Introduction to Maternal Infant Young Children Nutrition

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Lecture - 56
Session - 12

Standard Normal Distribution WHO Z Score Charts

Hello everyone. So, in this part I will be explaining about Standard Normal Distribution Z score charts.

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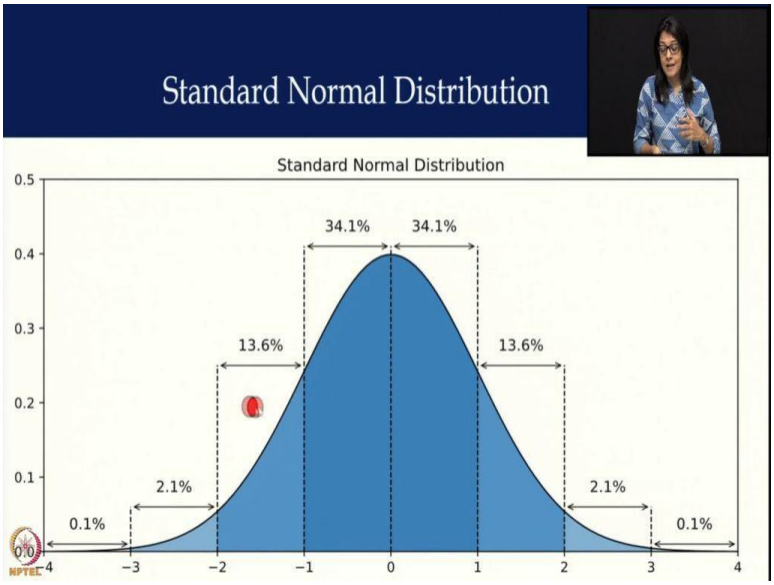

But, I want you to understand what is the Standard Normal Deviation. Because, although as pediatrician we were used to using percentile growth chart with a patient, but when you work in programs, or when you look at this data NFHS4 and NFHS5 data, they look at the how many, how many percentage of children are basically below minus 2 standard deviation. How many children are below minus 2 standard deviation, because those are the children who are basically they are underweight, they are stunted, they are wasted. So, we need to understand this growth chart Z score growth charts also; because it is not taught as part of the curriculum in pediatrics, so here it is.

And it is also important for healthcare workers because obviously they want to see in the program that how many children are undernourished, how many children all those wasted and stunted. So again, let us discuss this chart, so this is a bell curve. This is your basically your mean. Now, this is your minus 1 standard deviation, this is a minus 2 standard deviation, this is a minus 3 standard deviation. Then, you want most of your children to fall between minus 2 to plus 2 standard deviation; so, this is your normal basically curve. This most of your children they fall in this in this from plus 2 to minus 2 standard deviation.

How many person fall in this? So, look at these are the numbers. So, from minus 1 or say I would say from means to 1, you have 34.1 percent children fall between 0 to plus 1. And from plus 1 to plus 2, you have 13.6 percent children fall into this are positive; that means they are they have they have taller than or they are bigger than your mean that by average. Then, these are some children they are below average. So, below average would be your 34.1 percent children; they fall up to like from mean to minus 1; 34.1 percent children will fall in that. And then you have some children are even smaller than that.

So, you have what between minus 1 to minus 2 standard deviation. So, about 13.6 percent children, they fall in this from minus 1 to minus 2. But, once they start falling below minus 2 standard deviation, these are the children that means they are they are counted as undernourished like moderate malnourished, severe malnourished.

So, who are moderate malnourished? A moderately malnourished children who are between minus 2 and minus 3 standard deviation; these are moderately malnourished. And who are the children who are severely malnourished? These are the children who are falling below minus 3 standard deviation. So, these children are basically we have to immediately work on the children to get them up, at least towards the mean.

We want to bring them not just not just over here, you do not want to just bring them over here and leave them. You want to make sure that they get the full potential; so, our goal is to bring them as close to the mean as possible. So, so there is a long way to go for the child to go from here from minus 2 to mean. And look at this, there should be only under minus 2, you need you can have just like maybe 2.1 and maybe 0.1. So, not not much, maybe two points will figure out that how many children should like. Normally, you see in a standard deviation, how many children do you see below minus 2 standard deviation?

Unfortunately, in India, these numbers are too high; this number is they are much higher than what it is shown over here, so will talk about that. But, remember that half of your children are above average; half of your children are above average, half of your children are probably below average.

