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## **SEASONAL VARIATION IN THE OCCURRENCE OF MENARCHE IN THE SCHOOL-GIRLS IN THE FEDERATION OF BOSNIA AND HERZEGOVINA<sup>1</sup>**

### **ABSTRACT**

Information for these studies has been collected from the girl students, who attend 44 primary schools in the Federation of Bosnia and Herzegovina; this study has been done in between 01-05-1997/30-04-2000. In this study 5926 school girls took part (Bihać, Goražde, Mostar, Sarajevo/Ilidža, Tuzla and Zenica region) age 9-16, grade 5-8; 3519 school girls were from the urban area, 1881 from rural area and 526 school girls were from the refugee camps (Vožuća-Zavidovići, Tinja-Srebrenik, Dobošnica-Lukavac). Method status quo has been used for the appearance of menarche, while the static differences between the two found percentages have been found with the "T%" test. (Malina 1990, Guersi 1997).

### **INTRODUCTION**

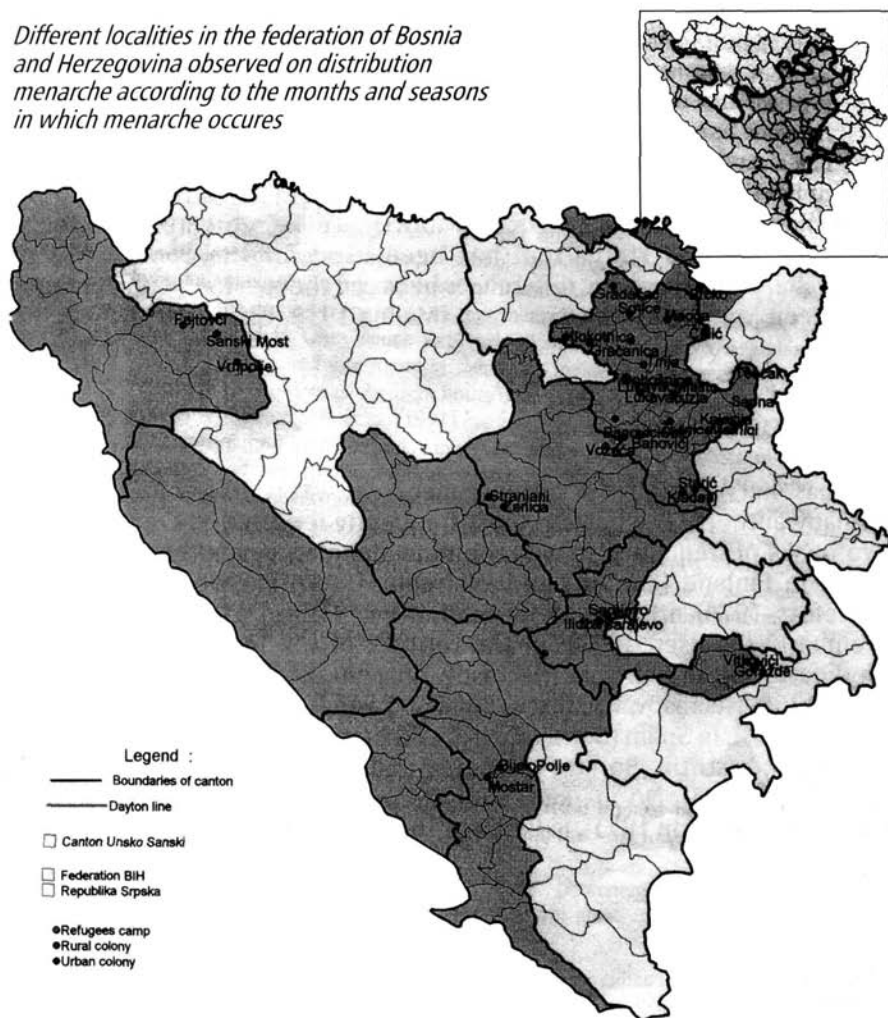
Seasonal variation in occurrence menarche was is subject investigation of many authors. The pattern most frequently reported in Europe shows two peaks of frequency, in winter and in summer: examples of this were found in Finland (Kantero and Widholm 1971), in Sweden (Bergsten-Brucefors 1974), in Norway (Bruntland and Liestol 1982), and Odense (Denmark) (Boldsen 1992), in the territory of the former Soviet Union (Godina 1993), in Rumania (Necrasov, Antoniu, Botezatu, Gheorghiu and Jacob 1964, Necrasov, Cristescu, Bulai and Feodorovici 1964), in Hungary (Farakas 1988), in Spain (Bernis, Fuster and Prado 1977) and in Italy (Benso, Lorenzino, Pastorin, Boratto, Signorile and Mostert 1989, Floris, Murgia and Sanciu 1991). No marked summer peak was found in Copenhagen (Bojlen and Bentzon 1971), in Berlin or Halle/Saale (Grimm 1952) (according

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to Gueresi 1997). Bojlen and Bentzon (1974) observed that in 10 out of 11 reports concerning school girls from large European towns the winter peak fell in January. In analogy with the European monthly rhythm December-January and August-September peaks were found in a sample of US women examined by Albright, Voda, Smolensky, His and Decker (1990).

