A61 An Age-Based Approach to Establishing Minimum Number of Individuals (MNI) in Commingled Juvenile Skeletal Material

Maria L. Cox, BA, California State University, Chico, 400 W 1st Street, Chico, CA 95929; and Valerie Sgheiza, BS, California State University, Chico, 400 W 1st Street, Chico, CA 95929*

After attending this presentation, attendees will be informed of a step-by-step approach to constructing an age-based MNI from durable age-informative elements. Attendees will understand the situations in which the application of the method is warranted, as well as any limitations inherent in this approach.

This presentation will impact the forensic science community by providing an additional tool for assessing MNI in commingled assemblages, particularly in situations such as mass graves or mass disasters in which there may be an unknown number of young individuals of varying ages and states of skeletal preservation and recovery.

The goal of this presentation is to describe a systematic, replicable, and defensible approach to computing an age-informed MNI from commingled assemblages containing a large proportion of juvenile remains. This presentation will end with two case studies that demonstrate how this approach can provide a more accurate picture of burial demographics.

Incorporating age information into MNI is a common strategy for reducing the downward bias inherent to this estimator.[1] Such an approach is especially helpful with juvenile remains, as age estimation is more precise for younger individuals, but elements are more fragile and poor preservation may inhibit other approaches. The method presented here was developed during the analysis of two large archaeological burial features from the Lower Illinois River Valley, Helton 20-36 and Carter 2-15; however, this method is structured to be applicable and replicable in diverse situations, including modern mass graves or fatalities.

The goals of this method are replicability, utility in analyzing assemblages with poor preservation or recovery, flexible age categorization, and reduction of the downward bias of the traditional max(L, R) method of MNI calculation in which the MNI is computed as the largest number of a single element from the same side of the body.[2] The resulting procedure differs from many other age-based MNI approaches in that it focuses primarily on the dentition and uses flexible rather than fixed age categories. This approach could theoretically be useful for practitioners in legal settings as it produces a well-documented and supported MNI that can be presented in a way easily understood by laypeople.

The age-based MNI is calculated using the following procedure: (1) an age- and sex-informed MNI is calculated for all adult elements; (2) age at death is estimated for all maxilla and mandible fragments using associated teeth; (3) maxillae and mandibles are paired based on age matches; (4) age is estimated for each unassociated (loose) tooth; (5) unassociated teeth are placed with paired maxillae and mandibles based on age and absence of that tooth, tracking the age of each set of dentition as teeth are added; (6) any remaining teeth are grouped into as few units as possible based on age; and, (7) additional elements are used (e.g., the petrous pyramid) to ascertain any missing age categories, such as infant or fetal, as well as to provide support for the age ranges constructed from dentition.

For Helton 20-36, the max(L, R) MNI was 16 and the age-based MNI was 20. In Carter 2-15, the max(L, R) MNI was 10 and the age-based MNI was 13. Constructing an age-informed MNI made it possible to more accurately assess both the size and demography of the features by including age categories that would have otherwise been

overlooked. In a forensic scenario, this would mean establishing the presence of more individuals whose remains could then be individuated through other means, such as DNA testing.

Reference(s):

1. Adams B., Konigsberg L. Estimation of the most likely number of individuals from commingled human skeletal remains. *American Journal of Physical Anthropology.* 2004:125(2):138-51.
2. White T. A method of calculating the dietary percentages of various food animals utilized by aboriginal peoples. *American Antiquity.* 1953:18(4):396-8.

Commingling, Juvenile, Minimum Number of Individuals