

MEASUREMENT OF HEIGHT USING WALL MOUNTED STATUREMETER

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Height is one of the most widely used indicators for assessment of nutritional status and provides an index of linear skeletal growth.

Until a few decades ago many of the surveys were carried out in places without level ground or vertical wall.

Under these circumstances height was measured using either a stadiometer or anthropometry rod.

Stadiometer is a bulky instrument, occupies space and is heavy.

Anthropometry rod is relatively compact but intensive training is required to keep the rod perpendicular and accurately measure the height.

Currently in all urban areas and most rural areas, most residences have even flat floor and vertical walls.

Under these conditions the small readily portable wall mounted staturemeter is used for measurement of height.

STATUREMETER FOR HEIGHT MEASUREMENT



Wall mounted staturemeters are used for measuring height.

Instrument specifications

Reverse wound stainless steel tape in a plastic case with horizontal and vertical arms

Vertical arm fixes the staturemeter to the wall

Horizontal arm rests on the head of the person being measured

Tape length: 2 meters.

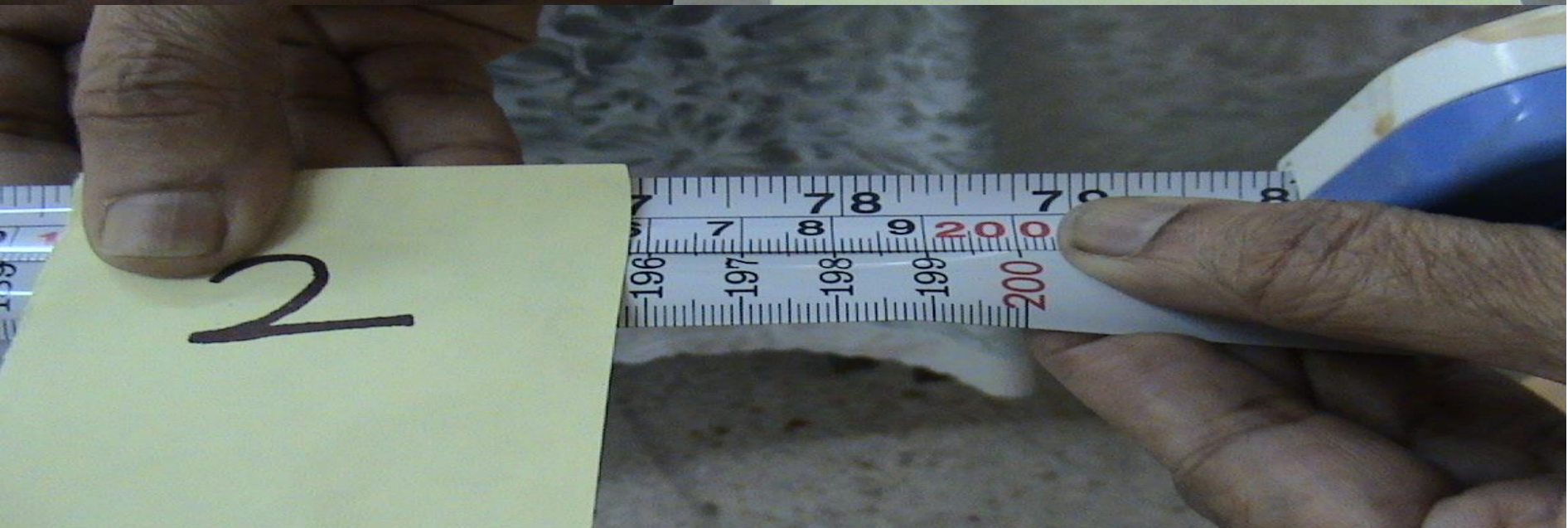
Instrument accuracy: 0.1 cm.

Accuracy of the tape assessed by comparing with the standard steel tapes certified by Deptt of Weights and Measures.

Accuracy of staturemeter in measuring height of individuals is tested against a standard stature meter.

