Introduction to Maternal Infant Young Children Nutrition
Prof. Rupal Dalal
Department of Biological Science
Health and Nutrition
Indian Institute of Technology, Bombay

Lecture - 55
Session - 12

The WHO Multicenter Growth Reference Study (1997 – 2003) Percentile Growth Charts

Hello, everyone. So, this is the last session on growth charts. One of my favorite session after cross cradle hold and 45 points of counseling. And what I am going to discuss today is basically WHO growth chart, both percentile and z score. So, I am going to take you into the basics of growth chart, what are these growth charts? How did they come up? And since when they have been in use.

So, all that I am going to discuss. We have created really good tutorials on WHO growth chart, percentile growth chart, we are also working on z score. But, we would put it up as soon as it gets ready. But let us start with the, WHO growth chart. My, it will be my session. And then after that, we will also kind of put up our tutorials that we have created for weight-for-age and length-for-age.

But I want you to understand all the definitions of, what is wasting, what is stunting? What is underweight? So, people who are working in different programs working on malnutrition, they should know, basically what all these definitions. So, let us start with your WHO multicenter growth reference. This was a study which was done between 1997 and 2003.

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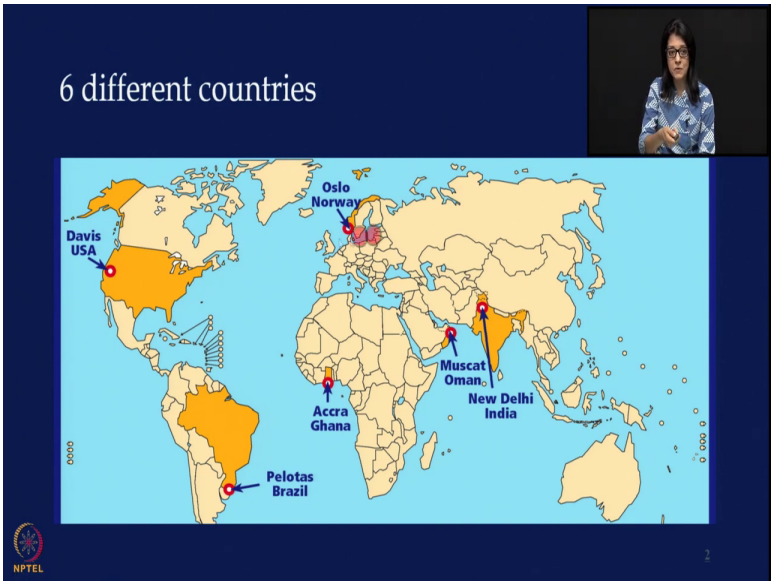

And what they found is basically, they took about 6 different countries. So, they took data from children, same 6 different countries, for example, they took USA, they took Norway, they took Ghana, they took Brazil, they took Oman, and they took India. So, India was part of this multicenter study, which was done on children.

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So, that is important, 6 different countries which were involved, including US, including India. And basically, this growth charts were created from this study. And they wanted to show that how children should grow. And then, of course, I will describe how the study was done. But essentially, it was basically to show how children should grow all over the world. It establishes breastfeeding as a biological norm, means that all the children were breastfed.

So, they wanted to show if children were breastfed how these children would grow in all over the world, not just in India or in US. And then they wanted to create the international standards for all the healthy children as human milk support, not only a healthy growth, but also optimum cognitive development and long-term health. So, this was very, very critical for, for all over the world to have this kind of WHO growth chart, which would tell us how children would grow.

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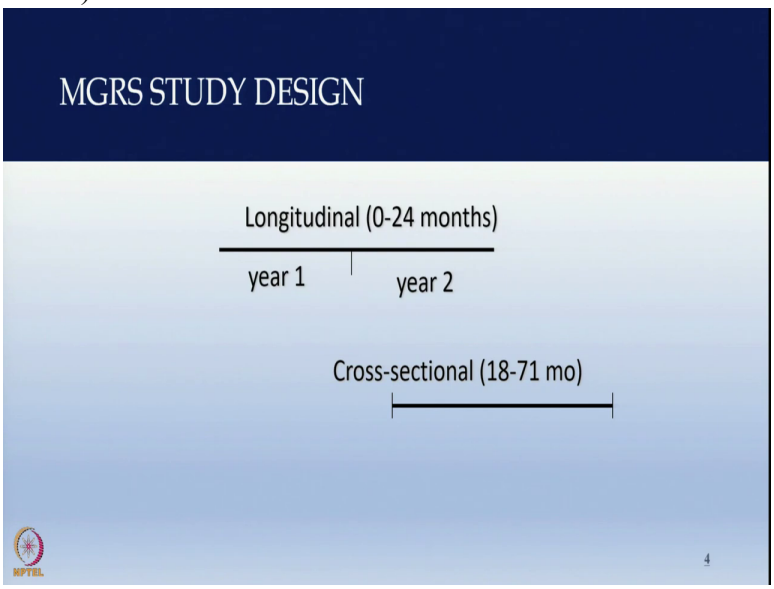

So this was this basically study, it was done longitudinal data was taken for 0 to 24 months of age. Longitudinal means they, they monitored these children, on a regular basis, which I will explain how they monitor on a regular basis. And they basically took the height and weight of the children starting from birth till 2 years of age. So, they took longitudinal data, so same children, they followed, up to 2 years of age, and then at 18 months to 17 months old children, they took cross sectional data.

