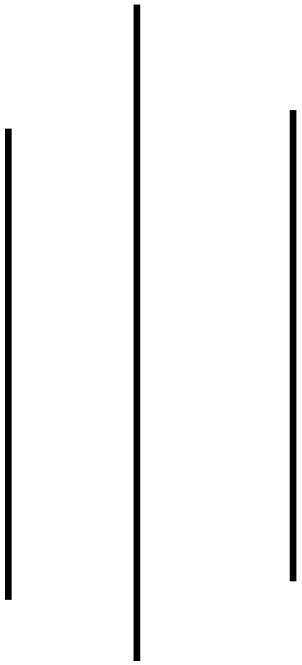
# Standard operating procedure of age estimation of the living in Nepal

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## Goal of the Protocol:

In the absence of a standardised protocol on age estimation, there has been a lack of uniformity among the age estimation procedures undertaken throughout Nepal. Age estimation procedures are undertaken not only by Forensic Medicine experts, but also by government medical officers and physicians of other specialities. Age estimation procedures require a multi-disciplinary approach, with input from professionals of other disciplines, including radiology, and requires co-ordination and planning. This has therefore necessitated the formulation of the Standard Operating Protocol for age estimation of the living to ensure that they are scientific and uniform throughout the nation. This Standard Operating Protocol has been developed to assist government medical officers and other professionals in conducting age estimation, where required by law enforcement, judiciary or other authorities.

## Authorisation:

Forensic age estimation (for medico-legal purposes) should only be commenced after receiving a requisition letter from the law enforcement, court or any public authority.

## Registration:

A separate register should be maintained for registration of age estimation cases, mentioning the particulars of the examinee. This should also include the requesting office, along with the reference number of the letter of authorisation, date of requisition as well as dispatch of the report.

The name of the accompanying Police Personnel and/or any other official representing the legal authority should be noted.

The examination for estimation of age should include:

1. History-taking of the examinee and/or guardian to establish the date of birth/age, age of menarche, where relevant, as well as any developmental anomalies, injuries and conditions that could lead to delayed skeletal maturity. The examinee should also be asked about the reason s/he has presented for age estimation, as well as any other information the examinee deems relevant. The information provided by the examinee can also assist in establishing the mental state of the examinee.
2. Physical examination for evaluation of the status of secondary sexual characters, which also records anthropometric data, signs of sexual maturation and any age-relevant developmental disorders.
3. X-ray examination of the right elbow (AP and Lateral views), right wrist with hand (AP view) and pelvis (AP view) should be performed, as required depending on the alleged

age of the examinee. Additional X-rays may be required, including Shoulder joint (including medial ends of the clavicle), knee joint, ankle joint including foot etc.

4. A dental examination is also required during the age estimation procedure. The eruption status of the dentition of the examinee should be examined and recorded. Where available, dental radiography may be warranted.

These methods should be used in combination to increase the accuracy of the estimated age as well assist in the identification of developmental disorders.

## History-taking

Following registration of the case details, the examinee and legal guardian should be examined in a private, isolated area. The examiner should ensure that the guardian is always present at the examination area. Before eliciting history or performing examination, informed consent should be obtained from the examinee and/or the legal guardian:

**Informed consent:**

The examinee should understand the full nature of their consent to the procedure. This can be accomplished by presenting them with all the relevant information in a language they can easily understand. Informed consent should be taken from the individual prior to being examined, including history taking, for age estimation. Additionally, consent of the legal guardian of the examinee may be needed, if the individual is not able to provide valid consent, either due to their mental status or age. The informed consent should detail the instructions/details provided to the examinee as well as the language of instruction and should be signed by the individual and/or the legal guardian. If they are unable to sign, fingerprint impressions of both thumbs should be collected in place of the signature.

**Details of the examinee**

The history taking should elicit the following information:

1. Name – If the requesting authority has mentioned a code name, the examiner should also note down the same. The name of the examinee should be recorded only in the medical records of the examinee. The Examiner as well as the examining authority are required to maintain confidentiality of all information and the name and other personal details of the examinee should be withheld from all documents.
2. The age (in years, months and days) as alleged by the individual and/or the legal guardian. Where available, collect and record the date of birth as well as the details of any official document specifying the date of birth.
3. The sex of the examinee.
4. The permanent and current address of residence of the examinee and/or the legal guardian.
5. All personnel present at the time of examination. Other than required medical personnel, only the legal guardian(s) should be allowed to be present during the history-taking and examination.
6. Person(s) accompanying and identifying the examinee.

