International Journal of Community Medicine and Public Health
Vishal K et al. Int J Community Med Public Health. 2026 Aug;13(8):4753-4761
https://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20262770

Review Article

Stature estimation from anthropometric head measurements in adults: South Indian populations

Vishal K.[1], R. Ganesh[1]*, S. Abirami[2]

[1]Department of Forensic Medicine and Toxicology, Shri Sathya Sai Medical College and Research Institute, Nellikuppam, Tamil Nadu, India
[2]Department of Community Medicine, Sri Lalithambigai Medical College and Hospital, Chennai, Tamil Nadu, India

Received: 08 June 2026
Revised: 15 July 2026
Accepted: 21 July 2026

***Correspondence:**
Dr. R. Ganesh,
E-mail: doctorganesh6776@gmail.com

ABSTRACT

Anthropometric evaluation of head and craniofacial dimensions is a cornerstone of human biological research with important applications in forensic science, clinical medicine, ergonomics and anthropology. South Indian populations exhibit substantial biological and sociocultural diversity making population-specific cranial reference standards. This review critically synthesizes existing literature on head anthropometry in South Indian adults focusing on biological determinants, regional variability and practical applications. The evidence indicates that adult head dimensions demonstrate relative post-maturity stability with limited age-related remodeling. The review highlights the relevance of head anthropometry in forensic identification, including sex determination, population affinity assessment and disaster victim identification. Emerging directions such as multicentric studies, three-dimensional imaging, artificial intelligence based morphometric analysis.

Keywords: Cephalic index, Craniofacial measurements, Forensic anthropology, Head anthropometry, South Indian population

INTRODUCTION

Anthropometry represents one of the most fundamental tools in human biological research, providing quantitative descriptions of the physical dimensions and proportions of the human body. Head and craniofacial measurements occupy a central position within anthropometry because the skull reflects both evolutionary adaptation and developmental stability, making it a reliable anatomical structure for comparative and population-based analysis.[1]

Head measurements in adults offer particular advantages for anthropometric analysis. Unlike long bones which may be affected by trauma, disease or postural changes, the cranial vault remains relatively resistant to external modification in adulthood. The strong biological relevance of cranial morphology has led to sustained interest in head anthropometry across forensic anthropology and human biology.[5]

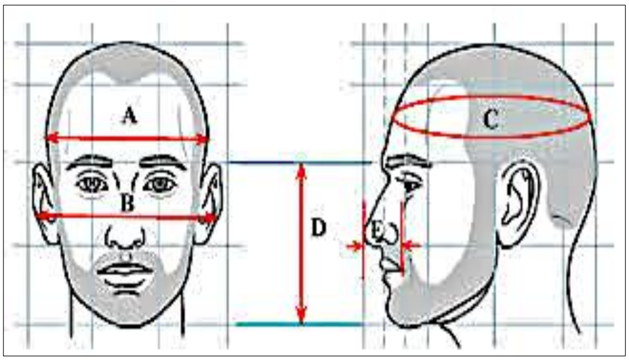

Figure 1: Anthropometric evaluation.

Differences in measurement landmarks, classification systems and reporting styles hinder meaningful comparison across populations and regions.[9]

The present review is therefore framed to critically examine anthropometric head measurements in South Indian adult populations from a comprehensive, multidisciplinary perspective. By consolidating existing knowledge on cranial dimensions, biological determinants, regional variation and applied significance, this review aims to clarify the role of head anthropometry in understanding human diversity within South India. Through this synthesis, the review seeks to provide a foundational reference for researchers, clinicians and forensic practitioners while identifying gaps that warrant future investigation.[10]

HEAD ANTHROPOMETRY

Head anthropometry constitutes a specialized domain within physical anthropology and human anatomy that focuses on the systematic measurement of cranial and facial dimensions. The human head, encompassing the skull and overlying soft tissues, serves as a biologically stable and morphologically informative region for assessing human variation.[11]

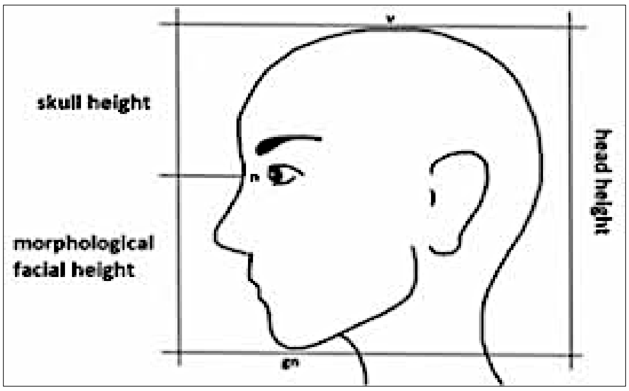

Figure 2: Head anthropometry.

