

# Factors associated with early menopause in Bangladesh

MOHAMMAD ALI<sup>1, A-F</sup>, SABRINA AFROSE<sup>1, B-F</sup>, N.A.M. FAISAL AHMED<sup>1, E</sup>,

ORCID ID: 0000-0002-0279-1972

MOST. FARIDA KHATUN<sup>2, E</sup><sup>1</sup> Statistics Discipline, Khulna University, Khulna, Bangladesh<sup>2</sup> Pharmacy Discipline, Khulna University, Khulna, Bangladesh

A – Study Design, B – Data Collection, C – Statistical Analysis, D – Data Interpretation, E – Manuscript Preparation, F – Literature Search, G – Funds Collection

**Summary Background.** Early menopause is a risk factor for several health-related problems of women. No single study was available in literature to determine the associated factors for early menopause in Bangladesh.**Objectives.** The aim of this study was to determine the prevalence and factors associated with early menopause in Bangladesh.**Material and methods.** Data was extracted from the nationally representative Bangladesh Demographic and Health Survey (BDHS) 2014. This data was collected from 17,863 married Bangladeshi women throughout the entire country using two-stage stratified cluster sampling. The BDHS 2014 report showed that women aged 30–49 years are estimated to be menopausal. Considering this estimation, we excluded women whose age was less than 30 years. Women whose menstrual periods had stopped because of pregnancy and postpartum amenorrhea, as well as those with some incomplete information and missing samples, were excluded from data. Consequently, 8,885 women were considered for this study. The chi-square test was used for bivariate analysis, and logistic regression was used as multivariate analysis.**Results.** The prevalence of early menopause in Bangladesh was 10.80%. The binary multivariate logistic regression model demonstrated that women with no education were more likely to experience early menopause compared to women of higher education [AOR = 3.39, 95% CI: 2.22–5.20,  $p < 0.001$ ]. A lower rate of early menopause was especially found among women who were living in the Sylhet division that were currently married and currently using contraceptive methods.**Conclusions.** The stepwise binary logistic regression model exhibited that most of the significant predictors were modifiable factors for early menopause. Authorities should provide basic education on early menopause to less educated women.**Key words:** logistic models, Bangladesh, chi-square distribution, menopause.Ali M, Afrose S, Ahmed NF, Khatun MF. Factors associated with early menopause in Bangladesh. *Fam Med Prim Care Rev* 2020; 22(1): 13–17, doi: <https://doi.org/10.5114/fmPCR.2020.92500>.

## Background

Menopause is a climacteric change occurring universally in all women who reach midlife [1]. It is an important physical and hormonal event in the reproductive cycle of healthy women [2]. It is also relevant to women's health, as the occurrence of menopause indicates an increased risk of the onset of certain chronic diseases [3]. Menopause is the culmination of a gradual decline in fecundity with increasing age [4]. Menopause occurs because of a decrease in the ovaries' production of the hormones oestrogen and progesterone [5]. According to the World Health Organization (WHO), natural menopause was described as "permanent cessation of menstruation resulting from the loss of ovarian follicular activity". It is recognized after 12 months of consecutive amenorrhea [6]. The worldwide natural menopausal age range is 45 to 55 years [6]. Several studies have shown differences in the average age of natural menopause according to country, e.g. 46.2 years in India [7], 45 years in Thailand [8], 49.2 years in Korea [9], 46 years in South Africa and 51 years in the USA [3]. A regional study of Bangladesh showed that the average age of natural menopause was 51.14 years, which is similar to the USA [10].

If menopause occurs before the age of 45, it is known as early menopause [11]. Early menopause is a very important biomarker of not only the loss of fertility, but also an increased risk for various health-related diseases, such as cardiovascular, neurological and psychiatric diseases, as well as diabetes, osteoporosis, etc. [7, 12–14].

Over the last two decades, plenty of research has been carried out on menopause, and the various risk factors for early menopause have been investigated. The results were inconsistent, but the trend of the results suggested that women with no education experienced earlier menopause than women with higher education [15, 16]. Several internal studies found a lower BMI to be associated with the onset of early menopause [7, 17, 18]. However, another study showed that BMI was not significantly associated with menopause [19]. A study in India reported a higher prevalence and earlier onset of menopause by multiple parity [20], although a number of international studies showed a high prevalence of earlier menopause in nulliparous women [21, 22]. Women with a lower socio-economic status had earlier menopause [16, 23–26]. Marital status, contraceptive use status and smoking status were significantly associated with early menopause [7, 19, 27].

