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Standard for Sex Estimation in Forensic Anthropology

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Foreword

Sex is one of several biological parameters that can be estimated from skeletal remains or radiographic images of skeletal remains. Estimated sex can be compared with antemortem records and other information contributing to the identification process. In addition, sex estimation serves as a foundation for developing other essentials of a biological profile. Sound and valid sex estimation is also dependent upon accurate estimates of other biological parameters, such as ancestry and age.

This standard was revised, prepared and finalized as a standard by the Anthropology Consensus Body of the AAFS ASB. The Anthropology subcommittee of the Organization of Scientific Area Committees for Forensic Science (OSAC) under the guidance of the National Institute of Standards and Technology (NIST) recognizes sex estimation as an important component of the biological profile. Using the document initially published by the Scientific Working Group of Forensic Anthropology (SWGANTH), this document is intended to assist forensic anthropologists when estimating sex from complete or partial sets of human skeletal remains.

All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

Keywords: *sex estimation; Biological profile; Personal identification*

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Standard for Sex Estimation in Forensic Anthropology

1 Scope

This standard sets forth methods for estimating sex from adult skeletal elements obtained directly from skeletal remains or radiographic images of skeletal remains. The methods in this standard provide a morphologically-based or mathematically-based scientific manner for estimating sex, and for documenting the sex estimation process. This document does not include sex estimation in skeletal elements from subadults, or through DNA analysis.

2 Normative References

There are no normative reference documents. Annex A, Bibliography, contains informative references.

3 Terms and Definitions

For purposes of this document, the following definitions apply.

NOTE The term estimation is more generic and largely interchangeable with determination and assessment in the relevant literature; the term estimation often implies the development of error, probabilities, and/or expected classification rates.

3.1
biological profile
The description of an individual's estimated age, sex, ancestry, and living stature derived from an anthropological (skeletal) analysis.

3.2
estimate/estimation
An approximation derived from a statistical sample of a population.

3.3
gender
An individual's culturally mediated social expression along the feminine-masculine continuum.

3.4
metric estimation
An estimate based on measurement of skeletal elements.

3.5
morphological estimation
An estimation based on qualitative phenotypic traits without explicit measurement.

3.6
sex
The biological differences between males and females.

4 Requirements

4.1 Introduction

Skeletal remains shall be analyzed in a scientific manner to estimate sex. Techniques applied to estimate sex shall be appropriate for the skeletal elements available. All techniques used shall be documented in such a way to allow verification and replication of the work performed.

Sex estimation should be made independently of suspected or presumptive identification to minimize bias.

When applicable, population-specific and time/period-specific methods shall be used to estimate sex.

Estimation of sex shall be based upon the available age-appropriate cranial and postcranial variables, focusing on the most dimorphic elements present.

Practitioners of forensic anthropology shall implement this standard to the extent applicable, practical, and appropriate.

4.2 Procedure

4.2.1 General

Choice of sex estimation methods shall be dictated by the skeletal elements available, their condition/degree of preservation, and the general age of the individual. When multiple methods are available, the method(s) with the greatest accuracy shall be given greater consideration when evaluating the totality of the evidence.

Analysis of skeletal remains for sex estimation may involve different or multiple approaches, including the use of clearly defined morphological and metric variables. Metric and morphological variables shall be measured or scored and recorded according to generally accepted procedures.

4.2.2 Morphological Traits

Skeletal morphological traits may vary between the sexes by shape, features, and/or relative size. When multiple morphological traits are available, the most dimorphic traits shall be given greater consideration. In most cases, the pelvis is more sexually dimorphic than other regions of the skeleton.

Dimorphic traits used to draw conclusions should be appropriately documented. The use of exemplars from similar populations may be helpful.

4.2.3 Cranial and Postcranial Metrics

Metric estimates of sex are based on the size and/or shape of the skeleton and dentition.

In most cases, postcranial measurements produce more accurate estimates of sex than cranial measurements.

In most cases, multivariate techniques are more accurate than univariate techniques.

Measurements shall be taken following method-specific definitions and/or measurement guidelines.[2,6]

4.2.4 Considerations

Sex estimation of skeletal remains can be compared with antemortem records and other information contributing to the identification process. Accurate estimation of sex is critical to the estimation of ancestry, age, and stature, and is an essential element in the biological profile that can narrow a list of missing persons.

While estimating sex, potentially confounding factors include socio-economic status, secular change, pathological conditions, trauma, taphonomy, and biomechanical demands on the skeleton.

This standard is applicable to adult skeletal remains; however, methods also exist for subadults.

Gender cannot be determined from skeletal remains.

Conflicting morphological and/or metric indicators of biological sex should be documented and described. Contextual indicators inconsistent with the estimated sex may also be noted.

When population-specific standards are not available, caution should be used when estimating sex.

Presumed indicators of parity should not be used for sex estimation.

4.2.5 Reporting

Sex estimates should be reported as female, male, probable female, probable male, or undetermined.

The degree of certainty should be expressed when reporting sex estimates. This may be expressed numerically (e.g., correct classification rates, method accuracies) and qualitatively as necessary (i.e., using qualifiers such as probable). Cases in which sex cannot be assessed shall be reported as undetermined.

Reports shall include the methods used to estimate sex.

5 Conformance

Evidence of documentation showing that procedures were followed is used to demonstrate conformance.

Annex A
(informative)

Bibliography

This is not meant to be an all-inclusive list as the group recognizes other publications on this subject may exist. At the time this document was drafted, these were some of the publications available for reference. Additionally, any mention of a particular software tool or vendor as part of this bibliography is purely incidental, and any inclusion does not imply endorsement by the authors of this document.

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