The scientific relevance of head anthropometry extends across multiple disciplines, including anatomy, forensic science, medicine, ergonomics and evolutionary anthropology. Cranial dimensions reflect both genetic inheritance and adaptive responses to long-term environmental pressures, such as climate and nutrition.[2]

Classification of head measurements

Head measurements are broadly classified based on the nature of the dimension being assessed and the anatomical structures involved.[13]

Linear measurements represent straight-line distances between two predefined anatomical landmarks. These measurements form the foundation of head anthropometry and include parameters such as head length, head breadth, facial height and bizygomatic breadth. Their simplicity and reproducibility make them particularly suitable for large-scale population assessments.[14]

Angular measurements describe the spatial relationship between cranial or facial structures by quantifying angles formed between intersecting planes or lines. They are frequently applied in orthodontics, craniofacial surgery and cephalometric analysis, where facial harmony and proportionality are of clinical importance.[15]

Circumferential measurements involve measurements taken around curved surfaces, most notably head circumference. These measurements reflect overall cranial size and volume and are particularly useful in clinical screening, neurological assessment and anthropometric comparisons. Head circumference is widely recognized as a reliable indicator of cranial growth and development and retains relevance in adult populations for comparative and ergonomic applications.[16]

Another important classification in head anthropometry distinguishes between external head measurements and cranial (skeletal) dimensions. External measurements are taken over the soft tissues using palpable surface landmarks and are applicable to living subjects. These measurements are non-invasive and practical for clinical and forensic settings. While cranial measurements offer greater anatomical precision, external head measurements are more commonly employed in population studies due to their feasibility and ethical acceptability.[17]

Commonly used head parameters

Several head parameters have achieved widespread acceptance in anthropometric research due to their anatomical relevance, ease of measurement and strong correlation with overall cranial morphology.[18]

Head length is defined as the maximum anteroposterior diameter of the head, measured from the most prominent point of the forehead to the most projecting point of the occiput.[19]

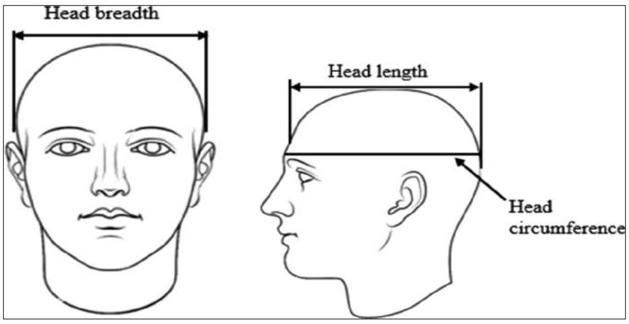

Figure 3: Head measurements.

Head breadth represents the maximum transverse diameter of the head.[20] Head circumference is measured as the maximum horizontal perimeter of the head, typically passing above the supraorbital ridges and over the occipital prominence.[21] The cephalic index is a derived anthropometric index calculated as the ratio of head breadth to head length multiplied by 100. This index provides a standardized numerical expression of cranial shape, allowing classification into dolichocephalic, mesocephalic and brachycephalic types.[23]

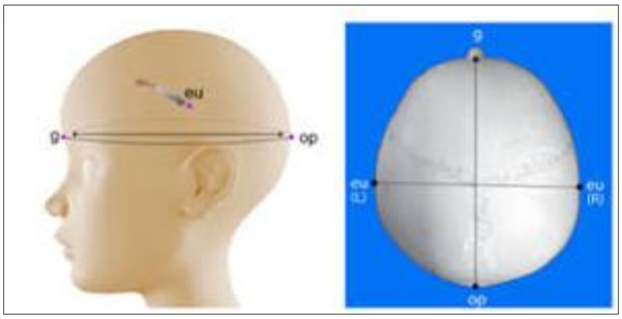

Figure 4: Cephalic index.

Facial dimensions, including facial height, bizygomatic breadth and nasal width, complement cranial measurements by capturing variation in the midface and lower facial regions.[24]

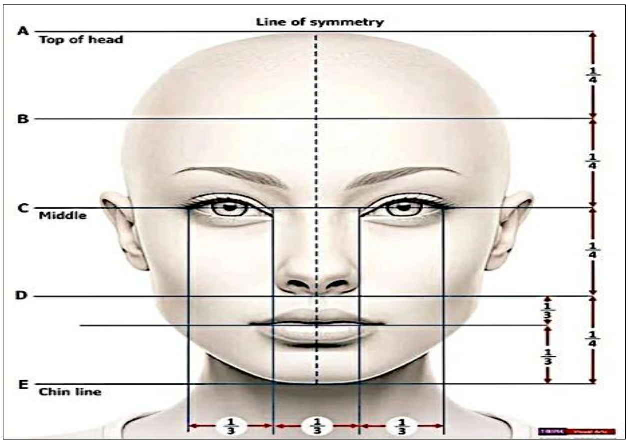

Figure 5: Facial dimensions.

