 years. Three-fourths of grand multipara women reside in rural communities (79.69%). More than half (61.1%) of reproductive-age women gave birth within short birth intervals and 66.06% of mothers started giving their first birth at the age below 18 years (Table 1).

Grand multiparity of women in Ethiopia

The prevalence of grand multiparity in Ethiopia has shown a steady but non-significant decline over 19 years, from 72.8% in 2000 to 66.3% in the 2019 Mini EDHS (Fig. 1). Data from five surveys, including the Mini EDHS 2019, revealed no statistically significant trend (Mantel-Haenszel χ^2 test for linear trend = 1.23, $p = 0.27$), indicating that grand multiparity rates have remained largely stable over this period (Fig. 2). Grand multiparity was highest among illiterate mothers (79.7%) and

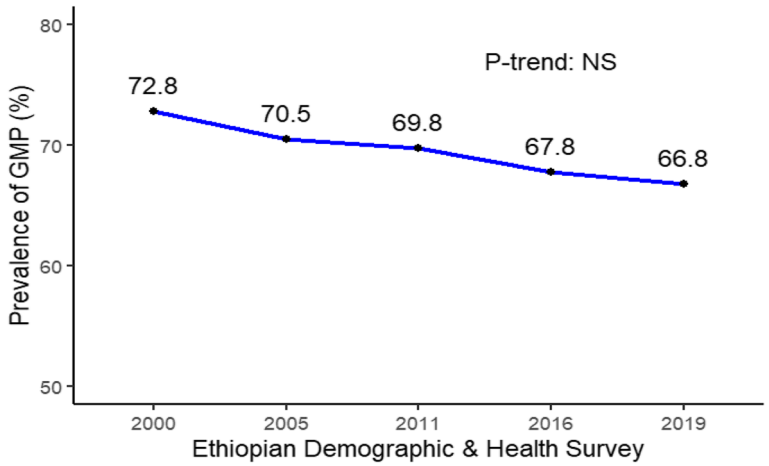

Fig. 1 The magnitude of grand multiparity among reproductive-age women in Ethiopia, based on the 2019 Mini Ethiopian Demographic and Health Survey (MEDHS)

decreased significantly with education: 18.5% for primary, 1.7% for secondary, and just 0.4% for higher education (P trend < 0.001) (Fig. 2). Grand multiparity was highest among mothers from the poorest households (34.5%) and decreased significantly with rising wealth: 20.3% for poorer, 17.8% for middle, 16.8% for richer, and 10.7% for the richest families ($P < 0.001$) (Fig. 3). Grand multiparity was found in 77.5% of mothers who had never used family planning, 14.9% of those using short-acting methods, and 7.6% of long-acting method users ($P < 0.001$) (Fig. 4).

Grand multiparity was significantly higher in Oromia (15.8%) and the Southern Nations, Nationalities, and Peoples' Region (15.4%), while the lowest was in Addis Ababa (0.9%) ($P < 0.001$) (Fig. 5).

Grand multiparity and association factors

In the model assumption check, the ICC value was found to be 32%, indicating that cluster differences accounted for 32% of the likelihood of a woman being grand multiparous. As a result, multilevel logistic regression analysis was used in this study.

In the adjusted multilevel analysis, being a poor family was more likely for grand multiparity compared to the mother from the richest family (AOR: 1.29; 95% CI: 1.07–1.60). The odds of grand multiparity were 74% higher for currently married women compared with not-married women (AOR: 1.74; 95% CI: 1.56–1.96). Mothers who didn't attain formal education were 16 (AOR: 16; 95% CI: 11–22) times higher odds of being grand multiparity compared to those who attended higher education. The odds of grand multiparity were 23% (AOR: 1.23; 95%CI: 1.08–1.41) higher among mothers who don't use any family planning compared to mothers who use long-acting family planning methods. The odds of grand multiparity were 26% higher (AOR: 1.26; 95% CI: 12.10–2.43) among mothers who married below the age of 18 years compared with counterparts. The odds of being grand multiparity were 43% higher (AOR: 1.43; 95% CI:3.11–3.79) among mothers who gave birth at a health facility compared to their counterparts. Mothers who had less than 36 months of birth intervals were 76% more likely for grand multiparity compared to the normal birth interval. Concerning community-level factors, the odds of grand multiparity were 12% more likely among mother who resides in rural communities compared to mothers from urban residences (AOR: 0.93; 95% CI: 0.86, 1.01) (Table 2).

