

Lecture 8

Topics in Development Economics: Nutrition

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Why Care?

Consequences of undernutrition:

- Particularly severe for children:
 - Muscle wastage;
 - Stunting;
 - Susceptibility to illness and infection;
- For adults:
 - Diminishing muscular strength;
 - Low immunity to disease;
 - Lowered capacity for productive work;
 - Fatigue and marked psychological changes:
 - Mental apathy;
 - Depression;
 - Introversion;
 - Lower intellectual capacity;
 - Lack of motivation.
 - Low life expectancy.

Why Care?

Stunting:

A condition when a child's height-for-age is more than two standard deviations below the WHO Child Growth Standards median.

Why Care?

Food adequacy standard, or a calorie-based poverty line is an appropriate way to measure moderate or extreme levels of poverty in developing countries.

- 1 *What is the relationship between income and nutrition?*

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 - In general, higher income is associated with better nutrition.
- ② *Imagine that you draw a graph with "income" in the x axis and "calories consumed" in the y axis.*
 - 2.1 *Would the line be upward-sloping or downward-sloping?*
 - 2.2 *What would the flatter curve mean?*
 - 2.3 *What would the steeper curve mean?*

Income and Nutrition

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- ② *Imagine that you draw a graph with "income" in the x axis and "calories consumed" in the y axis.*
 - 2.1 *Would the curve be upward-sloping or downward-sloping?*
 - The curve would be upward-sloping, as higher income would generally mean better nutrition.
 - 2.2 *What would the flatter curve mean?*
 - The flatter curve would mean that increases in income may translate (at least over some range) into a small increase in calorie consumption.
 - 2.3 *What would the steeper curve mean?*
 - The steeper curve suggests a stronger sensitivity of calorie intake to income.

Two effects of the increase in income:

↑ in nutritional status:

- Individuals attach significance to higher nutrition.
 - Greater stamina;
 - Better physical and mental health;
 - Higher resistance to illness.
- Nutrition is useful in a functional sense:
 - Work capacity \Rightarrow earnings ability.

↓ in nutritional status:

- Individual preferences for foods that:
 - Taste good;
 - Well advertised;
 - Well packaged;
 - Recognized as indicators of social and economic attainment.

\Rightarrow The desire to increase nutrition and the desire to increase food consumption for culinary pleasure or to signal social standing combine to create an intermediate reaction of nutrition to income.

- ③ *What are the examples when food is given more of a social importance (as an indicator of status or wealth)?*

- ③ *What are the examples when food is given more of a social importance (as an indicator of status or wealth)?*
- The consumption of meat, or expensive varieties of rice, or even canned food, may be given far more social importance than considerations of pure nutritive value suggest.

Nutrient elasticities:

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- 5 *Is the nutrient elasticity of 1 a realistic number? If not, would the elasticity be higher or lower than 1? Why?*

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- 4 *What does a nutrient elasticity of 1 mean?*
 - It means that there is an equivalent percentage change in nutrition when budgets change.
- 5 *Is the nutrient elasticity of 1 a realistic number? If not, would the elasticity be higher or lower than 1? Why?*
 - Because there are subsistence minima to nutrition level below which it is difficult to go, this number is too high.
 - If income falls below a certain minimum, individuals may obtain their nutrition from other sources:
 - *Example:* support from relatives.

Income and Nutrition

Table 8.4. Elasticities of calorie demand with respect to household budget, arranged in ascending order.

Calorie elasticity ^a	Country and year	Authors
0.01	Indonesia 1978	Pitt and Rosenzweig [1985] ^b
0.06	Nicaragua 1977-78	Behrman and Wolfe [1984] ^b
0.07	India 1976-78	Bhargava [1991] ^b
0.08	Philippines 1984-85	Bouis and Haddad [1992] ^c
0.09	Philippines 1984-85	Bouis and Haddad [1992] ^c
0.09	Brazil 1974-75	Strauss and Thomas [1990] ^c
0.12	Bangladesh 1981-82	Pitt, Rosenzweig and Hassan [1990] ^c
0.15	Indonesia 1981	Ravallion [1990] ^c
0.15	Kenya 1984-87	Kenney [1989] ^b
0.17	India 1976-78	Behrman and Deolalikar [1987] ^c
0.20	Brazil 1974-75	Williamson-Gray [1982] ^b
0.29	Pakistan 1986-87	Alderman [1989] ^c
0.30	Thailand 1975-76	Trairatvorakul [1984] ^c
0.33	Philippines 1984-85	Garcia and Pinstrup-Andersen [1987] ^c
0.34	India 1983	Subramanian and Deaton [1996] ^c
0.41	India 1983-84	Alderman [1987] ^c
0.47	Indonesia 1976	Timmer and Alderman [1979] ^c
0.48/0.37 ^d	Gambia 1985-86	von Braun, Puetz, and Webb [1989] ^c
0.51	Nepal 1982-83	Kumar and Hotchkiss [1988] ^b
0.53	Brazil 1973-75	Ward and Sanders [1980] ^b
0.54	Indonesia 1978	Chernichovsky and Meesook [1984] ^c
0.56	Sri Lanka 1984	Edirisinghe [1987] ^c
0.57	Ghana 1987-88	Alderman and Higgins [1992] ^c
0.58/0.34 ^d	India 1976-78	Behrman and Deolalikar [1989] ^b
0.62	Sri Lanka 1980-81	Sahn [1988] ^c
0.80	Bangladesh 1974-75	Pitt [1983] ^c
0.86	Sierra Leone 1974-75	Strauss [1984] ^c