Instruments and standardization

The accuracy and reliability of head anthropometric data depend heavily on the instruments used and adherence to standardized measurement protocols.[25] Traditional anthropometric tools have been designed to ensure precision while remaining practical for field and clinical use.

Spreading calipers are primarily used to measure curved or broad dimensions of the head, such as head breadth and bizygomatic breadth. Sliding calipers are suited for smaller linear measurements, particularly facial dimensions, where precision is essential.

Measuring tapes are typically used for circumferential measurements, such as head circumference, due to their flexibility and ease of application.[26] Standardization of measurement techniques is critical for ensuring comparability across studies and populations.[27]

BIOLOGICAL DETERMINANTS OF HEAD MEASUREMENTS

Head dimensions in adults reflect the combined effects of growth completion, age-related remodeling, sex-linked biological differences and population genetic structure.[28]

Age-related changes in adult head dimensions

Post-maturity stability is a defining feature of adult cranial anthropometry and many core head dimensions show relative constancy once skeletal growth has ceased. This stability is one reason cranial measures are widely used for adult identification, comparative population assessment and device design.[29,30]

Sexual dimorphism in head measurements

Sexual dimorphism is one of the most consistent biological determinants in craniofacial anthropometry. Across many populations, adult males tend to have larger absolute cranial and facial dimensions than adult females, reflecting differences in overall body size, muscle mass, hormonal influences and developmental trajectories.[36] This foundational observation underlies the common forensic practice of using cranial metrics as supportive evidence in sex estimation when pelvic data are unavailable.

Beyond simple size differences, sexual dimorphism can interact with age. Mydlová and colleagues examined facial appearance and reported that both age and sex significantly influence facial form and shape, indicating that dimorphism may change in expression across adult age brackets.[40] This matters for review synthesis: pooled adult samples spanning wide age ranges may show “blurred” sex effects if age-related facial changes are not considered.

Genetic and ethnic influences

Head anthropometric patterns are shaped by heredity and population structure and cranial morphology has long been used as a marker of population affinity though modern interpretations stress careful, non-deterministic, ethically responsible use.[41]

For South Indian populations “regional gene pools” are also shaped by sociocultural practices particularly long-standing endogamy, local marriage patterns and community structure potentially increasing differentiation among subgroups over time. In practical terms, a review should treat “South India” as internally heterogeneous prioritize subgroup-specific reporting where possible and interpret anthropometric variability as multifactorial, reflecting genetics, environment and developmental context rather than a single cause.

REGIONAL DIVERSITY WITHIN SOUTH INDIA

South India exhibits marked regional heterogeneity in craniofacial and head anthropometric characteristics, reflecting a complex interplay of ancestry, ecology, nutrition and sociocultural history. Although often grouped together in pan-Indian or "South Asian" datasets, populations from Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, and Telangana display distinct cranial patterns that warrant separate consideration. Anthropometric investigations conducted across these states consistently demonstrate that head dimensions and indices are not uniform within South India, emphasizing the importance of regional reference values for clinical, forensic and anthropological applications.[45]

Variations across South Indian States

Tamil Nadu has been one of the most frequently represented South Indian regions in anthropometric literature. Krishan and Sharma, in their broader anthropometric discussions, highlighted that South Indian groups, including those from Tamil Nadu.[46] Research focusing on Tamil Nadu adults has also emphasized sex-specific cranial patterns, with males demonstrating significantly larger head length, breadth and circumference than females, reinforcing the role of sexual dimorphism in regional datasets.

In Kerala, anthropometric patterns show subtle but meaningful differences compared with neighboring states. Studies summarized by Bhasin and colleagues indicated that populations from the southwestern coastal belt, including Kerala, tend to show slightly higher cranial breadth values relative to length, contributing to a higher proportion of mesocephalic and brachycephalic head types when compared with interior peninsular regions.[47]

Karnataka represents a geographically and culturally diverse state and anthropometric findings from this region reflect that diversity. Investigations among adult populations in Karnataka have reported variability in head length, head breadth and cephalic index, often influenced by rural–urban residence and ethnic background.