Cross sectional data means they went in there, they took, number of children, they select a number of children, and they took a cross sectional data means they took data that at that particular point, just one time, that is your cross-sectional data. Longitudinal data means you would, you would keep collecting data of the same child over and over and again over a period of 2 years.

So, that is the difference between longitudinal data and the cross-sectional data. So, for this WHO grow chart what they had done, they had taken, selected few children. So, those children they took you know, data of from birth to 24 months of age. And for cross sectional, what they did basically they did one-time data collection from for children between 18 months to 71 months of age. So, that was one important aspect of this study.

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And then basically, there were three things which was common for all these children, all this were breastfed infant. So, the optimal nutrition was given to the children, they had appropriate complementary feeding, then they had an optimal environment, what was, what do we mean optimal environment? When sanitation was good, no microbiological contamination in the environment.

So, they came from a very good background where there was not much about, not much problem with sanitation, there was no exposure to smoke and also optimum health care, where all these children had immunization, as per recommendation and they all had pediatric routine care. So, this were, all these thing were, all these variables were kept common.

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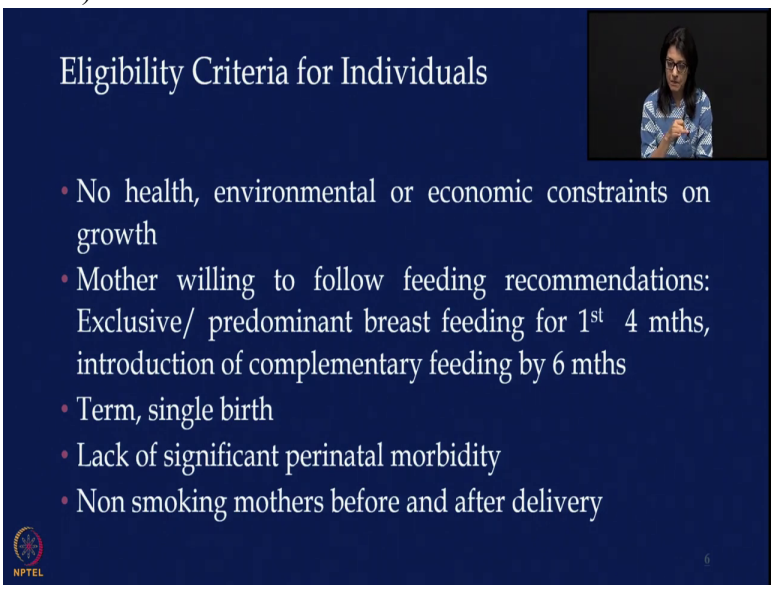

And then what was eligible criteria for individual? So, no health environment or economic constraint on growth. Because they all come, they came from a very good health, health background, they all had immunization vaccines, they all had good sanitation, there was no exposure to smoke, and then they had no economic constraint. Of course, looking at the sanitation, they wanted to make sure the sanitation is good, how would children grow.

Then second aspect was mother was willing to follow feeding recommendation. So, exclusive predominant breastfeeding for first 4 months and introduction of complementary feeding by 6 months of age. This was basically from 1997 to 2003. And all the children were terms single birth. So, only single term, baby were selected and there was no, there was a lack of significant perinatal morbidity.

Perinatal morbidity means children who are not sick, when children were born. So, there was lack of very significant morbidity, means not no ICU admissions and all those are exclusive, it was basically removed from the studies. And another important aspect is no smoking mothers before and after delivery. So, they wanted to make sure that there is no exposure to smoke, because smoking will also cause problems with growth,

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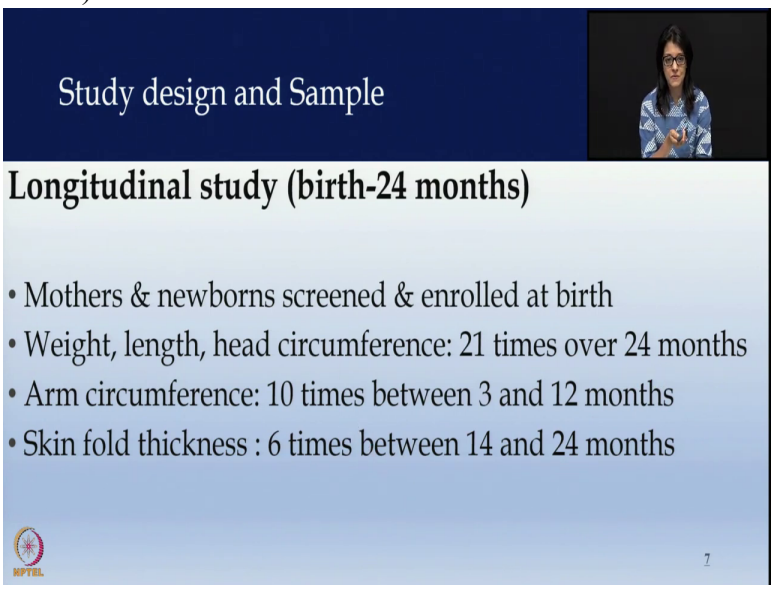

And the study design the sample that what they had done was basically as I said birth to 24 months of age, there was a longitudinal study. Mothers and newborns were screened and they were enrolled at birth. Then weight and length and head circumference were taken 21 times over 24 months. Arm circumference was taken 10 times between 3 to 12 months of age. And skinfold thickness was taken six times within 14 to 24 months of age.