Discussion

In this study, the prevalence of grand multiparity was 66.3% (95%CI: 65.7–66.96), remaining consistent with the findings from the previous four nationally representative Ethiopian Demographic and Health Surveys [35–38]. Similarly, these results align with earlier small-sample studies conducted in the Gedeo Zone (69.1%) [12], Enderta in the Tigray Region, Ethiopia (51%) [33], and the Sidama Region of Ethiopia (70.8%) [13]. However, the finding was significantly higher than those from studies conducted in Northern Tanzania (9.44%) [8], and an institution-based study in Jimma, Ethiopia (8%) [2]. The discrepancy in these findings can be due to differences

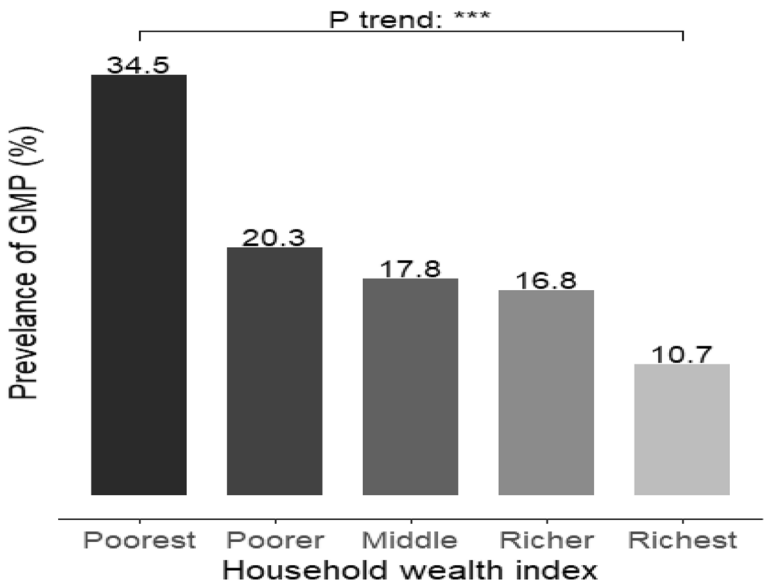

Fig. 3 The prevalence of grand multiparity across the household wealth index. (***: indicates that a significant trend exists; as the wealth index of households level increases, the prevalence of grand multiparity decreases.)

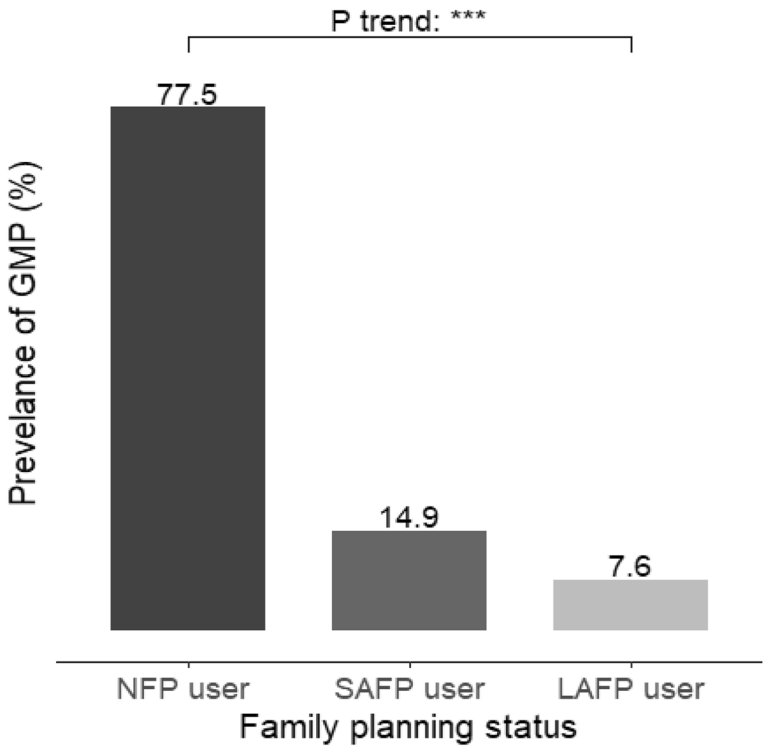

Fig. 4 The prevalence of grand multiparity across family planning among mothers. (***: indicates that a significant trend exists; NFP non-family planning user, SAFP: short-acting family planning; LAFP: long-acting family planning user)