- Overall, there is some evidence that pure nutritional concerns do not entirely drive household decision making.
- At the same time, we have 2 observations:
 - There is some evidence that poorer households indeed react more strongly to changes in their budgets by purchasing more nutrients.
 - The pooling of data across the peak and lean seasons may confound the elasticity estimates.
 - ⑥ *Would the elasticities be higher or lower in the peak (harvest) and the lean seasons?*

- 6 *Would the elasticities be higher or lower in the peak (harvest) and the lean seasons?*
- Because food supply in the peak or harvest season is more abundant, a change in the budget does not translate into significantly higher nutrient consumption.
 - On the other hand, if food availability is low, as in the slack season, an increase in household income is more adequately reflected in the demand for nutrition.

1. *Energy input.*

- The periodic consumption of food is the main source of energy input to the human body.
- Access to food, in most situations, is the same as access to income.

Reference man

of the Food and Agriculture Organization (FAO) is a European male who weighs 65 kg.

2. *Resting metabolism.*

- This is a significant proportion of the body's requirements.
- It represents the energy required to:
 - Maintain body temperature;
 - Sustain heart and respiratory action;
 - Supply the minimum energy requirements of resting tissues;
 - Support ionic gradients across cell membranes.
- For the "reference man" of FAO, this figure is 1,700 kcal per day.
- The exact number for a different individual varies significantly with:
 - the characteristics of the individual;
 - the ambient environment in which he lives.

Example: A higher body mass raises resting metabolism.

3. *Energy required for work.*

- The FAO's 1973 estimate, applied to their reference man, prescribed 400 kcal per day for "moderate activity".

⑦ *Is this number higher or lower for the poor in less developed countries, and why?*

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- The FAO's 1973 estimate, applied to their reference man, prescribed 400 kcal per day for "moderate activity".

⑦ *Is this number higher or lower for the poor in less developed countries, and why?*

- For the poor in less developed countries, who are subject to hard labor, this number is likely to be much higher.
- In studies of West African agriculture, estimates of calorie consumption:
 - 213 kcal per hour for carrying a log of 20 kg;
 - 274 kcal per hour for hoeing;
 - 372 kcal per hour for bush clearing;
 - 502 kcal per hour for tree felling.

4. *Storage and borrowing.*

- Over a period of time we can expect to see some form of balance between **energy input** and the sum of **resting metabolism** and **energy required for work**.
- In the short or medium run, however, excesses or deficits can be cushioned (to some extent) by the human body.
 - An energy deficit is met by running down stores from the body.
 - An energy surplus is partly dissipated, partly stored.

- 8 *Which of the two (energy deficit or energy surplus) is likely to be a problem in developed versus developing countries?*

- 8 *Which of the two (energy deficit or energy surplus) is likely to be a problem in developed versus developing countries?*
- Well-fed people in developed countries worry about an energy surplus (obesity).
 - In developing countries, for the hundreds of millions of people that suffer undernutrition, the real problem is the threat of an energy deficit.

Not only does **income** affect **nutrition**

BUT

Good **nutrition** affects the capacity of the body to perform tasks that generate **income**.

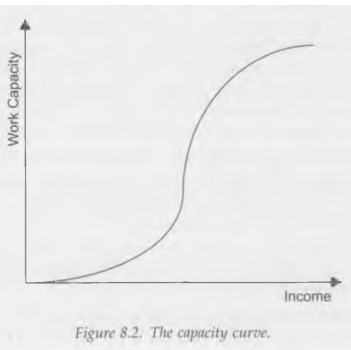
Capacity curve

The relationship between nutrition and the capacity to perform productive work.

Work capacity

A measure of the total number of tasks an individual can perform during the period under review.