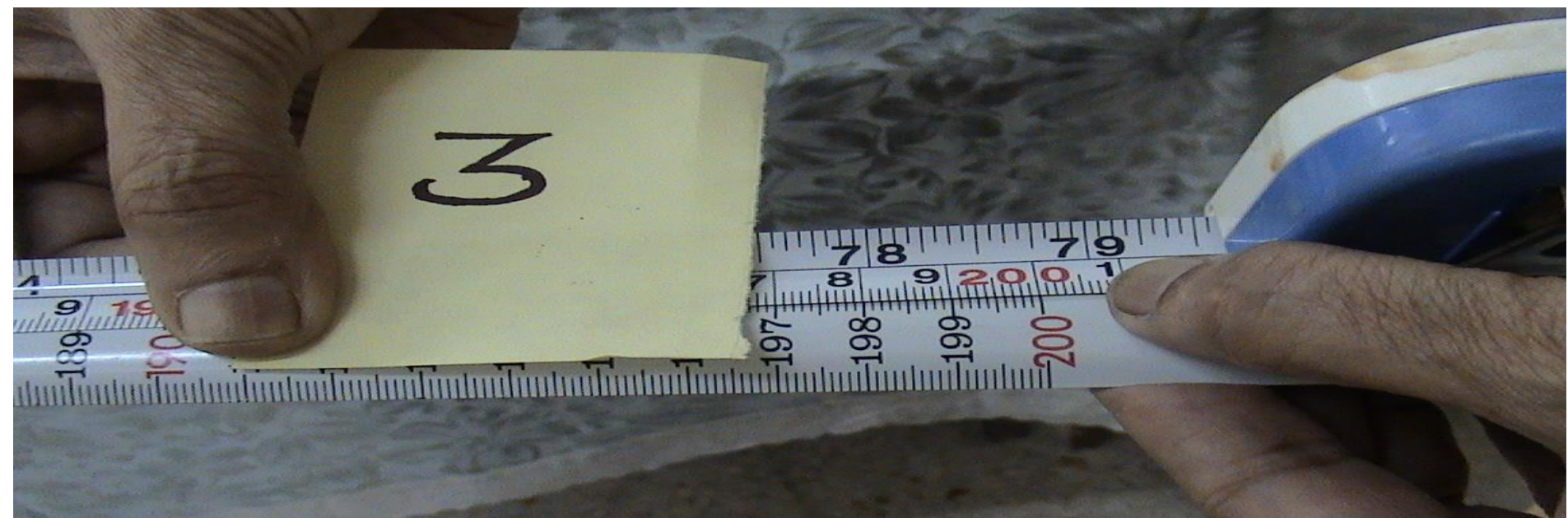
CHECKING ACCURACY OF THE STATURE METER







All the three stature meter tapes were accurate as compared to steel tape certified by the Deptt of weights and measures.