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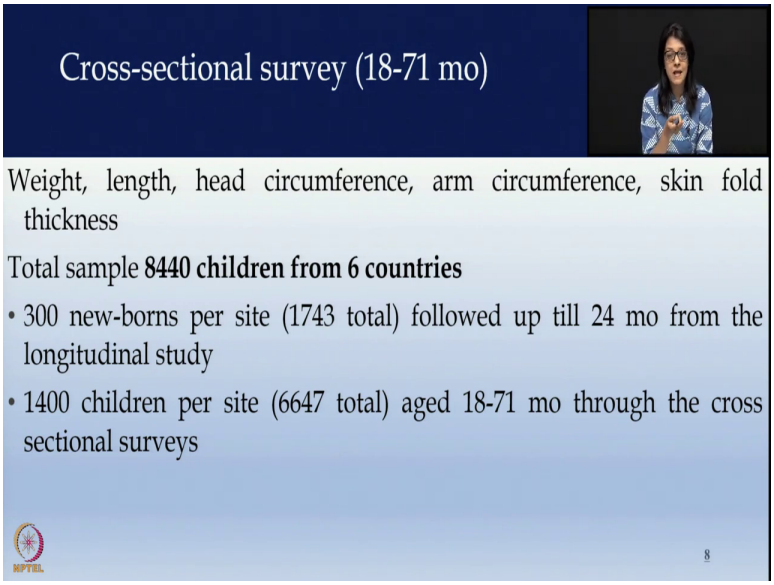

Then of course, in cross sectional study, of course, in longitudinal study, they had also taken a weight and length of children. But in a cross-sectional study, they also took basically weight

length, head circumference, arm circumference and skinfold thickness. How many total number of children were taken for this studies? 8440 children were taken from 6 different countries.

300 newborn per site, so, 1743, 1743 total followed up till 24 months of age from the longitudinal study and 1400 children per site. So, total about 6647 children aged between 18 to 71 months through the cross-sectional survey. So, this was the study, this was the designing of the study.

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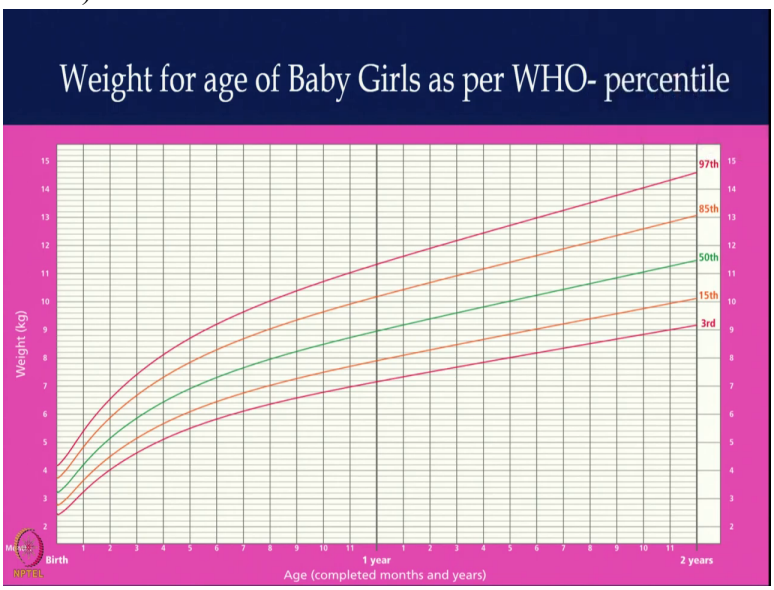

So, here, this is what they found. Now, this is the weight for age chart. Now, I have explained this chart in detail in the coming tutorial. So, you will learn in detail about what this chart is and what is there on a horizontal line over here, what is there on vertical line over here. So, of course, I have gone in very much detail, but I will quickly brush through it, because I want you to understand these charts very clearly.

So, that you, you when you, when you are in the field, and when you plotting the children on the growth chart, you need to know how children grow. Unfortunately, in India, our children are not growing well. And this is the reason that I want to kind of personally, take this session and explain to you how children grow as per WHO growth chart. So, this is your weight for age. So, weight, this is your, this on y axis you have a weight, weight of a child.