In Andhra Pradesh and Telangana, head anthropometric studies have reported distinctive cranial proportions influenced by regional ancestry and socioeconomic factors. Research synthesized by Reddy and co-workers demonstrated that adult populations from this region often exhibit relatively longer cranial dimensions, contributing to a higher prevalence of dolichocephalic head types in certain groups.[49]

Across all South Indian states, a recurring theme is heterogeneity rather than homogeneity. Bhasin and Walter, in their extensive anthropological syntheses, emphasized that South India cannot be treated as a single anthropometric unit due to long-standing population subdivision, endogamy and localized adaptation. Their work reinforces the importance of state-wise and community-specific data for accurate interpretation of head measurements in adults.

Rural versus urban differences

Beyond state-level variation, rural–urban differences represent another important dimension of craniofacial diversity in South India. Environmental exposure, childhood nutrition, healthcare access and lifestyle patterns. Ulijaszek and Johnston emphasized that anthropometric traits, including craniofacial measurements, are sensitive to early-life nutritional and environmental conditions, which often differ markedly between rural and urban populations.[50]

Urban populations in South India generally experience improved childhood nutrition, reduced infectious disease burden and greater access to healthcare, factors that may contribute to slightly larger mean cranial dimensions in adulthood. Wells discussed how secular changes associated with urbanization can influence body proportions, including cranial size, through improved developmental conditions.[51]

Comparison with other populations

Comparisons between South Indian and North Indian populations consistently reveal measurable differences in head anthropometric parameters. North Indian populations often demonstrate relatively broader cranial dimensions and higher cephalic indices compared with South Indian groups, which more frequently exhibit elongated cranial forms. Krishan and Kanchan emphasized that these differences likely reflect a combination of ancestry, climatic adaptation and long-term population history rather than simple geographic separation.[53]

In a global context, South Indian cranial patterns also differ from those reported in European, African and East Asian populations. Molnar noted that craniofacial dimensions reflect both deep evolutionary history and regional adaptation, making global comparisons informative but context dependent.[12,55]

CEPHALIC INDEX PATTERNS IN SOUTH INDIAN ADULTS

The cephalic index remains one of the most enduring and widely applied indices in craniofacial anthropometry, offering a concise numerical representation of cranial shape derived from the relationship between head breadth and head length. In South Indian adult populations, cephalic index patterns reveal both regional consistency and intra-regional variability, reflecting the combined influences of genetics, environment, nutrition and long-term population history.[56]

Classification of head types

Dolichocephalic head types are characterized by a relatively long anteroposterior cranial dimension in relation to transverse breadth. This cranial form has frequently been reported among South Indian adult populations and has been interpreted as reflecting both genetic ancestry and adaptation to long-standing environmental conditions.

Mesocephalic head types represent an intermediate cranial form, with balanced proportions between head length and breadth. Mesocephaly is commonly observed in populations undergoing admixture or occupying transitional geographic zones. Molnar noted that mesocephalic patterns often dominate in populations where diverse ancestral components intersect, making this category particularly relevant for regions of South India with complex population histories.[58]

Brachycephalic head types are defined by relatively greater cranial breadth in proportion to length, yielding higher cephalic index values. While brachycephaly is more frequently associated with certain North Indian, Central Asian and East Asian populations, it is also present in South India, particularly in coastal or urbanized groups. Krogman and İşcan cautioned that brachycephaly should not be interpreted simplistically, as cranial breadth can be influenced by multiple factors, including nutrition and secular trends.[59]

Although this tripartite classification has historical roots, modern authors stress that cephalic index categories should be used as descriptive tools rather than rigid racial classifiers. When applied within ethically responsible and population-specific frameworks, these categories continue to offer meaningful insight into cranial morphology [60].

Distribution trends in South Indian

Across South Indian adult populations, dolichocephalic and mesocephalic patterns emerge as the most frequently reported cranial forms, although the relative dominance of each varies by state, community and sex. Bhasin and Walter, in their extensive syntheses of Indian anthropometric data, consistently reported lower mean cephalic indices in South Indian groups compared with northern populations, supporting the predominance of elongated cranial forms in the south. In Tamil Nadu–based datasets, authors such as Krishan and Sharma observed that adult populations often cluster around mesocephalic to dolichocephalic ranges, with males tending toward slightly lower cephalic indices than females due to greater head length. These findings reinforce the interaction between sexual dimorphism and cranial shape classification.

Clinical and anthropological implications

The observed cephalic index patterns in South Indian adults carry important clinical, forensic and anthropological implications. Clinically, understanding dominant cranial forms aids in the design and fitting of head-related medical devices, helmets and prosthetics. Farkas emphasized that population-specific cranial shape data improve clinical outcomes by reducing mismatch between device design and patient anatomy.