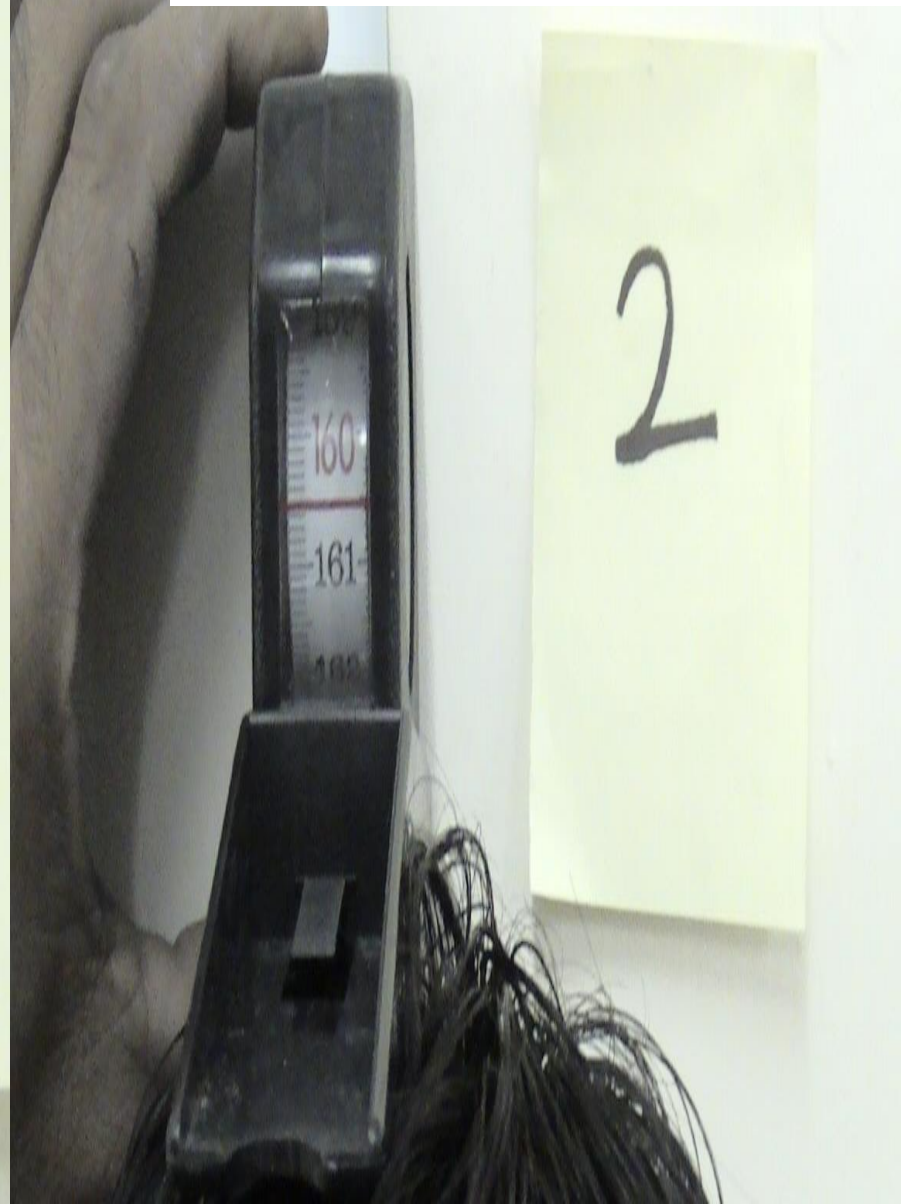


CHECKING ACCURACY OF THE STATURE METER

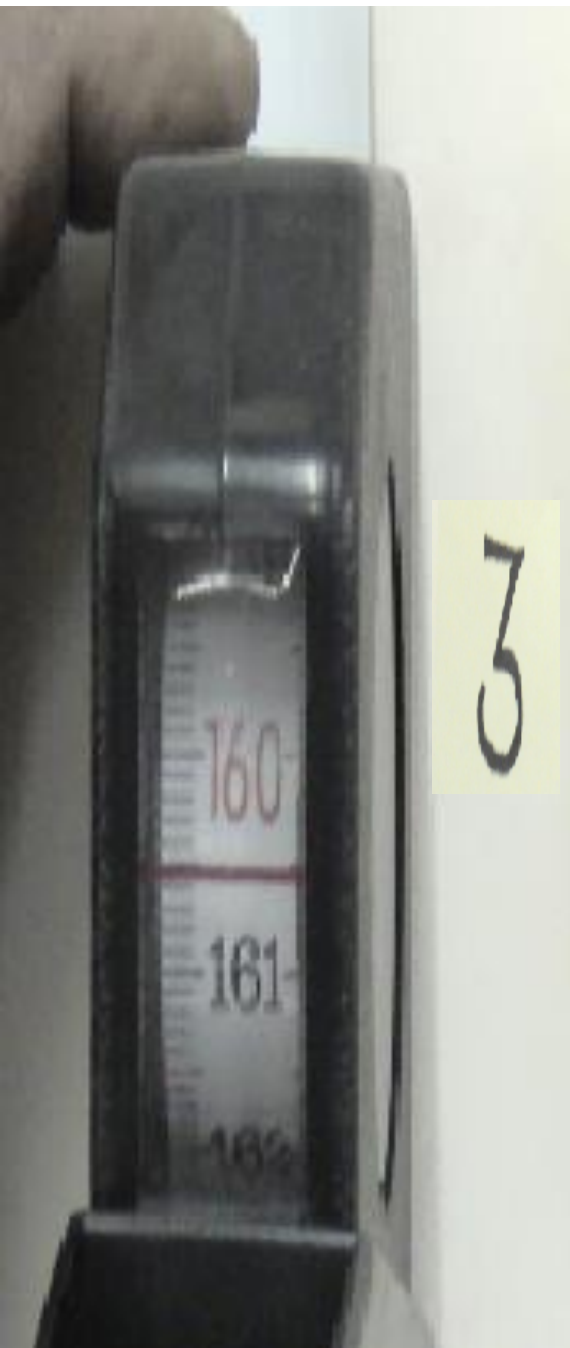
TEST STATURE METER



TEST STATURE METER



TEST STATURE METER



Height measured with the three stature meters were comparable to the height measured by standard stature meter

These three stature meters are accurate upto 0.1 cm

STANDARD STATURE METER



OTHER PROBLEMS WITH STATUREMETERS

Some staturemeter tapes do not unwind fully or smoothly.

Such staturemeters may not function under field conditions and so should be rejected and replaced.

The vertical limb may get fractured if the hammer blow falls on it when it is nailed to the wall. This may lead to slanted fixation and lead to errors in measurement of height. Efforts should be made to protect the vertical limb from hits while fixing the staturemeter.

If the vertical limb has been fractured such staturemeters should be rejected and replaced.