Energy Balance



- 9 *What happens as we move from left to right along the x axis, that is, as we increase the amount of income (nutrition) available to the household?*

Energy Balance

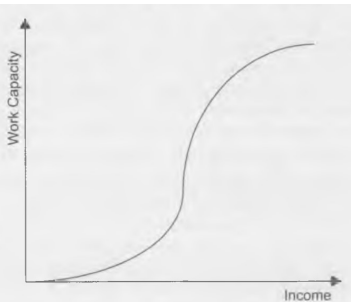
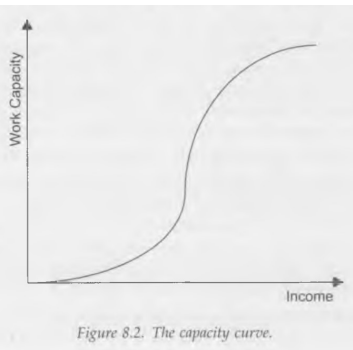


Figure 8.2. The capacity curve.

- 9 *What happens as we move from left to right along the x axis, that is, as we increase the amount of income (nutrition) available to the household?*
 - Initially, most of this nutrition goes into maintaining resting metabolism, and so sustaining the basic frame of the body.
 - In this stretch very little extra energy is left over for work.
 - So work capacity in this region is low (close to zero) and does not increase too quickly as nutrition levels change.

Energy Balance



- 9 *What happens as we move from left to right along the x axis, that is, as we increase the amount of income (nutrition) available to the household?*
- Once resting metabolism is taken care of, there is a marked increase in work capacity, as the lion's share of additional energy input can now be devoted to work.
 - This phase is followed by a phase of diminishing returns, as the natural limits imposed by the body's frame restrict the conversion of increasing nutrition into ever-increasing work capacity.

- 10 *If a low-income-undernutrition-low-income circle is possible in poor countries, why is it not possible for some groups of people in rich countries?*

Nutrition and Work Capacity

- 10 *If a low-income-undernutrition-low-income circle is possible in poor countries, why is it not possible for some groups of people in rich countries?*
- Because in rich countries the labor market is tight, so the returns to work are high even though a person may have low work capacity to start with.
 - These high returns permit the individual to consume adequate nutrition and hence raise his work capacity over time.
 - These opportunities in the labor market make the vicious circle theory based on undernutrition no longer valid.

Tight labor market

A labor market where the alternatives to working with any particular employer are relatively plentiful and attractive.

- 11 *Can't people simply borrow their way out of the vicious circle?*

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- The credit market may simply be closed to poor individuals, especially in terms of consumption credit.
- An economy with undernutrition may well be **Pareto optimal!**
 - ⇒ There may be no way (in the short run) to make the undernourished poor better off without some amount of redistribution from the portion of the population with greater access to income and assets.
 - ⇒ Introducing a credit market in which people can borrow to stock up on work capacity cannot have any effect at all!
 - For people to lend to such a market, they must register a gain.
 - The people who borrow presumably gain as well.
 - People who do not participate are unaffected.
 - ⇒ Then the new allocation achieved by the credit market must make some people better off and nobody worse off.
 - ⇒ This contradicts the postulate that the earlier allocation was Pareto optimal.

Pareto optimality

There is no way to rearrange endowments, production, and consumption so that all economic agents are simultaneously better off.

- 12 *If work capacity affects future work output, won't employers wish to offer long-run contracts that take advantage of this?*

Nutrition and Work Capacity

- 12 *If work capacity affects future work output, won't employers wish to offer long-run contracts that take advantage of this?*
- It is unclear that such contracts can be enforced unless there is some separate reason why workers want to stay in such contracts.
 - It is unlikely that an employer will make a long-run contract with his employee *just* to extract future gains from enhanced work capacity.
 - There is no guarantee that the employee will be around tomorrow:
 - he may work for a different employer;
 - he might migrate.
 - Under these circumstances, the employer might be extremely reluctant to engage in a nutrition-enhancing investment.
 - If a person in good health can be identified by other employers, the market will bid up the wage rate for such an employee.
 - The employee will reap the entire benefit of the employer-financed investment in the form of a higher wage.
 - If this is the case, then why undertake the investment in the first place?

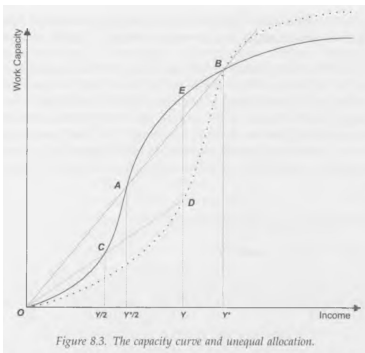
- 13 *If such long-run relationships were somehow in place for other reasons, would this have an effect on nutritional status?*

- 13 *If such long-run relationships were somehow in place for other reasons, would this have an effect on nutritional status?*
- It might, but there must be a separate factor, or set of factors, that makes the relationship inflexible in the sense that the employee is costly to replace.
 - *The slave economy.*
Slaves were bought, and therefore each act of replacement brought with it a large outlay.
 - *Industry.*
The effect of adequate nutrition on the productivity of workers has been emphasized repeatedly in manuals.
 - *Domestic servants.*
Servants are associated with characteristics acquired on the job that make them hard to replace.