So, you want to make sure that you do not just stop over here; you try to bring a child in the positive growth; this is the positive growth. So, try to bring your children more towards plus 1 to plus 2, because those children will if you try to bring them early on, say from 0 to 6 months of age, this as the weight goes up, the length will go up. And that I will show you some of the growth chart.

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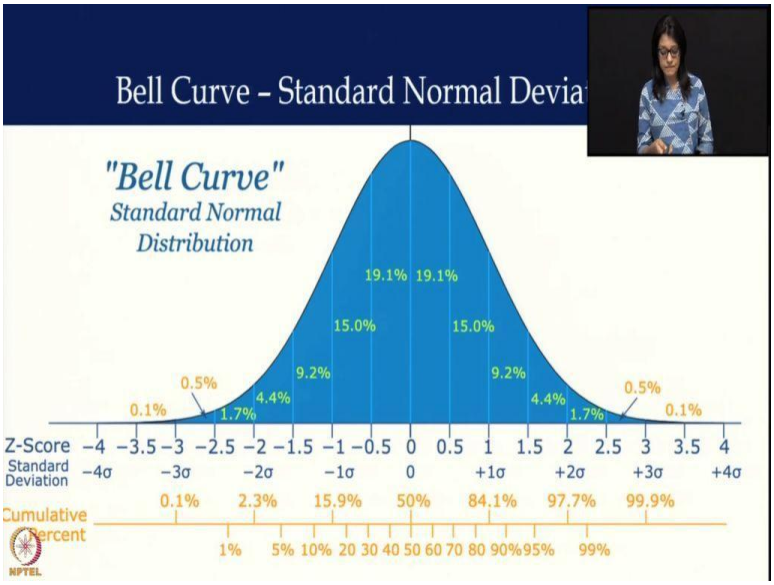

So, this is another one. Here we have shown all the different standard deviation, and we have shown the basically percentile; so, look at this your 50 percent children. So, your 50 percent children would be on here, like just below mean, and your 50 percent children will be above mean. Now, look at your minus 2 standard deviation; so minus 2 standard deviation basically coincides with 2.3 percent. So, normally only 2.3 percent children should be below minus 2 standard deviation, only 2.3 percent children in the world. But, in India, if you look at the weight 32 percent children are below minus 2 standard deviation, 32 percent.

Look at the difference between 2.3 to 32. Do you understand what I am saying? Now, this is below minus 2 standard deviation. So, you can imagine mostly mostly our children are probably

between minus 2 to minus 1. And if some of some of the children maybe up go to up to minus point 5, very seldom breastfed babies I see it over here in a positive growth. I do not see too many children who are between 0 to plus 2 standard deviation. But yes, we did started seeing once we started using the cross-cradle hold, we started seeing children basically more in this average your 50 percent 50 percent in this this side of the mean, rather than this side.

What is happening right now, when they find children who are below minus 2 standard deviation or even minus 3 standard deviation, healthcare worker try to bring them up a little bit, and then they leave them. They try to bring them children up a little bit and then they leave them. So, our children are just falling into this 4.4 percent children who are who are between minus 2 to 1.5 standard deviation. They are just leaving all these children over here. Our goal is not to keep the children in this section; we want to bring our children at least average children should be over here in mean. The earliest you start better it is okay; let us see the chart.

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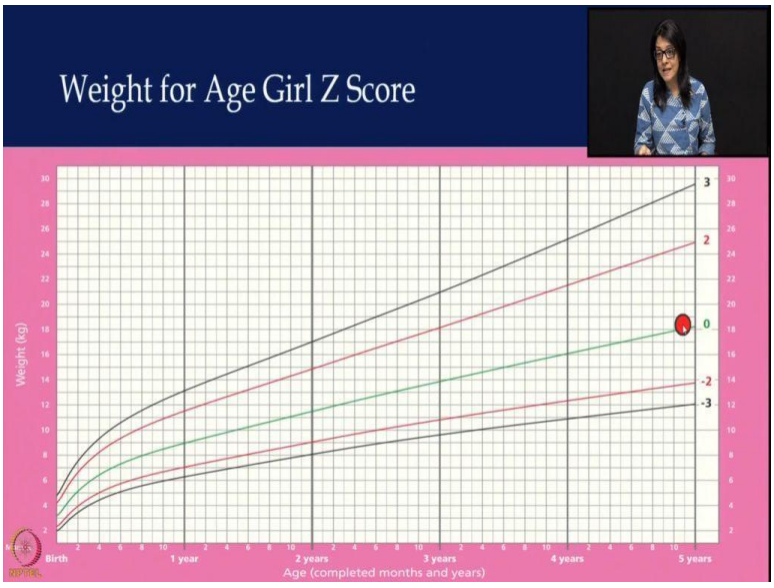

