

High prevalence of precocious menarche in Puerto Barrios, Guatemala



OBJECTIVE: To describe the patterns of precocious menarche in 2 urban areas of Guatemala.

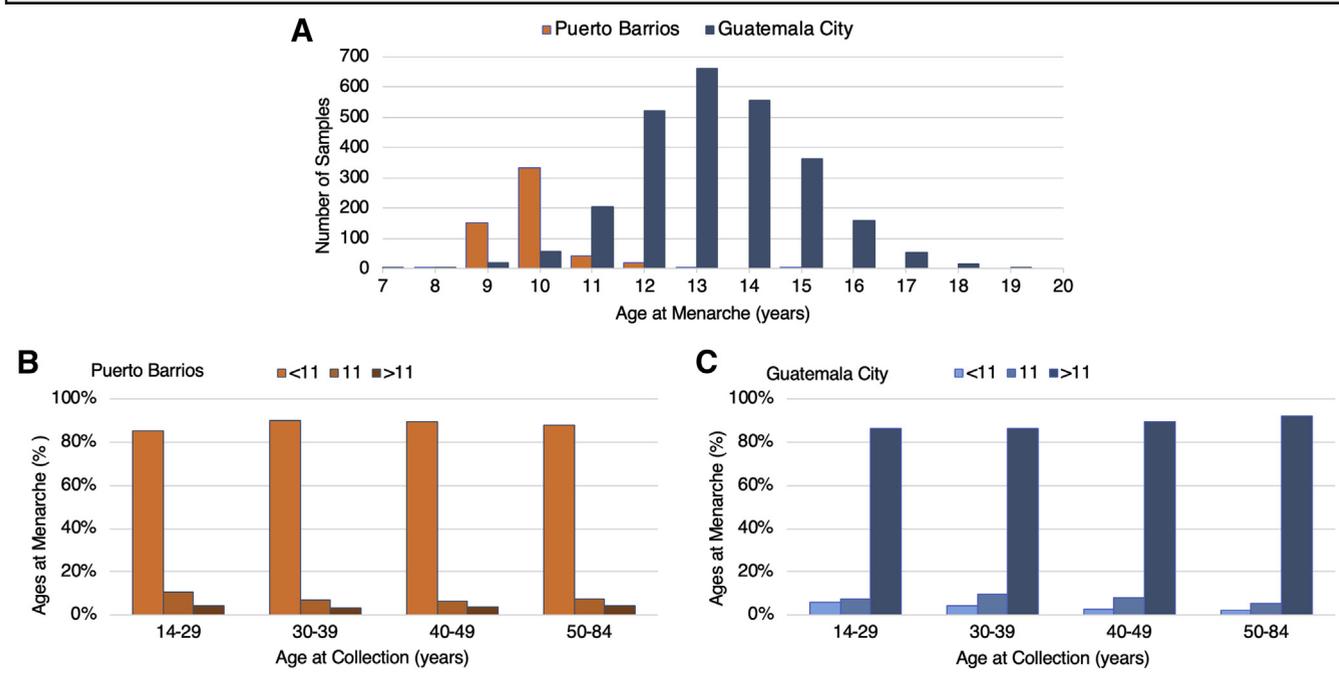
STUDY DESIGN: Reproductive histories from 3385 women were collected from 4 sites in Guatemala City and Puerto Barrios, Izabal, as part of an ancillary study conducted to collect information on human papillomavirus prevalence in Guatemala. Reproductive histories were collected via a questionnaire administered by trained personnel. Statistical analyses included determination of the age-specific prevalence of menarche and linear regression to determine the effect of year of birth, study site, and number of births and miscarriages on age at menarche.¹ The study was approved by Institutional Review Boards in Guatemala and the Office of Human Studies Research; subjects provided written informed consent.