In forensic anthropology, cephalic index distributions contribute to population affinity assessment and support sex estimation when used alongside other cranial and postcranial parameters. Krogman and İşcan stressed that cranial indices should never be used in isolation but can enhance interpretive confidence when applied within appropriate regional frameworks. In South India, cephalic index variability underscores the region's internal heterogeneity and complex population structure.

APPLICATIONS OF HEAD ANTHROPOMETRY

Head anthropometry has wide-ranging applications across forensic science, clinical medicine, surgery, ergonomics and human biology. Because adult cranial dimensions exhibit relative post-maturity stability and are strongly influenced by sex and population background.[1,2] In South Indian contexts, the application of head anthropometry is particularly relevant due to population diversity, frequent reliance on external measurements and the need for region-specific reference standards.

Forensic identification

In forensic anthropology, head anthropometry plays a crucial role in sex determination, population affinity assessment and disaster victim identification. When skeletal remains are incomplete or fragmented, cranial and facial measurements often provide the most accessible biological information. Krogman and İşcan highlighted that the skull is second only to the pelvis in its value for sex estimation and is particularly useful when postcranial elements are missing or damaged.

Sex determination

Sex determination using head measurements relies on well-documented sexual dimorphism in cranial size and proportions. Farkas documented consistent male–female differences across multiple craniofacial parameters. For South Indian adults, applying equations or thresholds derived from non-local populations may reduce accuracy, underscoring the need for regional datasets.

Disaster victim identification

Disaster victim identification (DVI) increasingly relies on anthropometric data, particularly in mass fatality events where bodies may be fragmented or decomposed. İşcan emphasized that cranial anthropometry, combined with sex and stature estimation, can significantly reduce the pool of possible matches during DVI operations. In densely populated regions of South India, where large-scale disasters may overwhelm forensic infrastructure, readily applicable head measurement standards can play a supportive role in rapid identification.

Stature estimation from head measurements

Stature estimation traditionally relies on long bones; however, head measurements offer valuable alternatives when limbs are unavailable or when assessment must be conducted on living individuals. Authors such as Krogman and İşcan recognized their practical utility in constrained forensic scenarios.

Studies summarized by Jasuja and Singh also highlighted the forensic relevance of craniofacial measurements for stature estimation in Indian populations, particularly when only partial remains are available. Although prediction errors are typically larger than those obtained from long bones, head-based models remain valuable in specific forensic and medico-legal scenarios, such as identification of mutilated remains or assessment of living individuals in legal investigations.

Clinical and surgical relevance

Beyond forensics, head anthropometry has substantial clinical and surgical relevance, particularly in craniofacial surgery orthodontics and biomedical design. Accurate knowledge of normal cranial and facial dimensions is essential for diagnosis, treatment planning and outcome evaluation. Farkas emphasized that craniofacial anthropometric norms form the foundation for identifying deviations associated with congenital anomalies, trauma and developmental disorders.

In craniofacial and maxillofacial surgery, head measurements guide reconstructive procedures and aesthetic planning. Enlow and Hans highlighted that understanding population-specific craniofacial proportions is critical to achieving functionally and aesthetically acceptable outcomes.

Anthropometric head data are essential for designing protective helmets, respirators, hearing protection devices and other head-mounted equipment. Zhuang and Bradtmiller demonstrated that mismatches between device design and population-specific head dimensions can compromise safety and comfort. In South India, where occupational helmet use is widespread in construction, transportation and industry, locally derived head anthropometric data are crucial for optimizing fit and compliance.

NUTRITIONAL, ENVIRONMENTAL AND SOCIOECONOMIC INFLUENCES

Craniofacial and head anthropometric characteristics in adults are not determined solely by genetic inheritance. Authors such as Ulijaszek and Johnston emphasized that anthropometry provides a biological record of lived conditions, capturing the cumulative effects of early-life environment on adult morphology.

Childhood nutrition plays a central role in shaping adult head dimensions. Adequate intake of energy, protein and micronutrients during prenatal life, infancy and early childhood supports optimal cranial growth and brain development. Tanner highlighted that while the cranial vault is less plastic than stature, chronic undernutrition during growth can lead to reduced cranial dimensions and altered proportions that persist into adulthood. As a result, adult head anthropometric variability within South India cannot be fully understood without reference to early-life nutritional environments.