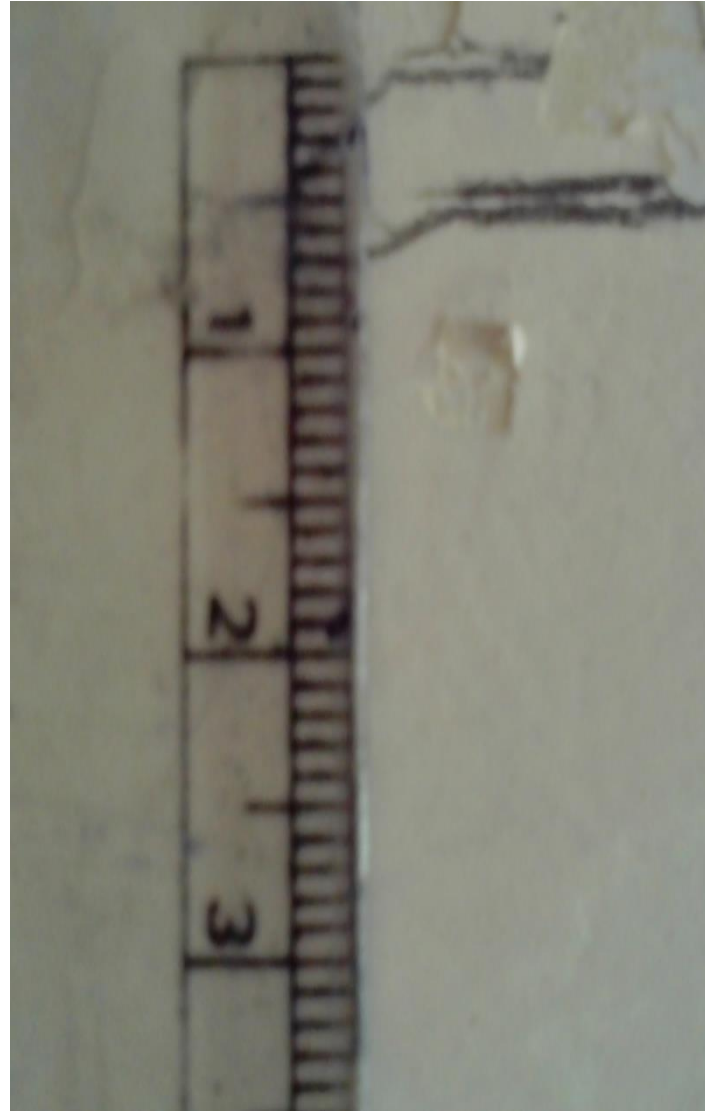


Errors in fixing the tape to the wall

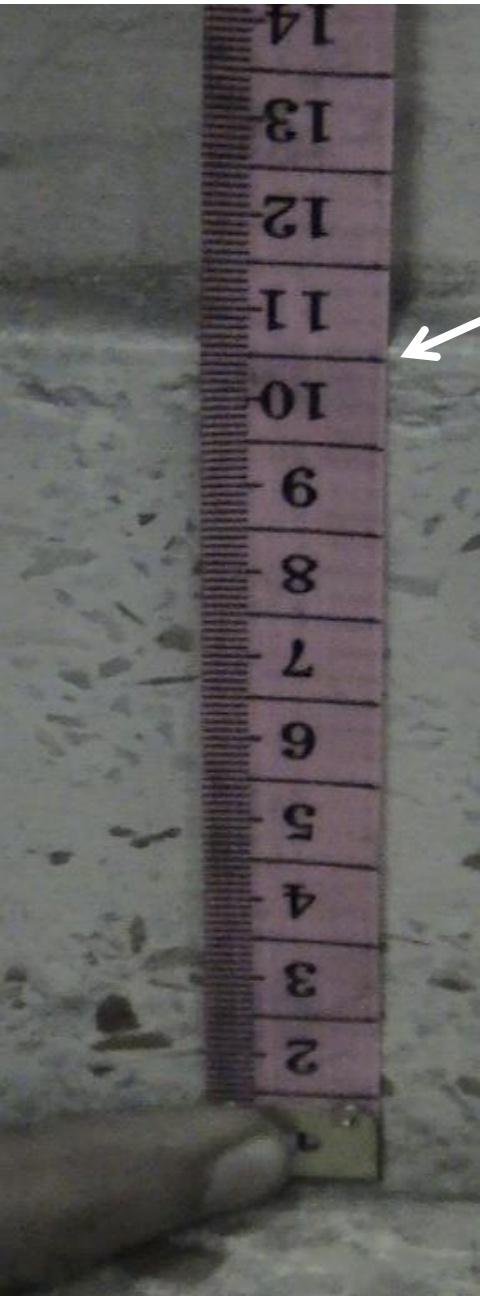
Horizontal limb of stature meter is placed on the ground with tape reading 0 and the tape drawn up to read 200 cm

There is a gap between the tape and the wall at the skirting and the tape is being obliquely pulled over the skirting

The error due to keeping horizontal limb of the stature meter on the floor while fixing the stature meter at 200 cm may vary between 0.3 to 1.0 cm depending upon the thickness of the skirting



FIXING STATURE METER TO THE WALL AT 200 CM



Correct method of fixing the stature meter to the wall