7. Date, time and the place of examination.

Relevant details should also be enquired about the age of menarche, where relevant. Additionally, other relevant details, including developmental anomalies, injuries and conditions causing delayed skeletal maturity should be elicited. The reason for the age estimation procedure, knowledge of the day/date, place of examination as well as familiarity with accompanying persons assist in confirming the soundness of mind of the examinee.

## Physical examination

Physical examination for age estimation includes the general examination as well as those required to assist in the process of age estimation.

The general physical examination begins with the confirmation and recording of two marks of identification (huliya) that can assist in confirming the identity of the individual in court or even at a later data.

a) Height: Should be measured by portable/wall mounted stadiometer with movable head piece, or measuring rod. Height should be recorded in feet and inches.
b) Examinee is asked to remove his/her shoes, heavy outer garments, and hair ornaments.
c) The examinee is asked to stand with his/her back against the height rule. The back of the head, back, buttocks, calves and heels should be touching the upright, feet together.
d) The head should be positioned in the 'Frankfurt Plane', where the top of the external auditory meatus (ear canal) should be level with the inferior margin of the bony orbit.
e) The head piece of the stadiometer or the sliding part of the measuring rod is lowered so that the hair (if present) is pressed flat.
f) Height is recorded to the resolution of the height rule (i.e. nearest millimetre).
g) If the examinee is taller than the examiner, the measurement should be recorded by standing on a platform so that the examiner can properly record the reading on the stadiometer/measuring rod.
h) If the height of the examinee cannot be correctly measured, it can be recorded as "xx cm as reported by the examinee. The weight of the individual could not be measured due to underlying … condition"

**Calibration of height rule:** The height rule should be checked with standardized rods every month and corrected if the error is greater than 2 mm.

1. Weight:
    a. The weighing machine (scale) should be placed on a hard-floor surface.
    b. Examinee is asked to remove their heavy outer garments (jacket, coat, trousers, skirts, etc.) and shoes.

c. The examinee should stand in the centre of the platform, with the weight distributed evenly on both feet.
d. If the weight of the examinee cannot be correctly measured, it can be recorded as "xx kg as reported by the examinee. The weight of the individual could not be measured due to underlying … condition"

**Calibration of scale:** Calibration should be done at least once a month.

2. Voice: Ask the examinee some simple questions and note the type of voice either high or low pitched. Also note the voice whether it is child-like or mature.
3. Scalp hair: Note the colour and length of the hair as well as baldness (if present)
4. Moustache: Mention whether it is present, absent or shaved. Note the colour, length, distribution if present
5. Beard: Mention whether it is present, absent or shaved. Note the colour, length, distribution if present
6. Ask the date of menarche (in females) and record.
7. Where appropriate, use Marshal and Tanner's classification of breast development and pubic hair growth stages in females and genital development and pubic hair stages in males.
8. Note any relevant findings that indicate developmental disorders. These also include pathological conditions that could affect the status of maturation derived by other methods.

## Dental Examination:

The dental examination in all cases of age estimation should include the eruption status of dentition. This is recorded as follows:

A. Intraoral examination to observe the presence/absence of the teeth:
    a) Use FDI (Federation Dentaire International) method of teeth notation.
    b) Make a note on the teeth present, both deciduous and permanent teeth.
    c) Mention whether third molars are erupted. If not, note the presence of space and/or bulge distal to the second permanent molars.
    d) Mention whether any tooth is absent and note the cause of its absence.

In addition to the eruption status, a more detailed examination of the dentition may be required for assisting in estimation of age. This is done by performing dental radiological examination. Where available, orthopantomograms are the preferred over intra-oral peri-apical x-ray.

B. Note the stage of development of the teeth and the status of root closure.
Use established dental age estimation methods using the X rays (Eg. Eight stages of development (Demirjian's) method, third molars maturation etc) if possible. The methods should be used to compute the range of age based on the reference population (if such researches are available) to which the examinee belongs to.