So, it is basically 2, 3, 4, 5 and then there are all these you can see those dark lines. So, each dark line basically separated by 1 kg. So, 2, 3, 4 and in between, you can see those light color lines,

those each line is about 200-gram increment. So, if child falls into say 2 kg and there is, if they fall say one line above that dark line, that will be 2.22 kilogram 200 grams. So, there are four lines between those two dark lines, and each light line is about 200 grams.

On x axis, you see, your months and your year. So, this is your birth. So, what I recommend is to kind of put the date of birth over here, and then basically you put your 1 month, date over here, second month date so, I asked healthcare workers to put all these dates beforehand, so that they know when children are measured when where to plot them. And this is your one year and this is your two years.

Now, this is the girls chart, pink color is your girls chart and this particular chart is from birth to two years of age, there are different kinds of charts available, You have birth to only 6 months. Now, I like those charts from birth to 6 months for, for say Anganwadi workers, or Asha workers because they are still learning, they may have difficulty kind of calculating what is the weight, plotting of weight charts.

So, when they take 0 to 6 months, they are given a new weeks, the week increment of weight gain per week, and it becomes very easy, it becomes very easy for them to plot. But this particular over here I have shown chart from birth to 2 years of age. There is one more chart which is available, which is from 6 months to 2 years. There is one more, which is from birth to five years of age.

So, there are all these different charts, whichever program that you work in, so if you are taking care of just maybe, small children, then you have to, you can just take 0 to 6 months, if you are taking care of older children you can take from birth to 5 years. So, it depends upon which chart that you are using, or which program that you are working in. So, here now, see for example, this particular that you can see five lines over here.

So, you see green line, you see a yellow line, then you see ninety, last line, which is your 97th percentile and your third percentile. So, this is basically percentile growth chart means percentage of children who, who fell on this line or who are marked on this line, or who grew on this particular line.

So, for example, as per the WHO study, what they found that all children if everything was good, if health was good, if mothers were breastfeeding babies, if sanitation was good, if, if immunization was given, most of the children were growing at the same rate. Whether they came from India or they came from US or whether they came from Oman or whether they came from Norway, it did not matter. All these children, till 5 years of age, they grew at the same rate, same rate.

And that is why you, most of the countries in the world, we are using WHO growth chart. So, same chart we are using in India, in US we use this growth chart for younger children, or after that we use other growth chart, but for younger children, we are using WHO growth chart in us also. So, here, here then I am going to come back to the growth chart again. So, 50 percentage of the children, 50 percentage of children, that is your average children, they basically kind of grow along this green line.

So average children 50 percent of children should be growing at this rate. 85th percentile means 15 percent of children above 50 percent would be growing at this rate. So, in India, how many children are growing at 85th percentile? Very few, and then this one means 97th percentile 97th percentile mean 97 percent children would be below this line and 3 percent children will be above that line.

So, only 3 percent of children in the world are above that 97th percentile. Similarly, if you come down, here is a 15 percentile. So, 15 percentile means 15 percent of the children will be basically on this yellow line. And your third percent, means 3 percent of children are basically on this line or below that line. So, normally what would happen when you go in the community, you should see only 3 percent children below this red line, only 3 percent children.

But unfortunately, in India, we have so many underweight children and so many children who are stunted that we have almost I would say, as per NFHS five data, 32 percent children are underweight, 32 percent. Normally, we should have just maybe less than three, even even less than 2.7 percent or 2 point, 2 point, below this third percentile, we have almost 32 percent children. That is, that is actually terrible.

So, what we are trying to do, we are trying to increase the birth weight of the children, because remember, I told you that the birth weight, average birth weight of children in India is only 2.7.

So, let us see what happens when a child is born at 2.7. So, again, I want you to focus on this growth chart. Now, I want to show you what should be the average birth weight. So, this is your birth, average means your green line, so just follow your green line.

Now, look at this green line for a girl child, it is three and it is one line above, so it is 200. So, the average birth weight of a girl child all over the world is 3.2 kilogram. Where do our children fall? We have 2, and 7. So, if you look at this 7, that would be falling over here, so I would say, between third percentile, and 15th percentile. So, they are not even on 15th percentile when they are born.

Now, we want to bring those children because there is something called growth catch up. So, when you want to do a growth catch up, you have to remember that the children have to grow much more than what, what WHO is recommending. Because if you do not, just with one infection or one diarrhea, they may just fall, they would be growth faltering, they would not, they would they would come under minus 3 or I would say, third percentile.

And they will show up on underweight, as per as z score, I will I will discuss what is z score, but, you know, we, we need to have good amount of growth catch up. Unfortunately, what is happening is these children are not growing as per WHO standards. And I will show you how they grow for a month. And we have to make sure that if you cannot do a growth catch up, at least do not let them fall.

Because if we let them fall, these children will basically will show up into your NFHS 5, NFHS 6 data and says all these children are underweight, but they are born underweight, what did you do while they were falling off? So, that is what I wanted to explain to you. So, now you have suppose you have a girl child born in your family. And she is beautiful 3.2 kg weight gain, absolutely average as per world standard.

Now, look at the 1 month of age. So, at 1 month of age, what is where is that green line intersecting? You can see that green line is intersecting at 4.2 kg. So, you can see over here it is intersecting at 4.2. So, in 1 month, that girl child who was born who was 3.2 kilogram need to gain at least 1 kg to be able to follow her growth chart, to be able to follow her growth trajectory on 50th percentile.