Measure the height of skirting using a tape - it is 10 cm in this case.

Keep the horizontal limb of the staturemeter on the top of the skirting with the tape reading 10 cm. This will prevent the obliquity of the tapes while passing over the skirting

Vertically draw up the tape till the end.

Fix the stature meter using the three screws inserted in the three screw holes in the vertical arm.



Ensuring that the tape is winding down vertically

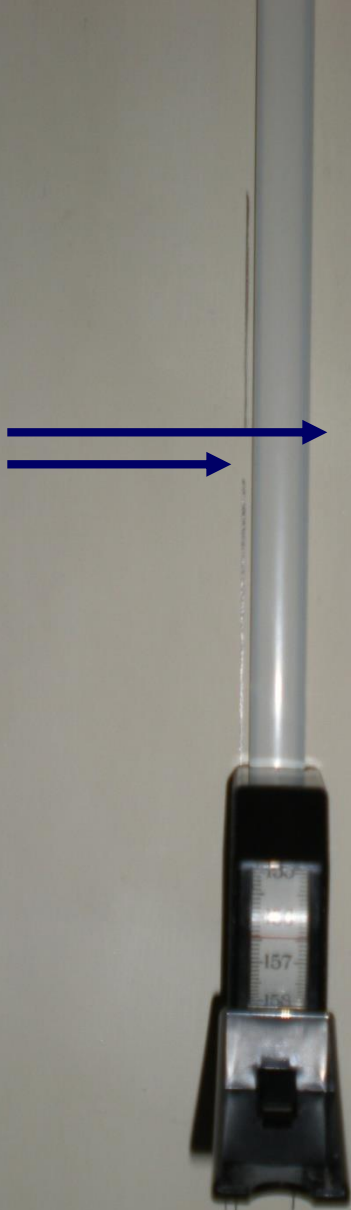
Place a 500g weight on the horizontal arm of stature meter and keep your palm below it

Gently allow the horizontal limb with the weight to fall.