Bangladesh is a developing country in Southeast Asia. In Bangladesh, most of the women are uneducated and have no consciousness about menopause [10]. Now-a-days, studies on menopause have received much attention, due to the increased life expectancy of women [28]. In Bangladesh, only three research studies based on a regional survey have been carried out concerning menopause [4, 10, 29]. These studies were conducted on a small population in Bangladesh to identify menopausal age and assess the symptoms for early and late menopause, but these were all restricted to a specific region. Among these, another study also investigated the effect of early menopause and late menopause on quality of life and found that menopausal



symptoms were strongly associated with quality of life for both early and late menopausal women. It was also noted that early menopausal women had to face more problem of menopausal symptoms compared to late menopausal women in Bangladesh [4]. To our knowledge, there has been no single study to determine associated factors with early menopause in Bangladesh.

## Objectives

The main objective of this study was to determine the prevalence and associated factors of early menopause.

## Material and methods

Data was extracted from the nationally representative Bangladesh Demographic and Health Survey (BDHS) conducted in 2014. This survey was authorised by the National Institute of Population Research and Training (NIPORT) of the Ministry of Health and Family Welfare. Data was collected using two-stage stratified random sampling from 17,863 ever married women. The BDHS report showed that women between the age of 30–49 are estimated to be menopausal. Considering this estimation, we excluded women whose age was less than 30 years from the data. We also exclude women whose menstrual periods had stopped because of pregnancy and postpartum amenorrhea, as well as those with some incomplete information and missing samples. Consequently, 8,885 women were considered for this study.

### Outcome variable

Menopause is a time that marks the end of women's menstrual cycles. A woman is diagnosed as menopausal after she has gone 12 months without a menstrual period. Menopausal status is divided into two categories (Coded; In menopause = 1, Not early menopause = 0).

### Independent variables

In this study, we included various demographic factors (age, region, religion, place of residence, educational status, wealth index, working status, marital status) and health related factors (height and weight (converted to BMI: weight in kilograms/height in), contraceptive use) as independent variables.

### Statistical analysis

Chi-square tests were used to assess the association between early menopause and selected variables. Univariate and

multivariate logistic regression models were used to identify any significant associated factors with early menopause. Multicollinearity problems among the predictor variables were checked by standard error (SE). If the absolute value of the SE was less than 0.5, this suggested that there is no evidence of multicollinearity problems [30]. Finally, the most significant predictors for early menopause were determined by the stepwise logistic regression model. All analyses were carried out by SPSS IBM version 22.

### Ethical approval

Data was collected from the Bangladesh Demographic and Health Survey (BDHS) 2014. This survey was approved by the Ministry of Health and Family Welfare, Government of Bangladesh.

## Results

A total number of 8,885 women were analysed for this study, with a mean age of  $38.60 \pm 5.74$  years (ranging from 30 to 49). The prevalence of menopause among Bangladeshi women was 21.90%, where early menopause was 10.80%. Socio-demographic characteristics and the prevalence of early menopause are presented in Table 1. The chi-square test revealed that some independent variables were significantly associated with early menopause. Those variables that are found significant are considered as independent variables for logistic regression analysis. Table 1 represents the effect of selected factors on the early menopausal status of Bangladeshi women. The results of the multivariate binary logistic regression model showed that women who lived in the Sylhet division were less likely to experience early menopause, followed by Barisal [AOR = 1.50, 95% CI: 1.11–2.02,  $p < 0.05$ ], Dhaka [AOR = 1.15, 95% CI: 0.86–1.53,  $p < 0.05$ ], Khulna [AOR = 1.98, 95% CI: 1.51–2.59,  $p < 0.001$ ], Rajshahi [AOR = 1.34, 95% CI: 1.01–1.79,  $p < 0.05$ ] and Rangpur [AOR = 1.51, 95% CI: 1.14–2.00,  $p < 0.05$ ]. Women with no education were more likely to experience early menopause [AOR = 3.39, 95% CI: 2.22–5.20,  $p < 0.001$ ] than women with higher education. It was found that the risk of women to experience early menopause decreases according to the increases their education level. The current marital status of women was found as a significant [AOR = 1.53, 95% CI: 1.22–1.91,  $p < 0.001$ ] predictor for early menopause. Women who were not using any contraceptive method had a 3.62-times [AOR = 3.62, 95% CI: 3.12–4.20,  $p < 0.001$ ] higher chance of early menopause than who were using a contraceptive method (Table 1).