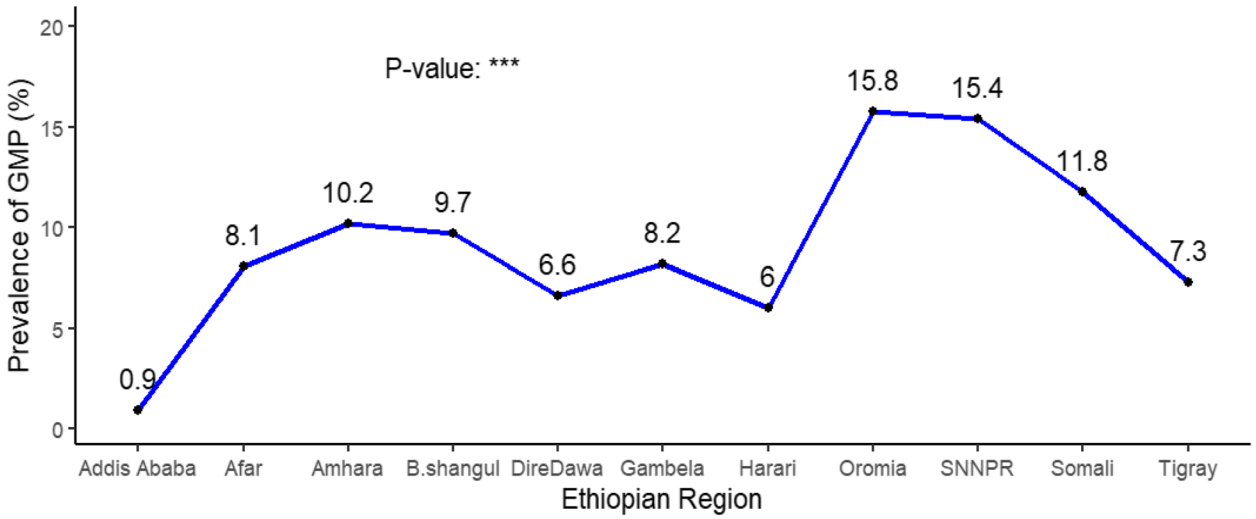

Fig. 5 The prevalence of grand multiparity across the Ethiopia regional state. (***: indicates that a significant association between the regional state and GMP)

in study settings. The current study was conducted at a national level, providing a more comprehensive representation of the population across Ethiopia. In contrast, the studies in Tanzania [8], Cameroon [23], and Jimma [2] were limited to a single site and institutional-based. These narrower settings may not fully capture the diversity and variations in grand multiparity prevalence that exist at the national level, which could explain the observed differences in results.

Table 2 An individual- and community-level determinants of grand multiparity in Ethiopia using multilevel logistic regression analysis, MEDHS 2019

Variables	Category		Model 2 AOR (95% CI)	Model 3 AOR (95% CI)		Model 4 AOR (95% CI)
Individual level factors						
Wealth index	Poorest	1.55(1.29, 1.85)				**1.29(1.07, 1.60)**
	poorer	1.44(1.21, 1.72)				**1.21(1.10, 1.50)**
	Middle	1.35(1.14, 1.60)				1.14(0.96, 1.36)
	Richer	1.37(1.16, 1.61)				**1.205(1.02, 1.40)**
	Richest	1			1	1
Marital status	Married	1.76(1.57, 1.98)				**1.74(1.56,1.96)**
	Other[a]	1			1	1
Educational level	illiterate	16(12, 23)				16(11, 22)
	Primary education	5.25(3.79, 7.25)				**5.08(3.6, 7.01)**
	Secondary education	1.81(1.27, 2.57)				**1.78(1.25, 2.52)**
	Higher	1			1	1
Family planning utilization status	Non-users	1.23(1.08, 1.40)				**1.23(1.08, 1.41)**
	Short-acting	0.74(0.64,0 0.86)				0.74(0.64, 0.86)
	Long-acting users	1			1	1
Age at first birth	> 18 years old	1			1	1
	< 18 years	2.27(2.12, 2.45)				**2.26(2.10, 2.43)**
Place of delivery	Home	3.41(3.0, 3.77)				**3.43(3.11, 3.79)**
	Health facility	1			1	1
Preceding birth interval	Short birth interval	2.75(2.57, 2.95)				**2.76(2.6, 2.96)**
	Normal birth interval	1			1	1
Community level factors						
Mother Media exposure status	Exposed		1	1		1
	Not Exposed			0.93(0.86, 1.01)		0.96 (0.82, 1.23)
Place of residence	Urban		1	1		1
	Rural			5.28(4.04, 6.91)		**2.12(1.67, 2.70)**