Now, this is your weight for age Z score. So, in Z score, see here this is in the form of growth chart; you have mean, you have minus 2 standard deviation, you have minus 3 standard deviation. In similarly, you have plus 2 standard and plus 3 standard deviation; so, average all your children should fall between 2 to minus 2, 2 to minus 2. If your child fall below minus 2 and it falls between minus 2 to minus 3, that means your children are moderately malnourished.

Now, this is because of weight; its weight for age it will be underweight. So, if your child falls between minus 2 to minus 3, those are moderately underweight.

If child falls below minus 3, those are severely underweight; so those are called SUW, and MUW, now, remember this. So, I want you now to bring your children not just over here, but I want you to bring your children up to mean and maybe above mean, try to bring the children up but with mother's milk can earlier you start better it is.

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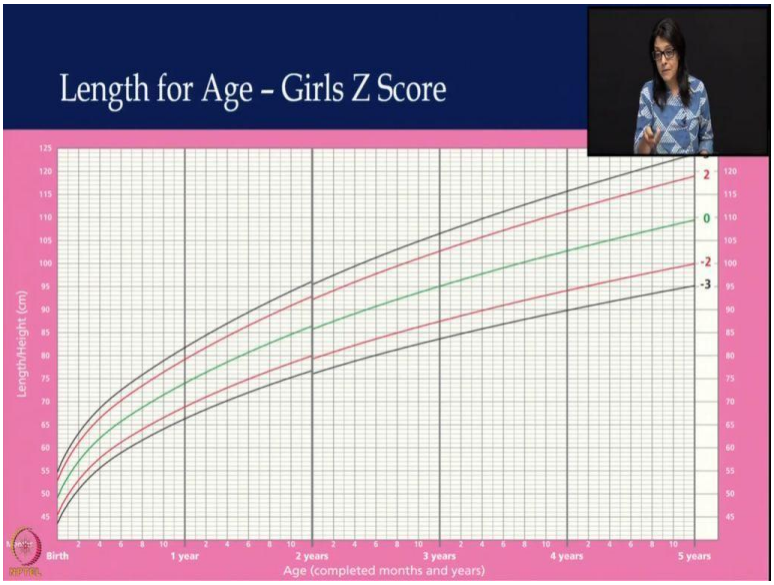

Similarly, this is for length. So again, this is your standard deviation growth chart, you have five lines in this. So, your 0 to minus 2 and 0 to plus 2 these are basically children should fall in this from plus 2 to minus 2. And moderately stunted children will fall between minus 2 to minus 3; remember only 2 point almost 2 percent children should fall below minus 2. But, we have in India, we have almost I would say 36 percent children have falling below minus 2 standard deviation; instead of going 2 percent we have 36 percent. And minus 3 below minus 3 is your severe stunting; so, length for ages for stunting.

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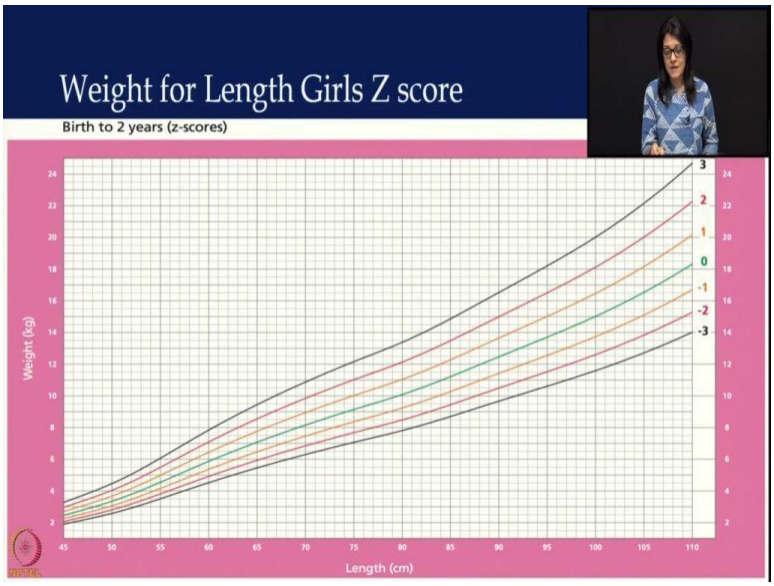

This is your weight for length chart. Again, here in weight for length means over here you have a length, and over here you have a weight. So, when you look at the length and weight chart, basically look at this; this is your SAM and MAM acute malnutrition, SAM and MAM. So, between minus 2 and minus 3 standard deviation, those are called MAM moderately acute malnutrition; and below minus 3 is your SAM severe acute malnutrition.