RESULTS: Compared with a low prevalence of precocious menarche (menarche before age 11) in Guatemala City (3.1%, 88/2834), a high prevalence of precocious menarche was observed in Puerto Barrios (88%, 486/551; **Figure, A**). The association remained significant (P value < .0001) in

adjusted models. To determine if age at menarche was similar by birth cohort, we divided women into 4 age groups: 18–29, 30–39, 40–49, and ≥ 50 years old. In Puerto Barrios, precocious menarche was high (85–91%) in all age groups and was highest in the 40–49 age group (91%). The median age at menarche was 10 years across all Puerto Barrios birth cohorts (**Figure, B and C**). In Guatemala City, the prevalence of precocious menarche was 2–4% in the 30–39, 40–49, and ≥ 50 age groups, similar to other worldwide populations,² while in the most recent birth cohort (women aged 18–29 years), the prevalence of precocious menarche increased to 9% (**Figure, B and C**). Our study used a convenience sample of women attending a cervical cancer screening clinic at a public hospital to determine human papillomavirus prevalence and may be biased by socioeconomic factors and language barriers.

CONCLUSIONS: In Puerto Barrios, Izabal, Guatemala, the prevalence of precocious menarche is dramatically elevated compared to Guatemala City and is substantially higher than the 2–4% reported in other worldwide populations.^{2,3} We observed precocious menarche in Puerto Barrios in all age

FIGURE
Age at menarche in women from Puerto Barrios and Guatemala City



A, The number of samples by age at menarche is shown for the 2 cities. **B, C**, The data are displayed by age group and by the age of menarche categories <11, 11, and >11 for Puerto Barrios (**B**) and Guatemala City (**C**).

Torres-González. High prevalence of precocious menarche in Puerto Barrios. *Am J Obstet Gynecol* 2019.

groups, indicating that this condition has been common for decades. This finding is supported by data from hospital records and published data that pregnancy and miscarriage under age 14 is substantially higher in Izabal^{4,5} compared with Guatemala City and other major cities in the country. Puerto Barrios is located on the Caribbean coast and is geographically isolated from the rest of Guatemala. The Puerto Barrios study population was recruited from a public, urban hospital in a city of over 106,000 inhabitants, made up of admixed Amerindians/Europeans, Native Mayans (mostly speaking Q'eqchi'), and Garifuna, a population of African origin. The diversity of the population makes a genetic cause unlikely. Several plausible environmental causes may contribute to the earlier observed age at menarche in our study population, including water contamination, plant toxins related to the estrogenic compound zearalenone—a mycotoxin produced by numerous species of *Fusarium* growing on corn, or fumonisin, which is more prevalent in lowland areas of Guatemala, including Puerto Barrios.⁶

Precocious menarche is associated with adverse reproductive outcomes in young women, including an early age of pregnancy or miscarriage, and the early age at menarche we describe warrants further investigation. Understanding the factors contributing to precocious menarche in this population may be useful in helping to reduce adverse reproductive outcomes in Guatemala. ■

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REFERENCES

1. Torres-Gonzalez E, Lopez G, Trabert B, et al. High prevalence of precocious menarche in Puerto Barrios, Guatemala: BioRxiv; 543090v1. 2019.
2. Anderson SE, Must A. Interpreting the continued decline in the average age at menarche: results from two nationally representative surveys of U.S. girls studied 10 years apart. *J Pediatr* 2005;147:753–60.
3. Thomas F, Renaud F, Benefice E, de Meeus T, Guegan JF. International variability of ages at menarche and menopause: patterns and main determinants. *Hum Biol* 2001;73:271–90.
4. Alvarez T. Atención Hospitalaria del Parto y Aborto en Adolescentes Embarazadas antes de los 14 Años. Guatemala City: Universidad San Carlos de Guatemala; 2013.
5. Orozco Vasquez I. Edad de la menarquia en la población Guatemalteco. Guatemala City: Universidad de San Carlos de Guatemala; 1999.
6. Torres OA, Palencia E, Lopez de Pratdesaba L, et al. Estimated fumonisin exposure in Guatemala is greatest in consumers of lowland maize. *J Nutr* 2007;137:2723–9.

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Prediction of mode of delivery using the first ultrasound-based “intrapartum app”



OBJECTIVE: Although characteristics of labor leading to a higher likelihood of cesarean delivery are now better described,¹ changing intrapartum practice has not translated

into reduced cesarean delivery rates.² Ultrasound, despite its promise in facilitating noninvasive assessment in labor, remains largely confined to determining fetal malposition