Climatic factors

Beyond nutrition, climatic factors have long been implicated in shaping cranial morphology through evolutionary and developmental pathways. Classic anthropological theories proposed that cranial shape reflects adaptation to temperature and humidity, with elongated cranial forms associated with warmer climates and broader forms associated with colder environments.[80] Although these relationships are probabilistic rather than deterministic, they offer a biological framework for understanding why regional cranial patterns may persist across generations in climatically stable regions like South India. Importantly, such adaptations operate over long timescales and interact with genetic structure, making them most visible at the population level rather than in individual variation.

Socioeconomic status

Socioeconomic status (SES) further modifies cranial anthropometric outcomes by shaping access to nutrition, healthcare, sanitation and education. Wells emphasized that SES influences growth trajectories through its effects on disease burden and nutritional quality. Ulijaszek observed that secular trends associated with urbanization can lead to modest increases in cranial dimensions across generations, even when genetic composition remains stable. Farkas cautioned that such factors should be considered when comparing external head measurements across populations with differing lifestyle profiles.

FUTURE DIRECTIONS

Future research in head anthropometry, particularly within South Indian adult populations, must move beyond isolated datasets toward integrated, technologically advanced and context-aware frameworks. Bhasin emphasized that much of Indian anthropometric research has historically relied on regionally confined or community-specific samples, which, while valuable, may not capture the full extent of intra-regional diversity. In future South Indian studies, AI-based approaches could assist in sex estimation, population affinity assessment and pattern recognition across regional subgroups, provided that ethical considerations and data governance are rigorously addressed. Importantly, these technologies should complement rather than replace classical anthropometric principles, ensuring continuity with existing literature.

CONCLUSION

Head anthropometry remains a robust and biologically meaningful approach for understanding craniofacial variation in adult populations. This review highlights that head measurements in South Indian adults are shaped by an intricate interplay of biological determinants, including age-related stability with subtle remodeling, pronounced sexual dimorphism and strong genetic and ethnic influences, alongside modifying effects of nutrition, environment and socioeconomic conditions. Regional analyses demonstrate that South India cannot be regarded as a homogeneous anthropometric entity, as significant inter-state and intra-regional variability exists in cranial dimensions and cephalic index patterns.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Bethard JD, VanSickle C. Applications of sex estimation in paleoanthropology, bioarchaeology and forensic anthropology Klales A. Sex Estimation of the Human Skeleton London, UK Academic Press. 2020;25-34.
2. Christensen AM, Passalacqua NV, Bartelink EJ. Forensic Anthropology:Current Methods and Practice Amsterdam, The Netherlands. Elsevier. 2014.
3. Yadav S, Pathak B. Estimation of stature from the measurement of forearm, hand, leg and foot dimensions in Uttar Pradesh region. Int J Ther Appl. 2018;35:49-53.
4. Martínez-Hernández RM. Gender determination according to the anthropometric measurements of the lower jaw. Rev Mex Med Forens. 2018;3:25-38.
5. Curate F. The estimation of sex of human skeletal remains in the Portuguese identified collections: History and prospects. Forensic Sci. 2022;2:272-86.
6. Sánchez-García S, García-Peña C, Duque-López MX, Juárez-Cedillo T, Cortés-Núñez AR, Reyes-Beaman S. Anthropometric measures and nutritional status in a healthy elderly population. BMC Public Health. 2007;7:2.
7. Patel SM, Shah GV, Patel SV. Estimation of height from measurements of foot length in Gujarat region. J Anat Soc India. 2007;56:25-7.
8. Sen J, Ghosh S. Estimation of stature from foot length and foot breadth among the Rajbanshi:An indigenous population of North Bengal. Forensic Sci Int. 2008;181:55.e1-6.
9. Ozaslan A, Işcan MY, Ozaslan I, Tuğcu H, Koç S. Estimation of stature from body parts. Forensic Sci Int. 2003;132:40-5.
10. Shetty B, Deepak M, Monteiro FN, Castelino KP, Xavier AP. Estimation of stature from dimensions of hands and feet in a South Indian population. IP Int J Forensic Med Toxicol Sci. 2020;5:14-9.
11. Navid S, Mokhtari T, Alizamir T, Arabkheradmand A, Hassanzadeh G. Determination of stature from upper arm length in medical students. Anat Sci J. 2014;11:135-40.
12. Patel SH, Bastia BK, Kumar L, Kumaran SM. Estimation of adult human stature from measurements of inter-acromial length in Gujarati population of India. J Indian Acad Forensic Med. 2015;37:365-8.
13. Wankhede KP, Anjankar VP, Parchand MP, Kamdi NY, Patil ST. Estimation of stature from head length and head breadth in Central Indian population: An anthropometric study. Int J Anat Res. 2015;3:954-7.
14. Yadav AB, Kale AD, Mane DR, Yadav SK, Hallikerimath S. Stature estimation from regression analysis of facial anthropometry in Indian population. J Oral Maxillofac Pathol. 2019;23:311.
15. Uppada UK, Tauro DP, Senthilnathan KP. Anthropometric analysis of Indian faces: A systematic review. J Maxillofac Oral Surg. 2024;23(3):451-61.
16. Heidari Z, Mahmoudzadeh-Sagheb H, Khammar T, Khammar M. Anthropometric measurements of the external nose in 18-25-year-old Sistani and Baluch aborigine womenin the southeast of Iran. Folia Morphol (Warsz). 2009;68:88-92.
17. Gomes LDEC, Horta KO, Goncalves JR, Santos-Pinto AD. Systematic review: craniocervical posture and craniofacial morphology. Eur J Orthod. 2014;36(1):55-66.
18. Raveendran M. The South Asian facial anthropometric profifile: a systematic review. J Cranio Maxillo Fac Surg. 2019;47:263-72.
19. Durtschi RB, Chung D, Gentry LR, Chung MK, Vorperian HK. Developmental craniofacial anthropometry: assessment of race effects. Clin Anat. 2009;22(7):800-8.
20. Farkas LG, Katic MJ, Forrest CR. International anthropometric study of facial morphology in various ethnic groups/races. J Craniofac Surg. 2005;16(4):615-46.
21. Uppada UK, Sinha R, Madishetti S, Pampana SG, Kumar S, Chidagam PR. Ergonomics among oral and maxillofacial surgeons in the Indian States of Telangana and Andhra Pradesh an evaluative study. Ann Maxillofac Surg. 2020;10:325-9.
22. The World Bank. India. Available at: https://data.worldbank.org/region/India. Accessed on 21 June 2026.
23. Uppada UK, Tauro DP, Senthilnathan KP. Patient satisfaction following orthognathic surgery: a systematic review. J Maxillofacial Oral Surg. 2023;22(4):762-9.