Others[a]: Divorced/widowed /separate; AOR: adjusted odds ratio; Bold: inclidates a statistical significance

The wealth index of a household was a key determinant of grand multiparity in this study. In the adjusted model, we found that women from the poorest wealth index had 29% higher odds of being grand multiparous compared to those from the richest wealth index. This finding is consistent with study conducted in the Gedeo Zone, Southern Ethiopia [12]. This may be because families in the poorest households often view having more children as a means of generating income, relying on them for labor or financial support [39–41]. This situation is particularly prevalent among poor households in the rural parts of Ethiopia [38, 42, 43].

Education was a significant determinant of grand multiparity, with illiterate women had higher odds of experiencing grand multiparity compared to those with higher education. This finding is supported by a study conducted in Enderta, Tigray, Ethiopia [33], and Sidama region, Ethiopia [13]. This is likely because the majority of grand multiparous women in this study reside in rural areas (85.12%) and are illiterate (79.7%), factors that often contribute to shorter schooling, early marriage, and higher fertility rates [12]. This is because lower education levels are often linked to limited access to family planning, fewer economic opportunities, and traditional societal norms that favor larger family sizes [44, 45]. In addition, illiterate women may marry earlier, have less control over reproductive choices, and experience higher fertility rates due to limited access to education and healthcare services [46, 47].

Although the utilization of family planning may seem self-evident in relation to grand multiparity, women who did not use any family planning methods had 23% higher odds of experiencing grand multiparity compared to those using long-acting family planning methods. This finding is consistent with results from studies conducted in Pakistan [28], Nigeria [25], Ethiopia [47], and Nepal [48]. Similarly, short preceding birth intervals were significantly associated with grand multiparity among women in Ethiopia. Women with preceding birth intervals of less than 36 months (short intervals) were more likely to experience grand multiparity than those with longer preceding birth intervals. This findings were supported by the previous studies [49, 50].

Grand multiparity was twofold higher among women who gave birth for the first time before the age of 18, consistent with studies conducted in Ethiopia [12, 33]. This trend may be due to factors such as immaturity and limited access to, and low health awareness levels [9, 32], family planning services [51], particularly in rural areas where traditional beliefs and cultural norms often prioritize larger family sizes [4, 8, 13, 19, 52]. Misconceptions about modern contraceptive methods, coupled with socio-economic barriers, can discourage women from utilizing family planning, resulting in higher fertility rates and an increased likelihood of grand multiparity [53, 54]. Similarly, married mothers were more likely to experience grand multiparity compared to their counterparts. This is likely due to a desire for a large family size [44, 45] and the need for labor [39–41], as the majority of our study participants are from rural areas.

We found that mothers who delivered at home were significantly more likely to experience grand multiparity compared to those who delivered at a health facility. This findings were in agreement with previous studies [45, 55, 56]. This may be due to several factors, including limited access to family planning in the postpartum period, cultural preferences for large families, and economic or geographic barriers that hinder access to healthcare facilities [50]. In many rural areas, home delivery is more common due to traditional practices [50, 56], a lack of transportation, or the perception that women with multiple previous births may not require skilled care.

Under community-level factors, mothers residing in rural areas were more likely to experience grand multiparity compared to those living in urban areas. Thus, mothers residing in rural areas were two times more likely to experience grand multiparity compared to women in urban areas. These findings are consistent with previous studies conducted in Ethiopia [42, 45, 47, 49, 54, 55]. This infact that in rural areas, there is often limited access to healthcare services, including family planning and maternal health care, which leads to shorter birth intervals and higher fertility rates. Additionally, cultural norms and traditional practices in rural settings may encourage larger families [8, 13, 44, 45, 52], and women may have less autonomy in reproductive decision-making. Economic constraints, lack of transportation, and limited education can also contribute to higher parity [44, 45], as women in rural areas may have fewer opportunities to delay childbearing or access contraception. In contrast, urban areas typically have better access to healthcare, family planning services, and education, which can reduce the likelihood of grand multiparity.

