



## Physical Anthropology Section - 2014

### H119 Same Border, Different People: Development and Assessment of Sex Estimation Methods for Multiple Hispanic Populations

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After attending this presentation, attendees will be familiar with different methods used to estimate the sex of skeletal remains from Latin America along the United States-Mexico border. These methods are typically based on remains analyzed at the Pima County Office of the Medical Examiner (PCOME) in Tucson, Arizona, which consists largely of Mexican individuals.

This presentation will impact the forensic science community by proposing new techniques for sex estimation and assessing the effectiveness across Latin American populations.

U.S.-Mexico border deaths continue to occur at an alarming rate, and PCOME casework, both identified and unidentified, have served as the foundational sampling source for many methods for estimating the biological profile when the case is presumed Hispanic. While the PCOME sample and methods based on it are an invaluable contribution to the field, a major presumption when working with this sample needs to be tested: Does the PCOME sample adequately represent skeletal variation of populations encompassed within the grouping of "Hispanic?"

The PCOME case demographic is primarily Mexican nationals, thus methods based on this sample primarily represent Mexican population variation. However, deceased migrants have been identified as citizens of other Latin American countries as well, such as Guatemala and El Salvador. Based on a 22-year study of PCOME casework, data indicate that non-Mexican migrants experience a greater risk of death while attempting to cross the border, and as these individuals increasingly attempt the journey, there is even more of an importance to have relevant methods for the entire migrant population, not just Mexican migrants.<sup>1</sup> Because the deceased are mostly unidentified when the forensic anthropological analysis is performed, the region/country of origin is typically unknown or presumptive, and, due to population variation, using PCOME sample-based methods may yield a significant error when applied to non-Mexican skeletal remains. To test the assumption that methods generated from the PCOME sample can be successfully applied to other increasingly common migrant populations, this study applied a sex estimation method previously established by Tise *et al.* of postcranial sectioning points to a modern (1980s) Guatemalan Maya sample.<sup>2</sup> The results indicate a substantial decrease in accuracy for estimating sex correctly for the Guatemalan sample (males: 50-69% accuracy; six sectioning points) as compared to the accuracy reported by Tise *et al.* when tested on an additional PCOME sample (75-86% for same six variables).<sup>2</sup> This disparity in accuracy suggests that inter-population postcranial variation is significant.

One approach to ameliorate this issue is to combine data from various Hispanic populations and generate new methods based on the expanded dataset, consisting of skeletal components that are both sexually dimorphic and display limited inter-population variation. While the classification accuracy will likely decrease in comparison to those methods based on single populations, it will be a more conservative approach when the individual is unidentified beyond a presumption of Latin American origins. Fowler and Perez developed a discriminant function for predicting sex of Guatemalan Maya (GUA) using four dental metric variables and found high accuracy.<sup>3</sup> To test for inter-population variation, the Guatemalan dental data from this study were compared to dental metric data from PCOME. Significant differences in mean dental measurements between the two samples were present in 1 out of 13 measurements for males and in 0 out of 5 measurements for females (number of variables tested dependent on sample sizes). Inter-population similarities for dental metric data make it potentially useful for estimating sex when region of origin is unknown beyond Latin America. To test its utility, a linear discriminant analysis (4 dentition metric variables) was performed on the combined GUA and PCOME sample to infer its utility in estimating sex across multiple populations. For the initial sample, jackknifed classification success is greater than 77% for both sexes. To assess whether those misclassified mimicked the postcranial method's trend of incorrectly classifying GUA males as females, this study examined the population origins of misclassified males. Approximately two-thirds of misclassified males were GUA, while misclassified females were more evenly distributed between the PCOME and GUA samples. By developing and assessing the utility of postcranial and dental metric methods for sex estimation of Hispanics, this study answers the call for critically assessing methods to applied border-crosser casework.

#### References:

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2. Tise M, Spradely MK, Anderson BE. Postcranial sex estimation of individuals considered Hispanic. *J For Sci* 2010;58:S9-S14.
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### **Hispanic, Sex Estimation, Dentition**