Although appearance of menarche and distribution of menarche according to the seasons in which menarche occurs in Bosnia population (with the exception of studies Svob, Bravo 1974, Terzić 1990, 1999) has not been studied yet. Goal of this work and study is to find seasonal distribution of menarche in urban and rural area and in refugee population in the Federation of Bosnia and Herzegovina and in the girls who went through hard trauma during the war in Bosnia and Herzegovina.

*Different localities in the federation of Bosnia and Herzegovina observed on distribution menarche according to the months and seasons in which menarche occurs*



## MATERIAL AND METHOD OF WORK

Information for these studies has been collected from the girl students, who attend 44 primary school in the Federation of Bosnia and Herzegovina; this study has been done in between 01-05-1997 / 30-04-2000. In this study 5926 school girls took part (Bihać, Goražde, Mostar, Sarajevo/Ilidža, Tuzla and Zenica region) age 9-16, grade 5-8; 3519 school girls were from the urban area, 1881 from rural area and 526 school girls were from the refugee camps (Vožuća-Zavidovići, Tinja-Srebrenik, Dobošnica-Lukavac). Method status quo has been used for the appearance of menarche, while the static differences between the two found percentages have been found with the "T%" test. (Malina 1990, Gueresi 1997).

## RESULTS AND DISCUSSION

Results and the analysis distribution of menarche according to the season in which menarche occurs (Figure 1-6), shows that the highest percentage of menarche of school-girls in the Federation of Bosnia and Herzegovina occurs in the winter (29%) and the least in the fall (18%), statistical differences are high, ( $p < 0,05$ ). In urban area as well, the highest percentage of menarche happens in the winter (30%), while in rural area most of menarche happens in the spring (30%), and winter (29%). In subsample school-girls who went through the hard war trauma, the highest percentage of menarche also happens in the winter (29%) and spring (26%). These results confirm the research of the most authors from Europe (Kowalska, Valsik and Wolonski 1963, Valsik 1965, Gavrilović, Radojević 1980, Farkaš 1988, Eiben 1988, Ivanović 1990, Godina 1993, Prebeg et.al. (1995), Guersi 1997) and non-European countries (Shakir 1974, Balasuriya, Malcolm 1988, Nakamura et. al. 1986, Albright et. al. 1990, Valenzuela et.al. 1991, 1996, 1999.) that in urban area most of menarche happens in the winter, which some authors connect with the stress caused by the winter stress, and in rural areas in the spring and summer. Existence of summer peak in urban area in the Federation of Bosnia and Herzegovina, can be explained with the constant migration from rural to urban areas and with the high number of refugees in urban areas, which the war in Bosnia lived in rural areas.

As regards causes for the rhythmicity in menarche occurrence, one of the most debated topics is a relationship either summer vacation or holidays (Kantero and Windholm 1971, Bergsten-Bruce-fors 1974, Bruntland and Liestol 1988, Nakamura et.al. 1986 and Valenzuela et. al. 1991). Balasuriya and Malcolm (1988) suggested that "the relaxed atmosphere during the months school vacation correlated influence the hypothalamus, triggering the onset of menarche", while Guersi (1997) found in the some Italian samples that menarche occurs more frequently than expected in the coincidence with school vacation. The some authors (Shakir 1974) found that monthly menarche incidence increased with an increase in the number of daylight hours over the year. However, results of a study by Valenzuela et. al. (1991) suggest that seasonal factors such as temperature and photoperiod cannot

be major or the factors in the monthly and seasonal rhythm of menarche. Results of our investigation confirm the results of many authors (Balasuriya, Malcolm 1998, Graben et. al. 1995, Guersi 1997) about connections between the season of menarche occurrence and psychosocial stress. The goal of our investigations is to explain more detailed the influence of hard war trauma and socioeconomic (nutritional) stress on the occurrence and the distribution of menarche according to the season.