Limitation the study

Several limitations are inherent to the methods used by the Demographic and Health Surveys (DHS). First, the study employed a cross-sectional design, making it difficult to establish causal relationships between the various variables and grand multiparity (GMP). Second, the DHS primarily focuses on quantitative data and does not encompass qualitative aspects that capture the nuances of people's attitudes, beliefs, and social dynamics, which could provide insight into factors contributing to higher parity. Lastly, we did not assess interaction effects on grand multiparity, as

the majority of participants in this study were from rural communities with similar characteristics.

Conclusion

This study revealed that there has been no significant change in the trend of grand multiparity among women in Ethiopia over the past 19 years. The findings suggest that several socio-economic and demographic factors contribute to high parity, including the family's wealth index, marital status, maternal education, utilization of family planning methods, age at first birth, length of birth intervals, and rural residence. These factors emphasize the need for targeted interventions that address access to family planning, education, and economic opportunities, particularly in rural areas, to reduce the prevalence of grand multiparity and improve maternal and child health outcomes in Ethiopia.

Abbreviations

AIC	Akaike Information Criterion
AOR	Adjusted Odd Ratio
BIC	Bayesian Information criterion
CI	Confidence Interval
DHIS	Demographic health survey
EAs	Enumuration areas
EMOH	Ethiopian Ministry of Health
ICC	Intra Class Correlation
LLI	Likelihood Ratio Test
MEDHS	Minin Ethiopian Demographic Health Survey
SNNPR	Southern Nations, Nationalities and Peoples' Region

Acknowledgements

We would like to thank the measure DHS Program and ICF International for providing us with permission to use the EDHS data. In addition, also like to acknowledge our friends for their assistance during our manuscript preparation.

Authors' contributions

D.D. and T.G.C. contributed to the study idea and design, collected, analyzed, interpreted the data, and prepared the main manuscript. D.D. and T.G.C. contributed to analyzing, interpreting, drafting, and revising the manuscript. Both authors read and approved the final manuscript.

Funding

The authors received no funding for this research.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 23 September 2024 Accepted: 6 December 2024
Published online: 05 February 2025