**Table 1. Prevalence of early menopause (POEM) by background characteristics and the effect of selected variables on early menopause in women in Bangladesh**

Characteristics	POEM %	Unadjusted Model			Adjusted Model		
		Overall 10.80	OR	95% CI of OR	$p$	AOR	95% CI of AOR
Region							
Barisal	11.00	1.25	0.93 to 1.66	0.001	1.50	1.11 to 2.02	0.007
Chittagong	9.40	1.04	0.79 to 1.39	0.766	1.50	0.86 to 1.53	0.346
Dhaka	10.20	1.14	0.87 to 1.50	0.347	1.35	1.02 to 1.78	0.037
Khulna	14.10	1.65	1.27 to 2.14	< 0.001	1.98	1.51 to 2.59	< 0.001
Rajshahi	10.00	1.12	0.84 to 1.47	0.458	1.34	1.01 to 1.79	0.043
Rangpur	11.50	1.30	0.99 to 1.71	0.061	1.51	1.14 to 2.00	0.004
Sylhet <sup>f</sup>	9.00	–	–	–	–	–	–
Place of residence							
rural	9.80	1.18	1.02 to 1.36	0.023	0.95	0.80 to 1.11	0.499
urban <sup>f</sup>	11.30	–	–	–	–	–	–
Education level							
no education	13.90	3.95	2.63 to 5.92	< 0.001	3.39	2.22 to 5.20	< 0.001
primary	11.20	3.08	2.05 to 4.65	< 0.001	2.83	1.85 to 4.33	< 0.001
secondary	7.70	2.05	1.34 to 3.12	0.001	1.98	1.29 to 3.05	0.002
higher <sup>f</sup>	3.90	–	–	–	–	–	–

**Table 1. Prevalence of early menopause (POEM) by background characteristics and the effect of selected variables on early menopause in women in Bangladesh**

Characteristics	POEM %	Unadjusted Model			Adjusted Model		
		Overall 10.80	OR	95% CI of OR	p	AOR	95% CI of AOR
Wealth index							
poor	12.20	1.40	1.20 to 1.63	< 0.001			
middle	12.00	1.37	1.14 to 1.64	< 0.001		0.96 to 1.40	0.128
rich <sup>r</sup>	9.00	–	–	–	–	0.96 to 1.43	0.127
Marital status							
married	10.40	0.69	0.56 to 0.85	0.001	1.53	1.22 to 1.91	< 0.001
widowed/divorced/ /separated <sup>r</sup>	14.40	–	–	–	–	–	–
Current contraceptive use status							
no	17.90	3.36	2.91 to 3.87	< 0.001	3.62	3.12 to 4.20	< 0.001
yes <sup>r</sup>	6.10	–	–	–	–	–	–

<sup>r</sup> = reference case.

## Discussion

The present study was conducted on Bangladeshi women and based on the Bangladesh Demographic Health Survey 2014, where the prevalence of early menopause was estimated at 10.80%. In this study, we observed that the rate of early menopause was lower compared to the overall prevalence of menopause (23%) reported in the BDHS 2014.

The prevalence of early menopause in Bangladesh, according to this study, was higher than that reported in some studies from other countries [19, 27, 31, 32]. Several researches argued that early menopause was a risk factor for several health problems, such as cardiovascular diseases, neurological diseases, diabetes, psychiatric diseases, osteoporosis, etc. [12–14, 33]. Although early menopause is a concerning issue for women's health, there have been no menopausal studies to determine the high-risk factors of early menopause in Bangladesh. In this study, we found significant risk factors, such as regions, education, current marital status and contraceptive use status, for early menopause in Bangladesh.

There are seven major administrative regions (divisions) in Bangladesh. In this study, the regional rate of early menopause among the women of the representative regions with the overall prevalence of early menopause in Bangladesh was also analysed. The prevalence of early menopause was found to be the lowest in the Sylhet region, followed by the others. A previous study showed that the higher the number of pregnancies, the lower the risk of early menopause [34]. The BDHS 2014 report also revealed that the number of pregnancies was higher among Sylhet region women, since the total number of ever born children was highest in the Sylhet region [35], which we think could be an attributing factor for the lower early menopause rate in this region.

Education level has been found to be a major determining factor significantly associated with early menopause. Women with no education were more likely to have early menopause, and early menopause rates decreased among women with an increased education level. This finding is consistent with other studies [15, 16, 19, 26].

In this study, we found that a lower wealth index was significantly associated with early menopausal status from univariate analysis, and this finding is consistent with others studies [19,

36, 37]. The chance of early menopause decreased with respect to an increase in economic condition.

Current marital status is also an important predictor for early menopause. In our study, widowed/divorced/separated women were more likely to have early menopause than women who were married, which is dissimilar from the results of a former study conducted in the United States [38, 39]. This variation could be due to the differences in socio-cultural rituals.