## CONCLUSIONS

1. Analysis and distribution of menarche according to the season in which menarche occurs, this shows that the highest percentage of menarche occurs in the winter (29%) and the least in the fall (18%), statistical differences are high, ( $p < 0,05$ ).
2. In urban area winter as well the highest percentage of menarche happens in the winter (30%), and in rural areas in the spring and summer, which some authors connect with the stress caused by the winter stress.
3. In the sub-sample school-girls who went through the hard war trauma, the highest percentage of menarche also happens in the winter (29%) and spring (26%).
4. These results confirm the research of the most authors from Europe and USA that there are two peaks of frequency in winter and in summer.

## SUMMARY

The results of this work are based on the analysis of the occurrence of menarche of the sample 5926 school-girls in the Federation of Bosnia and Herzegovina (3519 from urban area, 1881 from rural area and 526 refugees who are living in the refugee camp). The investigation covered 44 elementary schools in the Federation of Bosnia and Herzegovina. We used the status quo method for interviewing school girls in 5,6,7, and 8 grade, age between 9-16 years (in period 1<sup>st</sup> May 1997 to 30 April 2000.) Analysis and distribution of menarche according to the season in which menarche occurs, this shows that highest percentage of menarche occurs in the winter (29%) and the least in the fall (18%), statistical differences are high, ( $p < 0,05$ ). In the urban area as well, the highest percentage of menarche happens in winter (30%), this confirms the results of many authors, that in urban area most of menarche happens in winter, and in rural areas in spring and summer, which some authors connect with the stress caused by the winter stress. These results confirm the research of the most authors from Europe that there are two peaks, winter one (January-February) in the urban area and summer one in the rural area. Existence of summer peak in urban area in the Federation of Bosnia and Herzegovina, can be explained with the constant migration from rural to urban areas, and with the high number of refugees in urban areas; which before the war in Bosnia and Herzegovina lived in rural areas.

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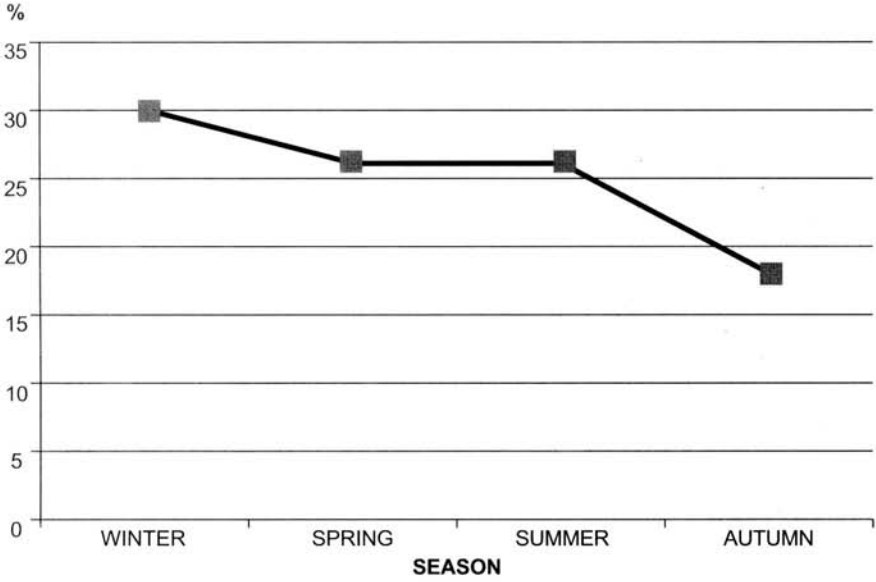
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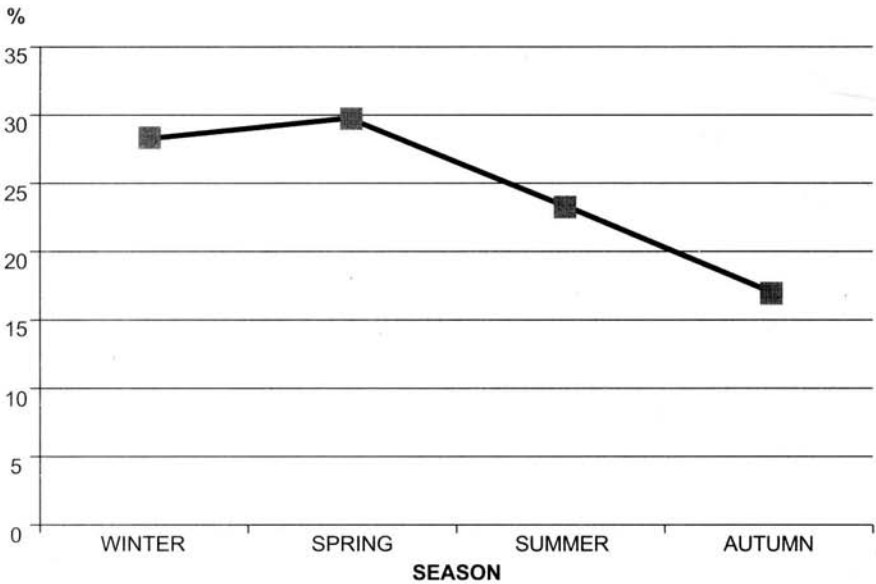
## SAŽETAK