So, this is your SAM and MAM and that is for that is called a wasting. Also, we use it weight for length chart. We have very high number of high percentage of children who fall below minus 2 standard deviation. And that is a kind of I would say it is an emergency because children when they are malnourished, acutely malnourished, that is when they have a high risk of mortality, all right.

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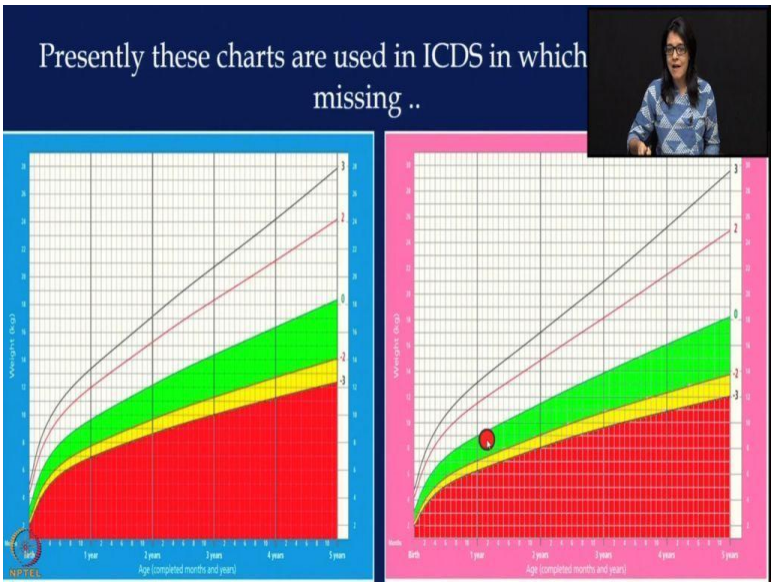

Now, this is I am going to show you what kind of chart we use in ICDS; so, this is ICDS chart. This is for boy child, this is for girl child. So, in ICDS, they have this standard deviation chart; but the way they have painted it, they have painted this green color from mean to minus 2. And my question is that where is the green color from 0 to 2? Because that also children. I mean I want 50 percent children to be over here between 0 to 2 percent, from 0 to 2 standard deviation; so we do not have this green zone at all.

So, for healthcare workers, if they bring the child in this particular little bit of green zone, they are extremely happy. I want all these children to be above green zone in a white zone. So, what we can do? I am requesting government to kind of fix this growth chart and have green zone from plus 2 to minus 2 standard deviation; not we do not want our children to be negative, below 0 or below mean.

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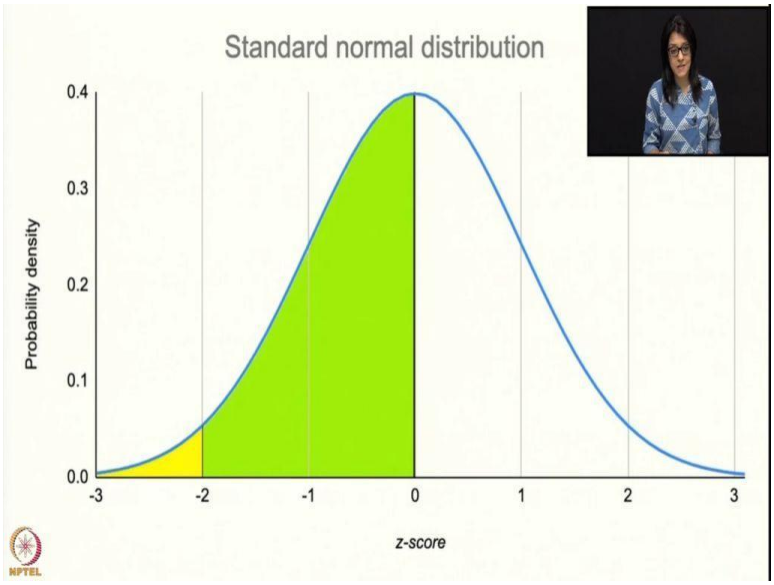

So, that is what again, our growth charts what we have in ICDS; they have only used green zone from minus 2 to 0, this part is completely missing. So, please talk to your local administration and tell them that this is what is missing and we need to fix it.