Remember, I told you children should not falter. In fact, our goal should be that child should gain as much weight as possible on mother's milk. So, if she is born even average and if she is growing beautifully if she has amazing milk transfer, those children will put on a lot of weight more than 1 kg. And that is what we have seen in our program, I will show you some of my growth chart which I have already shown you before.

But think about first 3 months are the most important time period for growth of that child. Because again I have discussed in my first 1000 days session, that how when these children they grow early on in their life they have a higher IQ and of course they are not stunted, they become taller. Because if you look at it, see how, how look at the growth trajectory, the weight they grow so fast.

So, that was your 1 month weight which was 1 kg. Now, let us see child, you did really well with all the different holds and baby's mother is breastfeeding properly and baby gain 1 kg, now let us see what happens in the second month. So, from first month to second month, basically the weight gain is from 4.2 to almost 5.1, I would say even 5.2. So, again in second month girl child is gaining about 1 kg average.

What we are told? We have a cutoff of 500-gram weight gain. So, whenever I speak to all the healthcare workers including medical officers including so many doctors because they say cutoff is 500 gram, they keep the target at 500 gram. So, they feel if the babies gain 500 gram, they are fine, no it is not, please understand from this growth chart, plot it yourself plot the child who you can get this growth chart from WHO website.

Plot it, plot it yourself because if you plot it you will know how children grow. So, if a child who is born 3.2 kg which is born absolutely normal, in 1 month of child gains only 500 gram will child will immediately fall down from 50th percentile. And the same child again instead of gaining 1 kg has gained just 500 gram because that is that is the target weight which all the healthcare workers understand.

They feel 500 gram gained, that’s enough. So, again if child falls from just gains a 500 gram from first month to second month, child will fall to again, 15th percentile. And then eventually within 3, three and a half months, the child is going to be under third percentile. This is the issue

that really I am facing in the field. I have to unlearn all this learning that healthcare workers have gone through.

And I have tell them no, your cutoff should not be 500 gram, your cutoff should be 900 gram or maybe 1 kg, children should grow weight as per WHO standards, why should we allow children to falter at all? So, focus on breastfeeding practices, focus on those skills, focus on those how to hold the baby, all those 45 points that I mentioned, and your child will grow not just one kg, they will grow 1.2 to 1.5 kg. So, this is what I wanted to tell you. Now, look at the third month.

This is a girl child again. So, child was 5.2 kg did very beautiful. So, 5.2 now in third month, now child is about 5.8, so about 5.9. So, now think about it from 4.2 or I would say sorry, 5.2 to now 5.9. So, again, child grew about 800 grams, so again, remember how children grow. See, she grew so fast in first two months, 1 kg, 1 kg, now 800 gram. Now, she will slowly slowly slow down, this child.

So, if you can really focus on those first 3 months and get the weight up, you know, believe me, they grow fast on the length also. So, then again, look at the average weight at 3 months of age, the girl child average weight is about, say between 5.9, 5.8 to 6 kg, so around, I would say around 5.8, 5.9, approximately. Now, same child, at six months, what is the average weight of a 6-month-old child?

About 7.3, 7.4, 7.3 7.4 kg is the average weight of a girl child. Now, if you ask anybody in the field, what should be the average weight of 6 months old child, most of them then say around 5 kg. So, if you have a 6-month-old child who is only 5 kg, they are basically already less than third percentile. So, that is what they are, approximate 5, five and a half kg. So, we want to make sure to remember that the girl child, approximately, their weight at 6 months is around 7.3 to 7.4 kg.

Now, same child at 1 year of age, it is about I would say, about 9 kg. So, here, this is the intersection you can see this is the dark line and here touching the nine kg. So, now you can see from 6 months to 1 year, there is not much weight gain as it was between 0 to 3 months of age. So, remember, if you want to gain, if you want to catch up on weight gain, first 3 months focus on first 3 months, follow up those babies every, at after birth, I would recommend to follow this

babies every 48 hours. As long as babies, as soon as baby gained 40 grams, 35, 40 grams, you know that mother knows how to breastfeed, mother knows those all important counseling points.

If baby is not gaining 35 to 40 grams. That means there is a high risk of this child faltering. And till that mother gains, baby gains 35 to 40 grams, you are not going to give up. Because if you do not follow up with the mother, you, if you do not kind of fill out those breastfeeding assessment form, that means, we have not done our job at all, how do you allow a child to falter? So, that is, that is an important part.

And I am kind of a little bit strict in my program, about how children should grow especially in first 3 months. And then my, my focus comes after 6 months. Because after 6 months, what happens is what we saw initially, all these children were just basically stagnating, means they were just not growing. So, they were just going in straight line. They were just stagnating. They may not, they may not be falling off the growth curve, but they were just stagnating.