Rezultati ovoga rada baziraju se na analizi praćenja distribucije menarhe prema godišnjem dobu u kome se javila. Analizirani uzorak obuhvata 5926 učenica (3519 urbana, 1881 ruralna i 526 učenica koje žive u prognaničkim naseljima Tinja-Srebrenik, Dobošnica-Lukavac i Vožuća-Zavidovići) od petog do osmog razreda (starosne dobi od 9-16 godina) iz 44 osnovne škole s područja Federacije Bosne i Hercegovine (Unsko-sanski kanton, Bosansko-podrinjski, Hercegovačko-neretvanski, Sarajevski, Tuzlanski i Zeničko-dobojski kanton). Istraživanja su sprovedena u periodu od 01. 05. 1997. do 30. 04. 2000. godine. Za utvrđivanje pojave menarhe korištena je metoda status-quo. Izračunata je srednja dob pojave menarhe ( $X$ ) po posmatranim kategorijama uzorka (urbano, ruralno, domicilni i prognanici), a statistički značaj konstatovanih razlika utvrđen je "T%" testom. Analiza distribucije menarhe prema godišnjem dobu u kojem se javila pokazuje da je najveći procent učenica (29%) u Federaciji Bosne i Hercegovine dobio menarhu u zimskom periodu, a najmanji u jesen (18%) -ralike statistički značajne ( $p < 0,05$ ). U urbanoj eriji, takođe najveći procenat učenica imao je menarhu u zimskom periodu (30%), a u ruralnoj eriji i populaciji prognanika u proljeće i ljeto, što neki autori dovode u vezu sa zimskim stresom. Ovi rezultati potvrđuju nalaze istraživanja mnogih autora u Evropi o postojanju dva vrha, zimski (januar-februar) u urbanom području i ljetni (august) u ruralnom području. Postojanje ljetnog vrha u nekim urbanim područjima Federacije Bosne i Hercegovine (Tuzlanski kanton), može se objasniti sve učestalijim migracijama iz ruralnih u urbana područja, te velikim brojem prognanika u gradskim (urbanim) erijama koji su prije agresije na Bosnu i Hercegovinu 1992. godine živjeli u ruralnim (seoskim) područjima.