References

1. Alsammani MA, et al. Effect of Grand Multiparity on pregnancy outcomes in women under 35 years of age: a comparative study. Med Arch. 2019;73(2):92–6.
2. Yesuf Ahmed Aragaw MMaHJ. Grand multiparity and pregnancy related complications among women who gave birth at Jimma University Specialized Hospital, Jimma, Southwest Ethiopia. Gynecol Obstet. 2017;7:4.
3. Mgaya AH, et al. Grand multiparity: is it still a risk in pregnancy? BMC Pregnancy Childbirth. 2013;13: 241.
4. Shahida SM, et al. Maternal outcome of grand multipara. Mymensingh Med J. 2011;20(3):381–5.
5. Asima Afzal NM, Firdous N. Pregnancy outcomes in grand multiparous patients: a hospital based study from Jammu and Kashmir, India. Int J Reprod Contracept Obstet Gynecol. 2016;5(3):788–92.
6. Alhainiah MH, Abdulljabbar HSO, Bukhari YA. The prevalence, the fetal and maternal outcomes in Grand Multiparas women. Mater Sociomed. 2018;30(2):118–20.
7. Shechter Y, et al. Obstetric complications in grand and great grand multiparous women. J Matern Fetal Neonatal Med. 2010;23(10):1211–7.
8. Muniro Z, et al. Grand multiparity as a predictor of adverse pregnancy outcome among women who delivered at a tertiary hospital in Northern Tanzania. BMC Pregnancy Childbirth. 2019;19(1):222.
9. Oshodi KS. K, Prevalence and risks/challenges of Grand Multiparity to women's health in Oyo State Nigeria. African J Psychol Study Soc. 2019;22:13–35.
10. Mutihir JT. Obstetric outcome of the grandmultipara in Jos, Nigeria. J Med Tropics. 2005;7(1):14–20.
11. Hoque, M., E. Hoque, and S.B. Kader, Pregnancy complications of grandmultiparity at a rural setting of South Africa. 2008.
12. Reda MG, Bune GT, Shaka MF. Epidemiology of high fertility status among women of Reproductive Age in Wonago District, Gedeo Zone, Southern Ethiopia: A Community-based cross-sectional study. Int J Reprod Med. 2020;2020:p2915628.
13. Dasa TT, Okunlola MA, Dessie Y. Multilevel analysis of grand multiparity: Trend and its determinants in the Sidama National Regional State of Ethiopia: a cross-sectional study design from demographic and health survey 2000–2016. BMJ Open. 2022;12(8):e061697.
14. Rosen S, et al. Initiating antiretroviral therapy for HIV at a patient's first clinic visit: the RapIT randomized controlled trial. PLoS Med. 2016;13(5): e1002015.
15. Hoque M, Hoque E, Kader SB. Pregnancy complications of grandmultiparity at a rural setting of South Africa. ijrm. 2008;6(2):25–0.
16. Cheng H, et al. Global trends in total fertility rate and its relation to national wealth, life expectancy and female education. BMC Public Health. 2022;22(1):1346.
17. AbouZahr C. Global burden of maternal death and disability. Br Med Bull. 2003;67:1–11.
18. WHO Maternal mortality. 2020. https://www.who.int/news-room/fact-sheets/detail/maternal-mortality/?gad_source=1&gclid=CjwKCAjwpszBhAiEiwALwsVYV7SM4F9KGeak7JUi62RwRkdHaIFOLcYdDGAOu0H0LTrBx-z4p8LTBoCXbkQAvD_BwE.
19. Geidam AD, Audu BM, Oummate Z. Pregnancy outcome among grand multiparous women at the University of Maiduguri Teaching Hospital: a case control study. J Obstet Gynaecol. 2011;31(5):404–8.
20. Farag RS, Abd El-Gawad ALM, Dogheim AE. Ethiopion demographic health survey 2016. Int Food Res J. 2011;18:659–65.
21. Newnham EC, et al. Comparison of labour and birth outcomes between nulliparous women who used epidural analgesia in labour and those who did not: a prospective cohort study. Women Birth. 2021;34(5):e435-41.
22. Tenforde MW, et al. Rapid antiretroviral therapy initiation in low-and middle-income countries: a resource-based approach. PLoS Med. 2019;16(1): e1002723.
23. Ajong AB, et al. Grand multiparity in rural Cameroon: prevalence and adverse maternal and fetal delivery outcomes. BMC Pregnancy Childbirth. 2019;19(1):233.
24. Emechebe CI, Njoku CO, Eyong EM, Maduekwe K, Ukaga JT. The social class and reasons for grand multiparity in Calabar, Nigeria. Trop J Obstet Gynecol. 2017;33:327–31.