And that was because children were not getting predominantly carbohydrate rich food. They were just getting rice, rice, rice, rice khichdi, rice roti, rice and dal it was just rice. And dal whatever they were getting was extremely watery, monotonous, dal that they were getting. So, here at 6 months if we want to improve children's weight, please focus on nutrient dense food talk about consistency, talk about the amount, talk about the food that they will get, start with protein rich food, do not be obsessed with vegetables and fruits.

Yes, you can give vegetables but start with protein first, give food which is high in protein and then add vegetables in it. And do think of giving those protein powders it, that mothers have made at home and if you do a home visit, make sure that mothers have prepared those so, legume and seed powder or those peanut and seed powders and bean powder that we have prepared.

If mothers start using those powders and if she knows the consistency how she should prepare, then believe me you will see the results. And for the children who are non-veg, focus on of course, eggs and chicken and liver, liver is one of the most nutrient dense food. So, do not have your own bias on children. You may have different religious bias, but that is for your sake, you cannot impose those biases children who are growing.

So, it is so essential for them to grow, their brain is growing. So, now you have a 1 year old child that I already discussed is, 1 year old should have about 9 kg average weight. Now, look at this just a 9 kg in one year. So, from 1 year to two years of age, this child will not grow much, so from nine kg to just about 11 and a half kg. So, that is about just 2 and a half kg. So, in the whole year, baby will gain just 2 and a half kg.

So, when you get children at 1 year of age, and if they are say very low on weight, very difficult to make, bring them up, because if they have not grown in first year of life, this children then they stagnate not only in weight, but they also stagnate in length. So, make sure that you, you focus on weight first till 1 year of age, I would say focus on the weight, but till 6 months of age.

Because after 6 months of age, you will realize that if children are not gaining length, that means they are getting nutrient, not nutrient dense food. They are getting probably calorie dense food if they are just gaining on weight but not gaining on length. That means children are getting too much of calories, which are not necessarily nutrient dense, probably they are getting empty calories. So, after 6 months, I tell all my team members to focus on length, you will realize if children are growing tall, that means they are getting good, good nutrient dense food. So, this was your weight for age chart.

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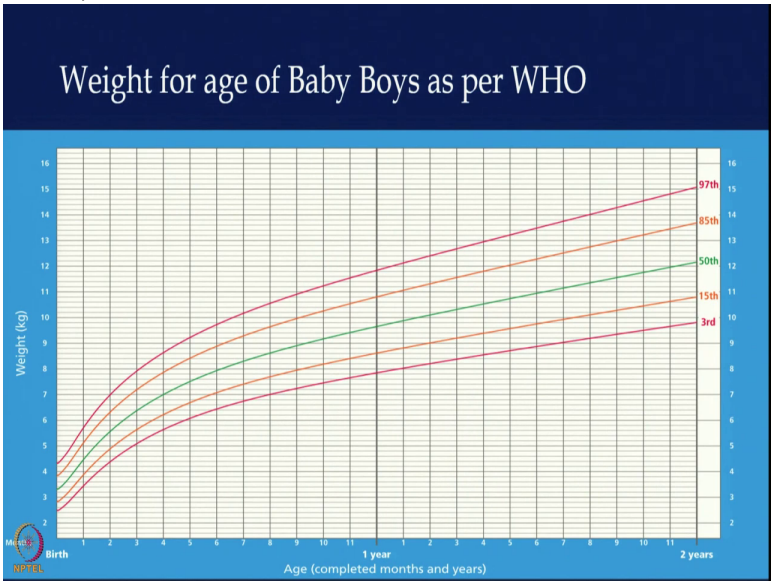

Now, I will go with the next chart. This is weight for age for boys. As per WHO this is, again, percentile growth chart. And I want you to look at now the boys chart that how they grow. This

is your age, these are your months, this is your weight. Same exactly same chart as girls chart, but the weight gain is different. So, here look at the average birth weight of a boy child. The average birth weight should fall on this green line.

So, average weight for a boy for a boy child at birth is about 3.3 kilogram. So, 3.3 kilogram is basically that what is the average weight, do we have 3.3 kg babies born in rural areas, tribal areas, urban slum. So, even to literate mothers no, we do not actually. It is very unfortunate, very rarely we see a 3.3 kg babies in India, why? Because mother's nutrition is not done properly.

They are just eating lot more carbohydrate rich food. They are not eating protein rich food. They are they are not eating good fats, and unfortunately, they put on a lot of weight. It is not that, you know, mothers coming from elite areas, they do not put on, they put on lot of weight, but it is not going to the baby. So, if you want a healthy baby, and this is again, I have explained very beautifully in Kailash's story, where his wife who was only 34 kg, put on good amount of weight on baby, mother had gained about 12 kg 11.5, 12 kg.

And that baby was 3.1 kilogram, imagine higher than the Indian average. And she came from a tribal area where she had previously had miscarriages, two miscarriages. I would not even say premature delivery, I would call it because babies were born after seven and a half months and obviously because of a poor nutrition. So, this is what I am saying is try to increase or improve mother's nutrition.