Gravity assisted fall will ensure that the tape is winding down vertically

Draw a pencil line on either side of the tape

Keeping the tape between the two lines will ensure that tape is being drawn down vertically and help in accurate measurement of height.

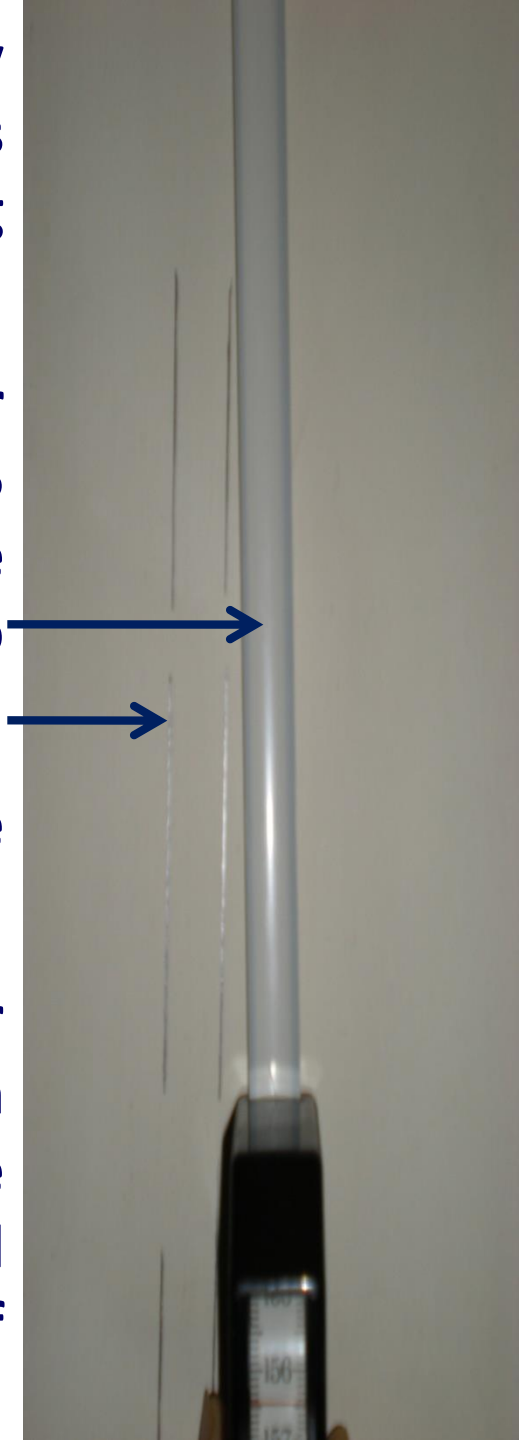
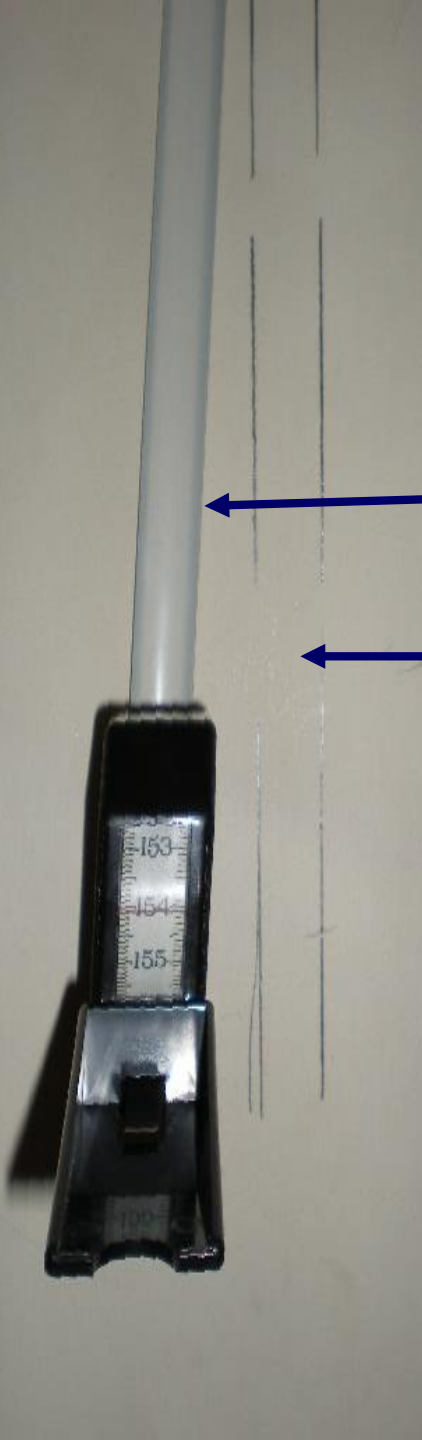