25. Alaba OO, Olaomi OO. Spatial patterns and determinants of fertility levels among women of childbearing age in Nigeria. South Afr Fam Pract. 2017;19(59):143–7.
26. Adhikari R. Demographic, socio-economic, and cultural factors affecting fertility differentials in Nepal. BMC Pregnancy Childbirth. 2010;10: 19.
27. Belachew TB, et al. Prevalence of married women's decision-making autonomy on contraceptive use and its associated factors in high fertility regions of Ethiopia: a multilevel analysis using EDHS 2016 data. BMC Public Health. 2023;23(1):83.
28. Kamal A. Factors affecting the family size in Pakistan: clog-log regression model analysis. J Stat. 2011;18:29–53.
29. Loll D, et al. Reproductive Autonomy and Modern Contraceptive Use at Last Sex among Young women in Ghana. Int Perspect Sex Reprod Health. 2019;45:1–12.
30. OlaOlorun FM, Hindin MJ. Having a say matters: influence of decision-making power on contraceptive use among Nigerian women ages 35–49 years. PLoS ONE. 2014;9(6): e98702.
31. Zeleke LB, et al. Individual and community level factors associated with unintended pregnancy among pregnant women in Ethiopia. Sci Rep. 2021;11(1):12699.
32. Yossef Ezra ES, Hakim M, Schenker JG. The outcome of grand-multiparous pregnancies of Arabic and jewish populations in peripheral and central areas of Israel. Acta Obstet Gynecol Scand. 2001;80:30–3.
33. Region T, Hailu AG, Berhe D, Slassie H, Yemane AGD, et al. Determinants of high fertility among ever married women in Enderta District, Tigray Region, Northern Ethiopia. J Health Med Inform. 2016;7:5.
34. Huang FL. Multilevel modeling myths. Sch Psychol Q. 2018;33(3):492–9.
35. Ethiopia Demographic and Health Survey. 2000. https://dhsprogram.com/pubs/pdf/FR118/FR118.pdf.
36. Ethiopia Demographic and Health Survey. 2005. https://dhsprogram.com/pubs/pdf/FR179/FR179[23June2011].pdf .
37. *Ethiopia Demographic and Health Survey. https://*dhsprogram.com/pubs/pdf/PR10/PR10.pdf. *2011.*
38. Ethiopia Demographic and Health Survey. 2016. https://dhsprogram.com/pubs/pdf/fr328/fr328.pdf.
39. International Labour Organization (ILO). 2021. https://www.ilo.org/research-and-publications/world-employment-and-social-outlook/world-employment-and-social-outlook-trends-2021.
40. Urban Institute. https://www.urban.org/tags/families-low-incomes. 2023.
41. Carlson MJ, Wimer C, Haskins R. Changing work, *changing families, and Public Policies toward Low-Income Families*. Russell Sage Foundation J Social Sci. 2022;8(5):1–22.
42. Kassie M, Zikhali P, Manjur K, Edwards S. Adoption of sustainable agriculture practices: evidence from a semi-arid region of Ethiopia. Nat Resour Forum. 2009;33(3):189–98.
43. *UNICEF Ethiopia. 2021. Child Labour in Ethiopia: A Statistical Profile Based on the 2015 Ethiopian Socioeconomic Survey.*https://www.unicef.org/ethiopia/media/3776/file/Report%20.pdf
44. Bradshaw CJA, et al. Lower infant mortality, higher household size, and more access to contraception reduce fertility in low- and middle-income nations. PLoS ONE. 2023;18(2):e0280260.
45. Worku S, Ahmed A, Mulaw T. Fertility intention and contraceptive use among women in Ethiopia: the role of education and economic factors. Public Health Rev. 2014;35(2):1–8.
46. The relationship between women's education and fertility. 2015. https://www.weforum.org/stories/2015/11/the-relationship-between-womens-education-and-fertility/.
47. Woldeamanuel BT, et al. Women's education, contraception use, and high-risk fertility behavior: a cross-sectional analysis of the demographic and health survey in Ethiopia. Front Glob Womens Health. 2023;4:1071461.
48. Adhikari R. Demographic, socio-economic, and cultural factors affecting fertility differentials in Nepal. BMC Pregnancy Childbirth. 2010;10(1): 19.
49. Kassaw T, Alebachew M. The effect of birth intervals on maternal and child health in Ethiopia: a retrospective cohort study. Ethiop J Health Sci. 2020;30(1):67–74.
50. Abebe F, Berhane Y, Girma B. Factors associated with home delivery in Bahir Dar, Ethiopia: a case-control study. BMC Res Notes. 2012;5:p653.
51. *Central Statistical Agency (CSA) [Ethiopia] and ICF. 2016. Ethiopian Demographic and Health Survey (EDHS). 2016.*
52. Asmamaw DB, et al. Spatial distribution, magnitude, and predictors of high fertility status among reproductive age women in Ethiopia: further analysis of 2016 Ethiopia demographic and Health Survey. PLoS ONE. 2023;18(9):e0290960.
53. Jonas K, et al. Rumours, myths, and misperceptions as barriers to contraceptive use among adolescent girls and young women in South Africa. Front Reprod Health. 2022;4: 960089.
54. Habitu Y, Yalew A, Bisetegn TA. Determinants of grand multiparity among reproductive age women in Arba Minch Zuria district, Ethiopia: a community-based cross-sectional study. BMC Public Health. 2018;18(1):1–8.
55. Mengesha ZB, et al. Determinants of skilled attendance for delivery in Northwest Ethiopia: a community based nested case control study. BMC Public Health. 2013;13: 130.
56. Kaso M, Addisse M. Birth preparedness and complication readiness in Robe Woreda, Arsi Zone, Oromia Region, Central Ethiopia: a cross-sectional study. Reprod Health. 2014;11: 55.

Publisher's Note