And we have gone through all these tutorials in my previous session on pregnancy nutrition, adolescence nutrition and pre-pregnancy nutrition. So again, think of what all things that mother need to eat focus on protein again, and you will not have an issue. So, here let us see so now your baby is born say 3.3 kg. Now, at 1 month of age, that child weight at average is about 4 point I would say 4.5 kg, a four point I would say yeah 4.5 kg.

So, from 3.3 to almost 4.4, 4.5, that is about 1.1 kilogram. So, if it is per month this is 1.1 kilogram, so how much it should be for per day? It will be around 30, 30 gram more than 30 gram actually it will be more than 30 gram, it is 1.1 kg. So, almost up to 40, 40 gram, 38 gram per day, follow this children up. I want you to follow this up children from birth till baby start getting minimum 35 grams, minimum.

I would be very happy if you keep the target up to 40 grams because that is what my target is. My target in my program is 40 gram. So, if children gain 40 gram weight gain per day, that is when I tell mothers okay, you are fine, you do not, I do not need to see you for next one month, so do that. Now, again if you look at from 1 month to 2 months of age, this children from 4 point almost 5. So, they are now gaining almost 5.5 kg, 5.6 in fact 5.6 kg.

So, again children are gaining almost 1.1 to 1.2 kg a month. If it is 1.2 kg is 40 gram weight gain per day. Now, in India, we have a cutoff of 500 gram per month. So, can you please calculate if you, if you divide 500 gram over 30 days, what would be the weight gain per day? It is only 17 grams approximately, 17 grams, where is 17 grams per day and where is 40 gram weight gain. Just think of it and then think you have to think of yourself think about it.

And then you know make a decision that what you want to do? You want to keep the target that low that you allow the child to keep faltering, faltering, so by the time child is 3 months old, they already come into undernutrition and all those basically z score, it comes to standard deviation, less than minus two standard deviation. I will talk about standard deviation, but we do not want that.

Please allow the child to grow, do not have those preconceived notion that this much is enough, no child, you have to give full potential to the child to grow. Now, same child at 3 months of age, what is the average weight of a 3 month old boy child? It is about 6.4 kg you can see over here, this is a 6 kg, there are two lines up. And that is 6.4. So, the average weight of a 6 month old child is 6.4. Now, do you remember what was the birth weight of the child?

The birth weight of the child was average 3.3. So, from 3.3 now this child's average at three months is 6.4. So, that is almost I would say double. So, you are doubling the weight of a child in almost 3 months and not 5 months. Because that is what I was taught in pediatrics in US that children double their weight in 5 months. Yes, over there, our children are born very big, the average weight is 3.5, 3.7.

So, if your average weight is 3.5, 3.7 or even 3.5, then you can say you are you are doubling your weight by 3 months I would be very happy, but your children are not growing at 3.5 kg birth weight, your children are growing at 2.7. So, if you have 2.7, if you double their weight is 5.4 so let what, what happens if you have double your weight gain 2.7 kg, double the weight is 5.4

And if you are telling everybody that at 5 months your child is growing, child should be double the weight that is your 5.4. So, let us see what happens at five months. If I have a child who is just 5.4, this is your 5 kg and this is your two lineup horizontal third percentile, this is what I just wanted to kind of bring it to your notice that a lot of this saying which are which kind of floats around in pediatrics, it is, it is not, it is not valid.

Yes, if you have a 3.5 kg birth weight, you can say double the weight in 3 months. But if you have a 2.7 kg and in most of the areas that I work in all these tribal areas, they low, they are low birth weight babies. Like for example, there is one district I am working right now, 30 percent children are low birth weight, means they are less than 2.5 kg. I am, probably average about 1.8 to 2 kg.

Now, how can I say this children will double the weight in three months or even I would like to have the double the weight in one month for the child. So, this is this is what I wanted to bring it to your notice. Now, let us see 6 months old child, boy child, now the weight of this child at 6 months is 8 kg. So, boy child, 8 kg at 6 months, what was the weight of a girl child at 6 months? 7.4 kg, 7.3, 7.4, it was near that.

Now, you have a same child 1 year old, what is the average weight of a boy child at one year of age? 9.5 kg. So, make sure that your children are at least your average children should be 9.5, your good amount of children should be above this mean, also because this is all normal, this is all a normal range. You want children to be as big as possible early on in life on mother's milk and good food, not on junk food, and the children are going to grow there is no doubt about it. So, make sure that you try to bring your children on at least mean or above them.

Then the same child, now baby is one year of age and is about 9.5 kg. And then you have a second year child, two year old child, what is the average weight around 12.2kg. So, 2 year old boy child, the average weight 2 years of age is about 12.2 kilogram. Please remember this because I do not see this kind of good weight gain. Of course, after 6 months of age, weight gain is important, but what is more important is height.

So, if children are not growing well in in terms of length because obviously under 2 years we call it length. That means the children are not getting nutrient dense food. They are, if they are gaining weight, but not length. That means they are getting energy dense food, energy dense

food means they are probably getting a lot more carbohydrate, lot more sugar a lot more jaggery, a lot more any of those nutrients, which are which I would call it, I would not even call it nutrient they are they are empty calories.