Women who were not using any contraceptive method had a 3.62-times higher chance of early menopause than those who used contraceptive methods.

Among the selected variables considered in the study, religion, place of residence, current working status and BMI did not show a statistically significant relationship with early menopause. Research has shown that BMI is not a significant predictor for early menopause [19]. This is the first menopausal research based on national representative data in Bangladesh, it is the main strength of this study.

## Limitations of the study

This study has a number of potential limitations. Since this is a cross-sectional study, it is difficult to establish a causal relationship between early menopause and selected factors, whereas a longitudinal study is more effective. Despite the above limitations, the findings of this study will contribute to understanding and identifying the associated factors of early menopause in Bangladesh.

## Conclusions

Globally, early menopause is a concern for several health problems of women. The prevalence of early menopause was higher in Bangladesh. Our study showed that regions, education level, current marital status and current contraceptive use status were significantly associated with early menopause. The government should take necessary steps to control early menopause.

**Acknowledgements.** The authors would like to thank the National Institute of Population Research and Training (NIPORT) for allowing them to use the BDHS 2014 dataset in this study.

Source of funding: This work was funded from the authors' own resources.

Conflicts of interest: The authors declare no conflicts of interest.

## References

- Al-Sejari MM. *Age at natural menopause and menopausal symptoms among Saudi Arabian women in Al-Khobar*. Columbus: The Ohio State University; 2005.
- Dennerstein L, Dudley EC, Hopper JL, et al. A prospective population-based study of menopausal symptoms. *Obstet Gynecol* 2000; 96(3): 351–358.
- Hachul H, Polesel D, Nozoe KT, et al. The age of menopause and their associated factors: a cross-sectional population-based study. *J Womens Health Care* 2016; 5(5): 1–10.
- Ahmed K, Jahan P, Nadia I, et al. Assessment of menopausal symptoms among early and late menopausal midlife Bangladeshi women and their impact on the quality of life. *J Menopausal Med* 2016; 22(1): 39–46.
- Lockley GS. *Premature menopause – the experiences of women and their partners*. Melbourne: Swinburne University of Technology; 2012.
- WHO Scientific Group on Research on the Menopause in the 1990s, World Health Organization. *Research on the menopause in the 1990s: report of a WHO scientific group*. Geneva: WHO; 1996.
- Ahuja M. Age of menopause and determinants of menopause age: a PAN India survey by IMS. *J Mid-life Health* 2016; 7: 126–131.
- Peeyananjarasri K, Cheewadhanaraks S, Hubbard M, et al. Menopausal symptoms in a hospital-based sample of women in southern Thailand. *Climacteric* 2006; 9(1): 23–29.
- Park YJ, Kim HS, Kang HC. The age at menopause and related factors in Korean women. *J Korean Acad Nurs* 2002; 32(7): 1024–1031.
- Rahman S, Salehin F, Iqbal A. Menopausal symptoms assessment among middle age women in Kushtia, Bangladesh. *BMC Res Notes* 2011; 4(1): 188, doi: 10.1186/1756-0500-4-188.
- Edmonds DK, Lees C, Bourne TH. *Dewhurst's textbook of obstetrics & gynaecology*. 7th ed. 2007. Wiley Online Library. Available from URL: <https://onlinelibrary.wiley.com/doi/book/10.1002/9780470753354>.
- Atsma F, Bartelink ML, Grobbee DE, et al. Postmenopausal status and early menopause as independent risk factors for cardiovascular disease: a meta-analysis. *Menopause* 2006; 13(2): 265–279.
- Gallagher JC. Effect of early menopause on bone mineral density and fractures. *Menopause* 2007; 14(3): 567–571.
- Shuster LT, Rhodes DJ, Gostout BS, et al. Premature menopause or early menopause: long-term health consequences. *Maturitas* 2010; 65(2): 161–166.
- Brett KM, Cooper GS. Associations with menopause and menopausal transition in a nationally representative US sample. *Maturitas* 2003; 45(2): 89–97.
- Gold EB, Bromberger J, Crawford S, et al. Factors associated with age at natural menopause in a multiethnic sample of midlife women. *Am J Epidemiol* 2001; 153(9): 865–874.