**FIGURE 1: DISTRIBUTION OF MENARCHE IN SCHOOL-GIRLS IN FEDERATION OF BiH ACCORDING TO SEASON (URBAN AREA)**

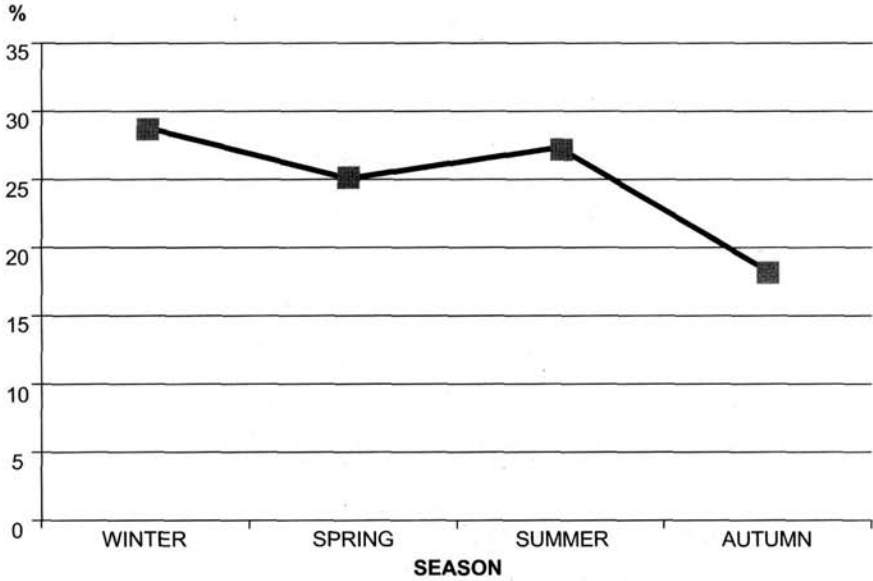


**FIGURE 2: DISTRIBUTION OF MENARCHE IN SCHOOL-GIRLS IN FEDERATION OF BiH ACCORDING TO SEASON (RURAL AREA)**

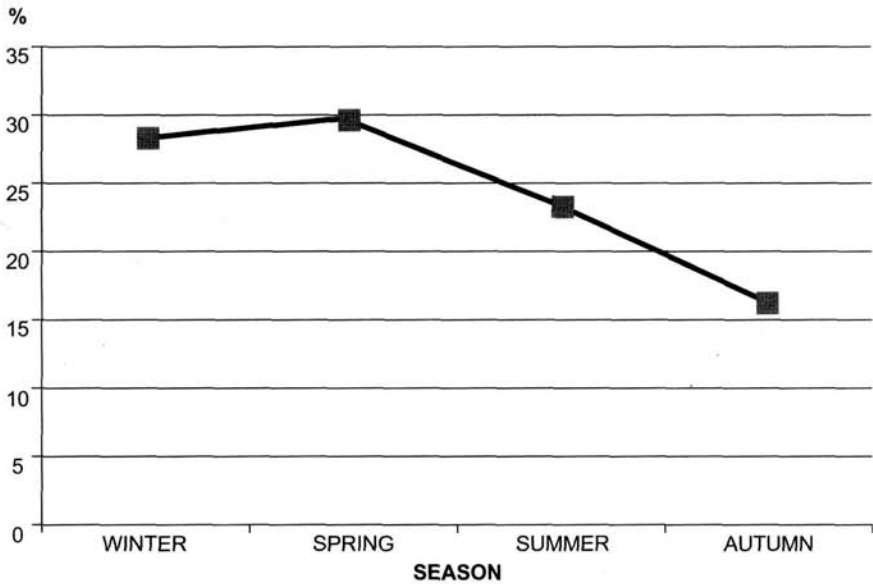


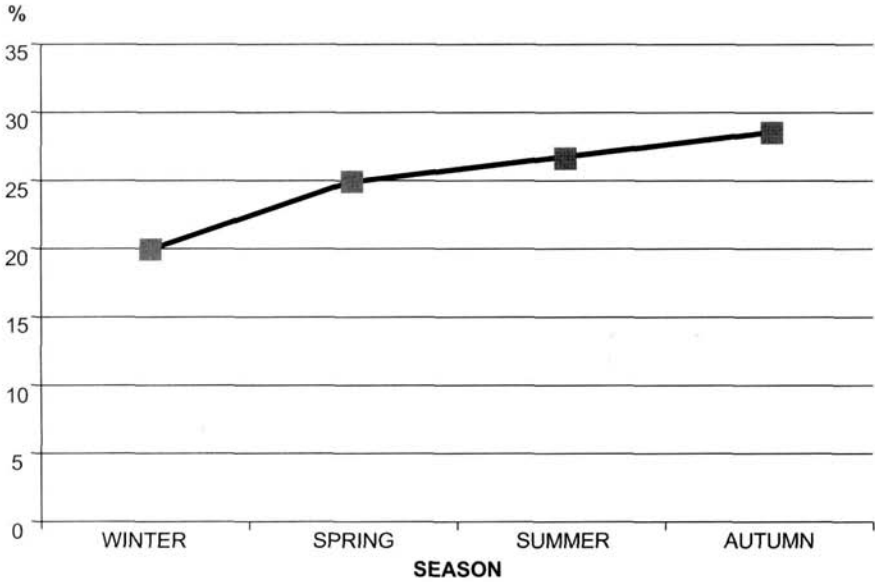


**FIGURE 3: DISTRIBUTION OF MENARCHE IN SCHOOL-GIRLS IN FEDERATION OF BiH ACCORDING TO SEASON (DOMICILE)**



**FIGURE 4: DISTRIBUTION OF MENARCHE IN SCHOOL-GIRLS IN FEDERATION OF BiH ACCORDING TO SEASON (REFUGEES)**



**FIGURE 5: DISTRIBUTION OF MENARCHE IN SCHOOL-GIRLS IN FEDERATION OF BiH WHO WENT THROUGH HARD TRAUMA ACCORDING TO SEASON****FIGURE 6: DISTRIBUTION OF MENARCHE IN SCHOOL-GIRLS IN FEDERATION OF BiH ACCORDING TO SEASON (TOTAL)**