Drawing down the tape obliquely is one of the common errors made especially when young children are measured.

If the obliquity is large the error in measurement may go up to 0.5 cm in children; however large obliquity may be more easy to detect and correct

It is difficult to assess when the obliquity is small.

Two lines are drawn on either side of the tape. The person measuring height can keep the tape between these two line and ensure accurate measurement of height.



POSITIONING THE PERSON FOR HEIGHT MEASUREMENT



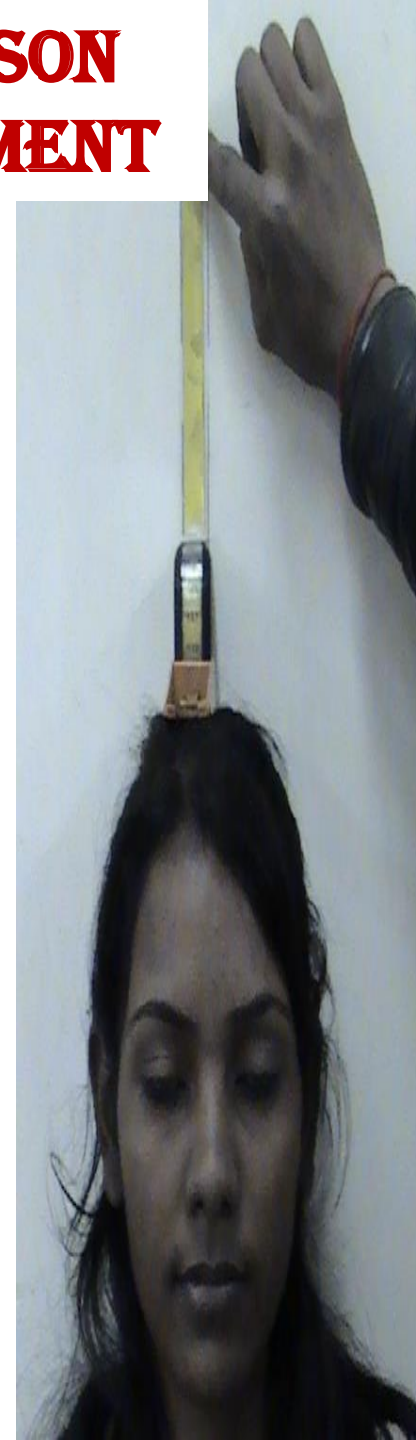
The girl is standing straight.

Heel, knee, buttocks, shoulders and back of the head are touching the wall.



The head is held in Frankfurt Plane - tragus is in line with the lower orbital margin.

POSITIONING THE PERSON FOR HEIGHT MEASUREMENT



POSITIONING THE PERSON FOR HEIGHT MEASUREMENT



Her height is
146.8 cm

MEASUREMENT OF HEIGHT

The person being measured should be barefoot and hair should be flat
Feet to be together with heels, buttocks, shoulder touching the wall
Tragus of the ear and the lower orbital margin should be in the same horizontal plane. This is called Frankfurt Plane.

