

BIOLOGICAL PROFILE / STATURE

When estimating stature, the examiner must first choose the appropriate formula for the calculation. Different formulae are used for different body types and groups of individuals. For example, males and females have slightly different body proportions, with females having relatively longer legs and males having relatively longer arms. Also, populations in colder climates tend to have stockier bodies and limbs to conserve body heat. Populations in hotter climates tend to have longer bodies and limbs to maximize cooling.

Stature estimates must also be adjusted for age. Once a person stops growing, at about 30 years of age, they begin to lose height through the compression of vertebral disks and age-related degeneration of vertebrae (i.e. the spine tends to shrink). After maturity, individuals lose approximately one centimetre of height every decade.

In our case, the forensic anthropologist selected a femur and a tibia to estimate the stature of the individual:

The femur measured 50.7 cm. The tibia measured 41.0 cm. The forensic anthropologist then estimated stature using the following regression equation for European males:

$$0.05566 (\text{Femur Max L} + \text{Tibia L}) + 21.64 = \text{Estimated stature } +/- 2.5''$$

Maximum length of the femur (507 mm) and tibia (410 mm):

$$0.05566 (507 + 410) + 21.64 = 72.68'' +/- 2.5'' (186 \text{ cm } +/- 6.35 \text{ cm})$$

As mentioned, because of differences in body size and shape, the anthropologist used a population-specific formula to calculate height. The formula for European males provides a 90% Prediction Interval (PI), meaning there is a 90% chance that this particular person would have had a living stature within this range. However, if the individual was not a member of this sample group, a different formula would be needed and the confidence ranges would also differ. If the sex or ancestry of the person could not be determined, the anthropologist would use a 'generalized' formula, but the result would be associated with greater uncertainty.

According to this formula, the individual whose remains have been found has a height of 180 – 192 cm (5' 10"-6'3").

Although the forensic anthropologist used the femur and tibia to estimate stature in this case, they could have used the arm bones (humerus, radius or ulna). However, this would have required a different formula, and because the arms do not correlate as well to height as the legs, the stature estimation would not have been as accurate. The prediction interval would also be broader (e.g., 180-192 cm using leg bones or 178-194 cm using arm bones).

While stature estimation seems fairly straightforward, producing an estimate is not always easy. Adult stature is the result of several factors including health and nutrition during growth and development; genetics; sex; ancestry; and social conditions. Anthropologists may not be able to account for all of these variables during an analysis, but they can improve their accuracy by incorporating certain aspects of the biological profile (e.g., female of Asian ancestry) and using the most appropriate formulae for that individual.

Cultural factors must also be considered. Our society places great importance on height, especially for males, but this can lead to unconscious mistakes in antemortem documentation. For example, when asked, males tend to overestimate how tall they are. This means that many men are not actually the height listed on their driver's license or other official identification. Under stressful conditions, family members may also report a loved one's height incorrectly. This presents a challenge for death investigators because they cannot always be certain that a living stature was reported accurately. Stature can be difficult from the perspective of missing persons lists as well. Height in most populations tends to fall in a bell curve. That is, most people are in the middle ("average" height), with only a few very tall or very short people. If the biological profile of a set of remains suggests the person was of average height, then this does not contribute much to identification. However, for very short or very tall individuals, stature can be extremely helpful in the identification process.