So, they are putting on weight. But, for height to grow, you required micronutrient dense food you need protein. You need good fats, you need magnesium, potassium, remember the growth nutrients. So, think of those growth nutrients, add those growth nutrients in the form of food. So, food to food fortification, I do not believe in giving too much of that fortified food. Give food to food fortification, natural food and children will grow.

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So, that is your weight for age boy. Now look at the length. So, similarly now you have a length for age. Again, this is a percentile. So, if you look at on the right hand side, you have this percentile, 3rd percentile, 15th percentile, 50th percentile. Before I come back to this length for age, I want to go back to your weight for age because I want to show you that if your child is born small, if your boy, a child is born 2.5, 2.7 and then you will need good amount of catch up.

And we have seen good amount of growth catch up in most of our babies if they were trained properly on milk transfer. So, for example, now you have a 2.7 kg child born over here, who is between 15th percentile and third percentile. Now, you want to try to bring this child up on 50th percentile because I do believe in growth catch up. So, what happens when this child if child has to come to mean to average, then what would it be?

It would be basically child would be gaining lot more than 40 grams a day for per day. They will be gain, they need to grow even for like 45 to maybe almost 50 and within 1 or 2 months, they would catch up and they would come. So, again, if you have a small child, young, like I would say, less than two, 3.2 kg, then do, do think of catch up growth. And those you can calculate how much weight can they need per day to catch up to at least up to mean.

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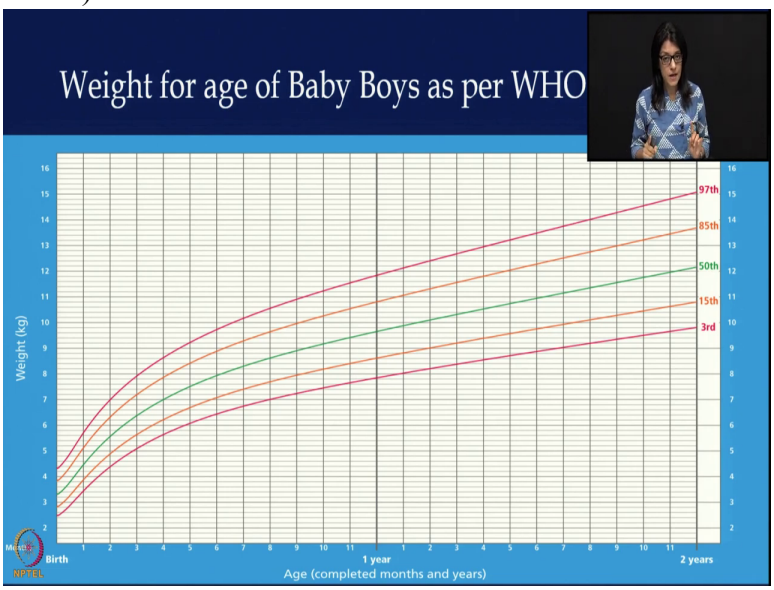

So, this is your length for age again, look at this average length for a boy child is about 50 centimeter over here you can see 50 centimeter, each line is one centimeter. So, at your green line intersect at 50 centimeter at birth, and then you have six months, again about I would say 66, 67.5. So, these are all, your average you want to just look at it, I am not going to go too much in detail because we have a tutorial.

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So, you can you will go in detail through those tutorials. The second percentile to chart for length for age, the average birth length for a girl child is 49 centimeters. So, remember that 49 centimeters at birth for a girl child, 50 centimeter and birth for a boy child.

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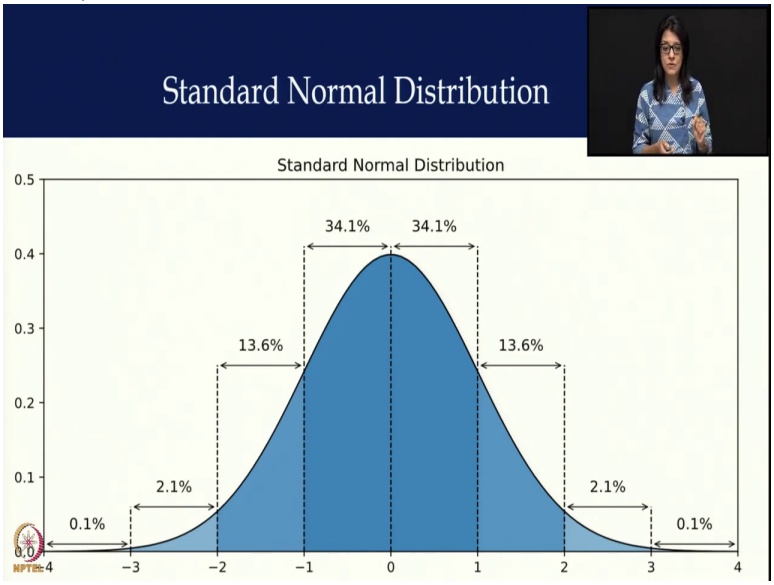

Now, this is a standard deviation chart. Now, I am going to come back to standard deviation growth chart in my next part, because now it is getting extended. So, I will come back to the standard normal distribution in the next part. Thank you so much.