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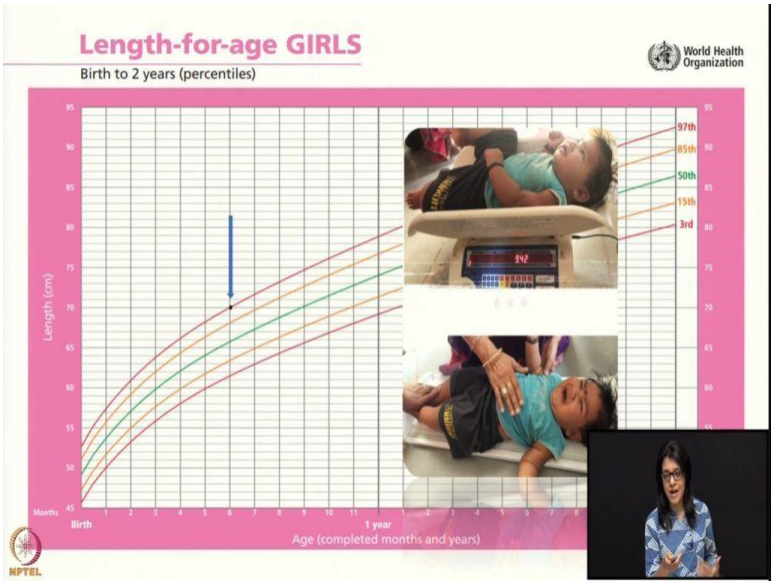

Now, last two slides, and I am done. So, this is a girl child as shown in one of my presentation earlier. This is a child who is only 6 months old girl child, and this is length for age. This is a percentile growth chart, because this child had beautiful milk transfer in first 6 months. Look at whether child's length is, she is 97 percentile, this is 97 percentile. Only 3 percent children of her

age are this tall, and she is a tribal child; so, you want to add look at the weight that is your 9.42. So, as child was growing beautifully on mother's milk, catching up on growth and with full potential, the length was growing. So, this child is definitely going to be very very tall when she grows up; because genetic kicks in after five years of age. So, if you can really focus on mother's milk and complementary food, which is high in protein and good fat, the children will grow tall.

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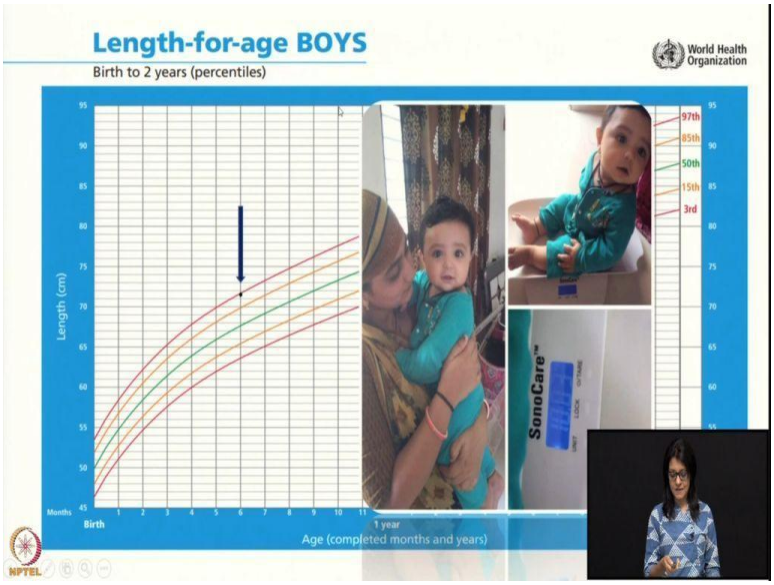

Similarly, this is a boy child, even this child look at the length plotted at 97 percentile, very tall child. He is only six months old. Look at the weight 6-month-old child, which is 10 kg. Remember the average weight for a boy child had mentioned about; I would say, I would say I think 8 kg, this child is 10 kg. So, as the weight was high, you can see the length is high too. So, this is what I want to explain to you. Thank you so much. And I will basically ask you to see two of our tutorials, and let me know if you have any questions. Thank you so much.