- Tao X, Jiang A, Yin L, et al. Body mass index and age at natural menopause: a meta-analysis. *Menopause* 2015; 22(4): 469–474.
- Akahoshi M, Soda M, Nakashima E, et al. The effects of body mass index on age at menopause. *Int J Obes Relat Metab Disord* 2002; 26(7): 961–968.
- Mikkelsen TF, Graff-Iversen S, Sundby J, et al. Early menopause, association with tobacco smoking, coffee consumption and other life-style factors: a cross-sectional study. *BMC Public Health* 2007; 7(1): 149, doi: 10.1186/1471-2458-7-149.
- Mozumdar A, Agrawal PK. Prevalence, trends, and determinants of menopause in India: NFHS 1992–93 to NFHS 2005–06. *Am J Hum Biol* 2015; 27(3): 421–425.
- Nagata C, Takatsuka N, Inaba S, et al. Association of diet and other lifestyle with onset of menopause in Japanese women. *Maturitas* 1998; 29(2): 105–113.
- Kato I, Toniolo P, Akhmedkhanov A, et al. Prospective study of factors influencing the onset of natural menopause. *J Clin Epidemiol* 1998; 51(12): 1271–1276.
- Gold EB. The timing of the age at which natural menopause occurs. *Obstet Gynecol Clin North Am* 2011; 38(3): 425–440, doi: 10.1016/j.ogc.2011.05.002.
- Luoto R, Kaprio J, Uutela A. Age at natural menopause and sociodemographic status in Finland. *Am J Epidemiol* 1994; 139(1): 64–76.
- Stanford JL, Hartge P, Brinton LA, et al. Factors influencing the age at natural menopause. *J Chronic Dis* 1987; 40(11): 995–1002.
- Lawlor DA, Ebrahim S, Smith GD. The association of socio-economic position across the life course and age at menopause: the British Women's Heart and Health Study. *BJOG: An International Journal of Obstetrics & Gynaecology* 2003; 110(12): 1078–1087.
- Cassou B, Derriennic F, Monfort C, et al. Risk factors of early menopause in two generations of gainfully employed French women. *Maturitas* 1997; 26(3): 165–174.
- Natarajan J, Vidyasa S, Muliira JK. Review Literature on distress during the menopausal transition and their impact on the quality of life of women: what is the evidence. *IOSR-JNHS* 2013; 2: 1–10.
- Jesmin S, Islam AMS, Akter S, et al. Metabolic syndrome among pre- and post-menopausal rural women in Bangladesh: result from a population-based study. *BMC Res Notes* 2013; 6(1): 157, doi: 10.1186/1756-0500-6-157.
- Chan Y. Biostatistics 202: logistic regression analysis. *Singapore Med J* 2004; 45(4): 149–153.
- Luborsky JL, Meyer P, Sowers MF, et al. Premature menopause in a multi-ethnic population study of the menopause transition. *Human Reprod* 2003; 18(1): 199–206.
- Cramer DW, Xu H, Harlow BL, et al. Family history as a predictor of early menopause. *Fertil Steril* 1995; 64(4): 740–745.
- Heianza Y, Arase Y, Kodama S, et al. Effect of postmenopausal status and age at menopause on type 2 diabetes and prediabetes in Japanese individuals: Toranomon Hospital Health Management Center Study 17 (TOPICS 17). *Diabetes Care* 2013; 36(12): 4007–4014.
- Ortega-Ceballos PA, Morán C, Blanco-Muñoz J, et al. Reproductive and lifestyle factors associated with early menopause in Mexican women. *Salud Publica Mex* 2006; 48: 300–307.
- National Institute of Population Research and Training (NIPORT), Mitra and Associates and ICF International. *Bangladesh Demographic and Health Survey 2014*. Dhaka, Bangladesh, Rockville (MD, USA): NIPORT, Mitra and Associates, ICF International; 2016.
- Benjamin F. The age of the menarche and of the menopause in white South African women and certain factors influencing these times. *S Afr Med J* 1960; 34(4): 316–320.
- Ginsberg J. What determines the age at the menopause? *BMJ* 1991; 302(6788): 1288.
- Nelson LM, Covington SN, Rebar RW. An update: spontaneous premature ovarian failure is not an early menopause. *Fertil Steril* 2005; 83(5): 1327–1332.
- Stepaniak U, Szafranec K, Kubinova R, et al. Age at natural menopause in three central and eastern European urban populations: the HAPIEE study. *Maturitas* 2013; 75(1): 87–93.

Tables: 1  
Figures: 0  
References: 39

Received: 22.08.2019  
Reviewed: 17.09.2019  
Accepted: 1.10.2019

Address for correspondence:  
Mohammad Ali, MSc  
Statistics Discipline  
Khulna University  
Khulna-9208  
Bangladesh  
Tel.: +880 1745077767  
E-mail: ail.ru.stat@gmail.com