# Radiological examination

Radiological examination is one of the primary methods for estimating the skeletal age of the examinee. It is therefore important to determine the appropriate site of radiological investigation to be selected.

- If the age of the examinee is suspected to be 10 years, x-ray of the wrist with hand (AP view) is recommended, specifically examining for the appearance and ossification of the pisiform bone.
- If the age of the examinee is suspected to be 14 years, x-ray of the pelvis (AP view) is recommended, with the focus being on fusion of tri-radiate cartilage, appearance of iliac crest as well as ossification of composite epiphyses of the femur.
- If the age of the examinee is suspected to be 16 years, the elbow (AP and lateral views) as well as wrist with hand (AP view) are recommended. On the elbow radiograph, the focus is on composite epiphyses of lower end of humerus, Fusion of medial epicondyle, fusion of head of radius as well as olecranon process. Similarly, the focus is on base of $1^{st}$ metacarpal, heads of $2^{nd}$ - $5^{th}$ metacarpals and lower ends of both radius and ulna.
  If the age of examinee is suspected to be 18 years, all three sites – elbow (AP and lateral views), wrist with hand (AP view) as well as Pelvis (AP view) are recommended. The focus of the examination of elbow is at the fusion of the composite epiphyses (distal humerus). For the wrist with hand, the focus is on the lower end of radius and ulna as well as heads of metacarpals. Lastly, on the pelvis, the focus is on the fusion of iliac crest, ischial tuberosity as well as fusion of the composite epiphyses (proximal femur).

In addition to the above radiographic investigations, additional site may be examined depending on the age to be estimated. ***The ossification status of the parts examined should be compared to a suitable reference study, ensuring maximum compatibility and likeness of the reference population with the examinee***. **Chain of custody during radiography**

When the examinee is taken to perform radiographs, at least one responsible person (eg. Police, staff of the hospital etc) should accompany the examinee to ensure that the individual being investigated is the examinee in question.

**Use of reference studies**

The collected findings and the determined stages of radiographs are to be presented in detail in the report. The used stage classifications and reference studies, if used in the report, are to be mentioned.

Reference studies used for forensic age estimation should meet the following requirements:

a. Adequate sample size
b. Proven age of subjects
c. Even age distributions of subjects
d. Analysis separately for both sexes

e. Information on the time of examination
f. Clear definition of the examined features
g. Detailed description of the methods
h. Data on the reference population regarding ethnicity, state of health
i. Data on the sample size, mean value, and range of scatter for each examined feature

Examples of reference studies are Greulich and Pyle (1959), Gunst et al. (2003), Kahl and Schwarze (1988), Mincer et al. (1993), Schmeling et al. (2004) and Tanner et al. (2001). The secondary data of age estimation from Indian population available from textbooks can also be suitable references. As the Nepalese people have ethic and nutritional resemblance with the India population, several Indian textbooks like Kishan Vij, NG Rao, Apurba Nandy, KSN Reddy etc. can be used.

## Comprehensive report to be provided by a coordinator

The physician who takes the responsibility of age estimation can act as a coordinator and take help of professionals of other disciplines like qualified dentist, radiologist, anthropologist etc. He has to compile the reports or opinions provided by those professionals, but he has to prepare the final comprehensive reports.

**Reporting**

- Where reports have been provided by experts, the examining physician should compile the reports and provide a complete, comprehensive and detailed report.
- The objective of the forensic report is to provide the most accurate estimation of the age of the individual and/or the probability that the stated age is the actual age or that the individual's age is above the penal age limit.
- The expert report has to quote the methods and the reference studies (if used) or source eg textbooks, guidelines etc. on which the age estimation is based on. The age should always be given in a range.
- The report should be prepared according to the format provided in कसुरको अनुसंधान सम्बन्धी नियमावली 2075 (Page 216-218) annexed in this standard operating procedure.

