

# BMI-Project

Nutrition situation of the Adivasi in the Nilgiris

Data collected in the Ashwini hospital in Gudalur (Tamil Nadu, India)

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## 1. The Body-Mass-Index (BMI)

The Body mass index is a tool to indicate the nutritional state of adults that is commonly used to classify underweight, overweight and obesity of adults. It is defined as the weight in kilograms divided by the square of the height in meters ( $\text{kg}/\text{m}^2$ ).

The classification of underweight, overweight and obesity according to the BMI is shown in the table below:

Classification	BMI( $\text{kg}/\text{m}^2$ )
	<b>Principal cut-off points</b>
<b>Underweight</b>	<b>&lt;18.50</b>
Severe thinness	<16.00
Moderate thinness	16.00 - 16.99
Mild thinness	17.00 - 18.49
<b>Normal range</b>	<b>18.50 - 24.99</b>
<b>Overweight</b>	<b><math>\geq 25.00</math></b>
Pre-obese	25.00 - 29.99
<b>Obese</b>	<b><math>\geq 30.00</math></b>
Obese class I	30.00 - 34.99
Obese class II	35.00 - 39.99
Obese class III	$\geq 40.00$

Source: Adapted from WHO, 1995, WHO, 2000 and WHO 2004.

The classification is based on the recommended values by the WHO. The WHO classification is mainly based on the relation between BMI and mortality.

These BMI values are age-independent and the same for both sexes.

Although it can generally be assumed that a person with a BMI of 30 or above shows an unnaturally high amount of fat. The BMI does not distinguish between weight associated with muscle and weight associated with fat. As a result, the relation between BMI and body fat content varies according to body build and proportion. It has been shown that a given BMI may not correspond to the same degree of fatness across populations. In addition the percentage of body fat mass increases with age up to 60-65 years in both sexes.

In this study the focus lies on underweight people and as there are no underweight people showing a high amount of fat it doesn't matter if the BMI decides between weight associated with muscle and weight associated with fat.

Finally it can be said that the BMI gives an idea of the nutritional state about (especially underweight) people.

## 2. This survey

In this survey, the BMI of ~100 tribal and ~100 non-tribal people has been checked. All people were Outpatients coming to the hospital. This means that all probands are sick and might have lost some weight. Therefore it's possible to compare their BMI values. In

comparison to these results 50 tribal staff members were checked, to see if there are any differences to the other 100 tribals. The survey was accomplished in June 2007.

### 3. Results and Conclusion

As you see in the diagram 50% of the tribals are malnourished, whereas only 38% of the non-tribals are so.

The difference is even more obvious when comparing the varieties in the group of the underweight people. One thing is that 46% of the tribals are underweight and in the group of the non-tribals only 17% are underweight. Even bigger differences are seen at the grade of thinness in the different groups in chart 1. In the small group of underweight non-tribals only 11% are severely thin, in the big group of underweight tribals there are 28% severely thin people. 63% of the thin non-tribals are mild thin, whereas the majority of the thin tribals are severely and moderately thin.

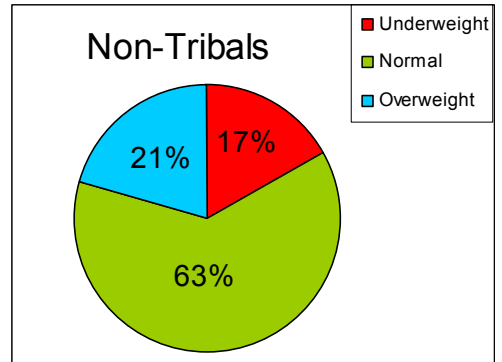
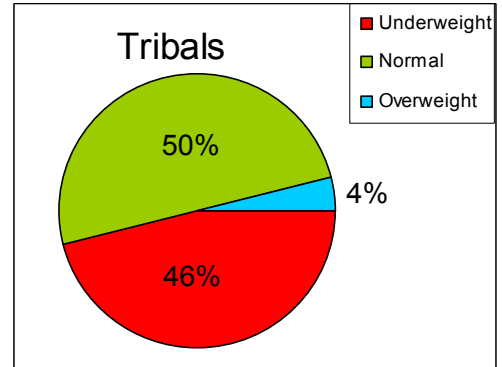
Only 4% of the tribals are overweight, while 21% (five times more) non-tribals are overweight. Some sources suggest that a healthy lifestyle can lead to a BMI below 18.5 (mild thinness) and increase lifespan meaning this kind of thinness could be healthy. Nevertheless a BMI below 17 is in any case unhealthy and an alarming sign.

Both over- and underweight is a major problem and extremely unhealthy.

Underweight may cause additional problems as a weak immune system and a higher risk of life-threatening situation when infected with certain diseases because they patients don't have any fat reserves. In women, being grossly underweight can result in amenorrhea (absence of menstruation) and possible complications during pregnancy. It can also cause anemia and hair loss.

Underweight is an established risk factor for osteoporosis even for young people.

There are different effects of overweight/obesity. Health consequences can be categorized by the effects of increased fat mass (osteoarthritis (degenerative joint disease), obstructive sleep apnea, social stigmatization) or by the increased number of fat cells (diabetes, cancer, cardiovascular disease, non-alcoholic fatty liver disease). Increases in body fat alter the body's response to insulin leading to insulin resistance and creates a proinflammatory state increasing this risk of thrombosis.