24. Uppada UK, Tauro DP, Senthilnathan KP. Is there a need for greater emphasis on clinical facial analysis than cephalometrics & 3D software solutions in the diagnosis and treatment planning of patients with dentofacial deformities? J Maxillofac Oral Surg. 2023;22(4):820-6.
25. Uppada UK, Sinha R, Reddy DS, Paul D. Soft tissue changes and its stability as a sequlae to mandibular advancement. Ann Maxillofac Surg. 2014;4:132-7.
26. Agarwal AS, Abhyankar S, Juneja M, Borgaonkar A. Anthropometric facial proportions in indian population compared to Caucasian population. J Clin Exp Dermatol Res. 2022;13(2):044.
27. Duggal S, Kapoor DN, Verma S, Sagar M, Lee YS, Moon H, et al. Photogrammetric analysis of attractiveness in Indian faces. Arch Plast Surg. 2016;43:160-71.
28. Gupta S, Narwal A, Kamboj M, Sharma P, Makkar V, Raman RK. Baseline data of facial parameters in the population of Haryana: an anthropometric study. J Forensic Dent Sci. 2019;11:28-34.
29. Saurabh R, Piyush B, Sourabh B, Preeti O, Trivedi R, Vishnoi P. Assessment of facial golden proportions among central Indian population. J Int Soc Prevent Communit Dent. 2016;6:S182-6.
30. Tripathi AA, Tandon RP, Hantodkar N. Facial divine proportions in attractive North Indian females: a photographic study. World J Dent. 2013;4(1):41-6.
31. Mane DR, Kale AD, Bhai MB, Hallikerimath S. Anthropometric and anthroposcopic analysis of different shapes of faces in group of Indian population: a pilot study. J Forenic Legal Med. 2010;17:421-5.
32. Shetti RV, Pai SR, Sneha GK, Gupta C, Chethan P. Study of prosopic (facial) index of Indian and Malaysian students. Int J Morphol. 2011;29(3):1018-21.
33. Geetha GN, Swathi S, Athavale SA. Estimation of stature from hand and foot measurements in a rare tribe of Kerala State in India. J Clin Diagn Res. 2015;9:HC01-4.
34. Krishan K, Sharma A. Estimation of stature from dimensions of hands and feet in a North Indian population. J Forensic Leg Med. 2007;14:327-32.
35. Wankhede KP, Anjankar VP, Parchand MP, Kamdi NY, Patil ST. Estimation of stature from head length and head breadth in Central Indian population: an anthropometric study. Int J Anat Res. 2015;3(1):95.
36. Sagar S, Nath S. Estimation of stature from different head and face measurements among male and female Jatavs of Delhi. IOSR J Humanit Soc Sci. 2014;19:52.
37. Shah T, Patel MN, Nath S, Bhise RS, Menon SK. Estimation of stature from cephalo-facial dimensions by regression analysis in Gujarati population. J Indian Acad Forensic Med. 2015;37(3):253-7.
38. Wankhede KP, Anjankar VP, Parchand MP, Kamdi NY, Patil ST. Estimation of stature from head length and head breadth in Central Indian population: an anthropometric study. Int J Anat Res. 2015;3(1):954-57.
39. Krishan K, Chatterjee PM, Kanchan T, Kaur S, Baryah N, Singh RK. A review of sex estimation techniques during examination of skeletal remains in forensic anthropology casework. Forensic Sci Int. 2016;261:165.e1-8.
40. Farkas LG. Anthropometry of the Head and Face. 2nd ed. New York: Raven Press; 1994.