## अनुसूची–१० ग

## (नियम ८ ककाे खण्ड –ख) संग सम्बन्धित)

## उमेर जांच सम्बन्धी शारीरिक परीक्षण प्रतिवेदनको ढाँचा

## REPORT OF MEDICAL EXAMINATION

## (AGE ESTIMATION)

1. Case Registration No.:
2. Name of the Office referred for examination (with letter reference No. and Date)
3. Name of the accompanying Police Personnel or other:

### DETAILS ABOUT THE EXAMINEE

1. Name／Code Name (For the purpose of maintaining Confidentiality:
2. Alleged Age and Sex:
3. Address:
4. Identification marks (Huliya):
9. Brought by and identified by:
10. Date, time and place of examination:
11. Consent: I am fully aware about the procedure and possible consequences of the examination; I hereby give my full consent for medical examination without any compulsion. (Consent should be taken in the form of signature／thumb print. In case of minors consent shall be taken from guardians.)

    From the examinee: From other guardian:

## GENERAL PHYSIQUE AND DEVELOPMENT

1. Height: 2. Weight: 3. Voice (Adult/Childish type):

4. Adam's apple 5. Scalp hair (Colour, length):

6. Moustaches (Present/absent; colour, length, distribution):

7. Beards (Present/Absent; colour, length, distribution) :

8. Auxiliary hairs (Present/absent; colour, length, distribution):

9. Pubic hairs (Present /absent; colour, length, distribution):.

10. Any abnormality and disease (If present to be described):

11. Breast Development (Globular/Pendular; nipple and areola colour):

12. Menstruation; when started:

13. Mental state (Alert/ not alert):

14. Dental development (Type of dentition; temporary/mixed/permanent and Number of teeth):

8 7 6 5 4 3 2 1 / 1 2 3 4 5 6 7 8
…….. = (Total teeth)
8 7 6 5 4 3 2 1 / 1 2 3 4 5 6 7 8

15. X-ray examination:

**(a) Right elbow A/P & lateral views:**

- Lateral epicondyle is (completed/not completed/not started) to fuse.
- Medial epicondyle is (completed/ not completed/not started) to fuse
- Upper end of radius is (completed/not completed/not started) to fuse.
- Olecranon is (completed/ not completed/not started) to fuse

**(b) Right wrist with hand A/P view:**

- Lower end of radius is (completed/not completed/not started) to fuse.
- Lower end of ulna is (completed/not completed/not started) to fuse.
- Base of first metacarpal is (completed/not completed/not started) to fuse.
- Heads of metacarpals are (completed/not completed/not started) to fuse.
- Pisiform bone is (ossified/ not ossified.
- Phalanges are (completed/not completed/not started) to fuse

**(c) Pelvis A/P view:**

- Heads of femur are (completed/not completed/not started) to fuse
- Greater and lesser trochanters are (completed/not completed/not started) to fuse.
- Triradiate cartilages are visible/invisible in acetabular fossa.
- Iliac creasts are (completed/not completed/not started) to fuse.
- Ischial tuberosities are (completed/not completed/not started) to fuse.

**(d) Other parts of the body:**

X-ray taken in (Hospital): Date:

X-ray code or Number in plates:

**OPINION:**

The examinee is in between …. year and …. Year.

Name of the Examiner:-

Signature:- Qualification:-

NMCReg. No. :- Office/Hospital/Health Centre:-

Date:- Seal of the Hospital/Health Centre:-**Note**

- **परिक्षण कार्य संभव भएसम्म** ँयचभलकष्अ **विषयको विशेषज्ञता, सो नभएमा तालिम प्राप्त चिकित्साकर्मीले गर्नुपर्दछ ।**
- **परिक्षण गर्ने चिकित्साकर्मीलेनै प्रतिवेदन तयार गर्नु पर्दछ ।**
- **संभवभएसम्म** Computer Type **गरी प्रतिवेदन तयार गर्नु पर्नेछ, सो नभएमा स्पष्ट वुझिने गरी उल्लेख गर्नु पर्नेछ । साथै परिक्षण** ***प्रतिवेदनको सक्कल प्रति नै संलग्न गर्नुपर्नेछ ।***

**निर्धारित स्थानमा विवरण उल्लेख गर्न नपुग भएमा छुट्टै Paper sheet प्रयोग गर्नु पर्नेछ ।**