**Chart 1**  
*Grade of thinness*

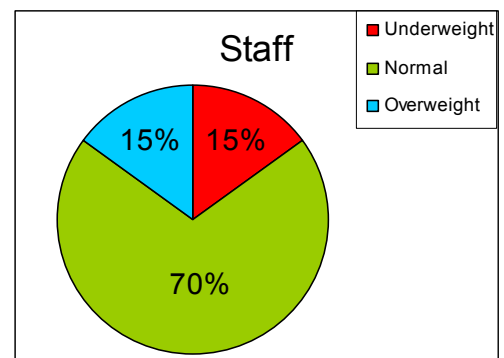
	Tribals	Non-Tribals	Staff
<b>severe</b>	28%	11%	0%
<b>moderate</b>	23%	26%	14%
<b>mild</b>	49%	63%	86%

Under- as well as overweight can cause serious diseases. Therefore following question must be considered: *Is it better to have over- or underweight?*

It's important to look at the reasons for under- and overweight. In most cases overweight people are able to lose a lot of weight, if they eat less but more healthy food and do more sport. To gain more weight, the people have to eat more, regular and healthy food. But food and especially healthy food that should contain a lot of proteins is expensive.

To figure out, why so many tribal are underweight the BMI of 50 tribals working for ACCORD has been checked.

The results are very interesting as 70% of them have a normal weight and only 15% are underweight. These numbers are quite satisfying as only 14% are moderately thin, 86% are mildly thin and no probands show severe thinness (chart 1).



What is the difference between tribals working for ACCORD and "normal" tribals?

On the one hand they have a regular income and therefore can afford "good" and enough food. On the other hand through ACCORD they are educated. As a reason they know what to spend their money on (not for alcohol, cigarettes....) and they now what healthy food is and so they can buy the right kind of food.

In chart 3 (appendix) you can see, that it doesn't matter how long they work for ACCORD, so maybe the influence of education is even bigger than the influence of money.

What can we learn from these results?

#### 4. What to do next?

First of all, get a status quo in the villages and check, if the situation is as bad as shown in this survey. With this status quo it can be checked if anything is changing or if certain villages need more help etc.

As seen above education is very important. Maybe it's possible to work together with the health animators so they can put a focus on nutrition. They could tell the people what kind of food is good and important for them and which food they can grow.

#### 5. Appendix

As Chart 2 is not very representative it is not mentioned or discussed in the results.

Tribe	total	underweight	%
Katunaikayan	9	6	67%
Bettakurumba	31	15	48%
Mulakurumba	7	0	0, %
Paniya	52	26	50%
Irula	4	0	0%

Chart 3

Data collected from tribals working for ACCORD sorted by BMI

Tribe	Village	m/f	Age	Weight	Height	BMI	How long in ACCORD
K	Ambalamula	f	22	32,5	140	16,58	4
P	Daliamvayal	f	21	40	152	17,31	11
P	Kundada	m	23	50	167	17,93	18
K	Chambakolli	m	54	46	159	18,20	13
P	Kundikaduu	f	20	41	150	18,22	11
P	Ayankolli	f	20	40	148	18,26	11
MK	Kabbala	f	26	44	155	18,31	1
P	Kollikolli	f	42	49	162	18,67	13
I	Kamarajanger	f	30	42,5	150	18,89	18
P	Erud	f	31	48,5	160	18,95	1
MK	Ohnikuula	f	23	45	153	19,22	1
MK	Kabbala	f	30	47,5	157	19,27	11
P	Cherukundu	m	22	56	170	19,38	1
P	Chipad	m	46	51,5	163	19,38	20
P	Chembakathara	f	26	44	150	19,56	6
P	Kottamerdi	f	19	49,5	157	20,08	18
I	Kanchikolli	m	30	51,5	160	20,12	10
MK	Cherukundu	m	39	68	183	20,31	16
P	Chakarakolam	m	29	52,5	160	20,51	4
BK	Kanchikolli	f	18	42,5	143	20,78	19
P	Kuttivayal	m	25	58	166	21,05	20
BK	Kadankolli	m	50	45,5	147	21,06	14
P	Erumallam	m	26	56	162	21,34	4
P	Koikolli	m	25	56,5	162	21,53	13
P	Irumalam	m	22	59	165	21,67	15
MK	Kabbala	f	33	51	153	21,79	1
BK	Paraberi	f	19	46	145	21,88	11
P	Ponani	f	19	51,5	153	22,00	10
MK	Padercheri	m	30	58	162	22,10	19
MK	Nedengode	f	34	54,5	157	22,11	8
MK	Kabbala	m	31	55,5	158	22,23	8
P	Muthikun	m	56	54,5	156	22,39	4
MK	Theyyakundi	f	31	62	166	22,50	18
P	Weramanga	m	30	55,5	157	22,52	2
MK	Nedengode	m	47	62	165	22,77	10
P	Kattavayal	f	43	48,5	145	23,07	10
MK	Nedengode	m	42	51,5	149	23,20	12
P	Narimoola	f	55	51,5	148	23,51	1
K	Chambakolli	m	39	65,5	165	24,06	1
MK	Kabbala	f	36	66	163	24,84	7
P	Ponani	m	35	64,5	160	25,20	1
BK	Kozikandi	f	25	53	145	25,21	2
MK	Padercheri	m	24	67,5	163	25,41	9
P	Soladi	m	45	61,56	155	25,62	13
MK	Kalichad	f	39	72	158	28,84	17
MK	Thaiakonni	m	37	79,5	166	28,85	4
P	Kolanvayal	f	30	69,5	131	40,50	1