41. Krishan K, Kanchan T. Anthropometry in forensic medicine and forensic science ‘Forensic Anthropometry’. Int J Forensic Sci. 2015;2(1):1-6.
42. Basu A, Sarkar-Roy N, Majumder PP. Genomic reconstruction of the history of extant populations of India reveals five distinct ancestral components and a complex structure. Proc Natl Acad Sci USA. 2016;113(6):1594-9.
43. Krogman WM, İşcan MY. The Human Skeleton in Forensic Medicine. 2nd ed. Springfield: Charles C Thomas; 1986.
44. Ulijaszek SJ, Johnston FE, Preece MA. The Cambridge Encyclopedia of Human Growth and Development. Cambridge: Cambridge University Press; 1998.
45. Molnar S. Human Variation: Races, Types and Ethnic Groups. 6th ed. Upper Saddle River: Prentice Hall; 2002.
46. İscan MY. Forensic anthropology of sex and body size. Forensic Sci Int. 2005;147(2–3):107-12.
47. Martin R, Saller K. Lehrbuch der Anthropologie. Stuttgart: Gustav Fischer Verlag; 1957.
48. Wells JCK. The evolution of human body shape and the influence of climate. J Anat. 2012;220(2):114-30.
49. Farkas LG. Anthropometry of the Head and Face. 2nd ed. New York: Raven Press; 1994.
50. Lynnerup N. Cranial thickness in relation to age, sex and general body build in a Danish forensic sample. Forensic Sci Int. 2001;117(1–2):45-51.
51. Lynnerup N, Astrup JG, Sejrsen B. Thickness of the human cranial diploë in relation to age, sex and general body build. Head Face Med. 2005;1:13.
52. Farkas LG, Ngim RC, Lee ST. Craniofacial norms in 6, 12, 18 year old Chinese subjects. In: Farkas LG, editor. Anthropometry of the head and face. New York: Raven Press; 1994;201-18.
53. Sharma RL, Pancholi P, Sharma SK, Sastya A. Anthropometric measurement of lips in adults of MP India. Int J App Res. 2017;3(2):210-2.
54. Spradley MK, Jantz RL. Sex estimation in forensic anthropology: Skull versus postcranial elements. J Forensic Sci. 2011;56(2):289-96.
55. Singh A, Gupta V, Singh S. Anthropometric study using craniofacial features to determine sex in adults. J Clin Diagn Res. 2017;11(4):ZC12-5.
56. Mydlová M, Dupej J, Koudelová J, Velemínská J. Sexual dimorphism of facial appearance in ageing human adults: A cross-sectional study. Forensic Sci Int. 2015;257:519.

57. Relethford JH. Craniometric variation among modern human populations. Am J Phys Anthropol. 1994;95(1):53-62.
58. Basu A, Sarkar-Roy N, Majumder PP. Genomic reconstruction of the history of extant populations of India reveals five distinct ancestral components and a complex structure. Proc Natl Acad Sci U S A. 2016;113(6):1594-9.
59. Witherspoon DJ, Wooding S, Rogers AR. Genetic similarities within and between human populations. Genetics. 2007;176(1):351-9.
60. Vasan SK, Thomas N, Christopher S, Geethanjali FS, Paul TV, Sanjeevi CB. Anthropometric measurements for the prediction of the metabolic syndrome: a cross-sectional study on adolescents and young adults from southern india. Heart Asia. 2011;3(1):2-7.

Cite this article as: Vishal K, Ganesh R, Abirami S. Stature estimation from anthropometric head measurements in adults: South Indian populations. Int J Community Med Public Health 2026;13:4753-61.