The horizontal limb of the stature meter should be firmly placed on the top of the head but should not be pressed

The eyes of the investigator should be in level with the window showing the reading. The height should be measured to the nearest 0.1 cm

Standing on a stool and stooping to read the height of taller persons



If the subject is taller than the investigator then a stool should be used to ensure that the eye of person who takes the measurement is on the same level as the window providing the reading in the stature meter. If the subject is shorter, the investigator should stoop to take the measurement.

Stooping to read the height of shorter person



POSITIONING THE PERSON FOR HEIGHT MEASUREMENT



Height is being measured in a child at home.

Child is standing straight.

Heel, knee, buttocks, back, shoulders and back of the head are touching the wall.

Head is held in Frankfurt plane.

The horizontal limb of the stature meter is resting on the top of the child's head.

POSITIONING THE PERSON FOR HEIGHT MEASUREMENT



**Child is looking straight ahead;
head is held in the Frankfurt
plane;**

**horizontal limb of the stature
meter resting on the head.**

His height is 94 cms.

POSITIONING THE PERSON FOR HEIGHT MEASUREMENT



This woman is standing straight with heels, knees (not in the picture), buttocks, shoulders and back of the head touching the wall.

She is looking straight ahead with head held in Frankfurt plane.

The horizontal limb of the stature meter is resting on the top of her head. Her height is 146.5cm.



QUALITY ASSURANCE IN ANTHROPOMETRIC MEASUREMENTS

Variability in the measurement can be of two types - intra-individual variability and inter-individual variability.

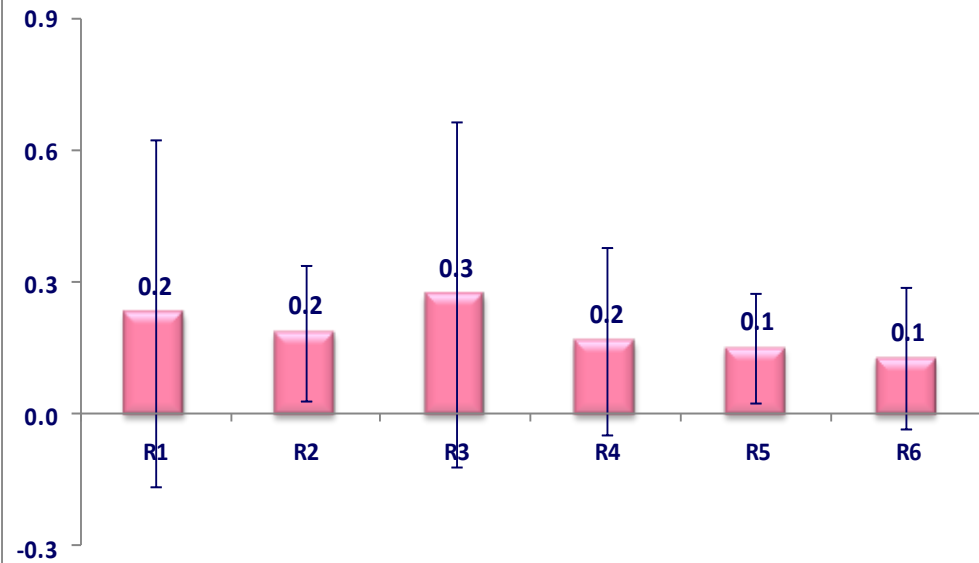
Intra-individual variability refers to the variation in the measurement, when the same measurement is taken by an investigator repeatedly in the same person at the given time.

Inter-individual variability refers to the variation in the measurement, when the same measurement is taken by different investigators in the same person at a given time.

Variability in measurement can be reduced by standardizing the tools and techniques used and by appropriate training of the investigators.

After getting trained in accurately measuring height, weight, mid-upper arm circumference (MUAC), waist circumference (WC), hip circumference (HC), all trainees have to participate in exercise to assess the errors in measurement as compared to the faculty.

Inter-round variation (7 persons)



Quality assurance measures in training

Height measurement had been carried out by 7 trainees for 6 rounds and the difference between height of these persons as measured by the faculty and the trainees were taken. Mean and SD of the difference is computed

With increasing experience the error margin comes down in all persons

There are some persons who are accurate right from the beginning.

There are some who have wide margin of error after several rounds and do not perform well.

Inter-personal variation (6 rounds)