The Unequal Sharing of Poverty

- Certain minimum amounts of nutrition, care, and economic resources have to be devoted to each person (including each child) in order for that person's life to be productive and healthy.
- In situations of extreme poverty, equal division of household resources might help no one, because the average amounts are far too small.
- The potential merit of unequal division is that it helps *some* individuals in the household to be minimally productive under extreme circumstances.

The Unequal Sharing of Poverty



- $OA = AB$;
- For capacity B , $Y = Y^*$;
- For capacity A , $Y = Y^*/2$.

Consider a household of 2 persons:

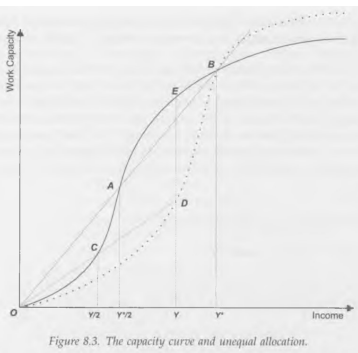
- Suppose their capacity curves are identical and given by the curve in Figure 8.3.
- Suppose that total household income is given by Y^* .

Think of two options:

- 1 The household shares the income equally.
- 2 One person consumes the entire income.

⇒ They yield exactly the same work capacity for the household.

The Unequal Sharing of Poverty



Suppose now that the household has an income level lower than Y^* , say Y .

- 1 Under equal division:
 - Each member gets $Y/2$.
 - Each person has work capacity C .
 - Total household capacity is therefore given by twice C , which is D .
- 2 When all income is consumed by one person:
 - Work capacity is $E > D$.

⇒ At incomes below the critical threshold Y^* , unequal consumption allocations create greater household work capacity than equal allocations.

⇒ At household incomes above the threshold Y^* , equal division does better than unequal division.

The Receiving End

Who are the individuals who are denied?

- Females, both adults and children.
- The old and the unfirm.

14 *Why the old?*

The Receiving End

Who are the individuals who are denied?

- Females, both adults and children.
- The old and the unfirm.

14 *Why the old?*

- The old are less able to provide income-generating capabilities.

The Receiving End

Table 8.6. Age-specific death rates for widows in rural Bangladesh.

Age group	Mortality rate (deaths per 100 person-years)				
	Currently married women	All widows	Widows heading households	Widows in HH headed by sons	Widows not in HH headed by self or sons
45-54	0.89	1.36	1.68	1.15	1.63
55-59	1.78	2.06	2.21	2.13	1.23
60-64	3.10	3.83	2.42	3.86	5.84
65-69	3.81	5.56	5.20	5.15	8.27
70-79	9.43	9.99	8.63	9.88	11.67
80+	9.38	17.50	15.04	17.66	18.52
Total	1.87	5.29	3.75	5.37	7.59

Source: Rahman, Foster and Mencken [1992] and Chen and Drèze [1992].

The Receiving End

- Death rates jump by a factor of 3 if a woman is a widow, rather than currently married.
 - Widows who are heads of households do relatively better than the average for all widows.
 - Widows living in households that are not headed by themselves or by one of their sons do particularly badly.

The Receiving End

Table 8.7. Calorie intakes and requirements by sex in rural Bangladesh (1975–76).

<i>Age (years)</i>	<i>Male</i>		<i>Female</i>	
	<i>Calorie intake</i>	<i>Calorie requirement</i>	<i>Calorie intake</i>	<i>Calorie requirement</i>
10–12	1,989	2,600	1,780	2,350
13–15	2,239	2,753	1,919	2,224
16–19	3,049	3,040	2,110	2,066
20–39	2,962	3,122	2,437	1,988
40–49	2,866	2,831	2,272	1,870
50–59	2,702	2,554	2,193	1,771
60–69	2,569	2,270	2,088	1,574
70+	2,617	1,987	1,463	1,378

Source: Sen [1984, Table 15.3].

The Receiving End

- Females receive systematically lower nutrition in all the age groups surveyed.
 - The intake shortfall varies from a min of 11% (in the youngest age group) and rises to a high of 44% in the 70+ category.
- If the shortfall is measured relative to stated *requirements*, this discrepancy goes away.
- ⑮ *What is the implicit assumption in the previous statement? Can we trust the numbers for the calorie requirements?*

- 15 *What is the implicit assumption in the previous statement? Can we trust the numbers for the calorie requirements?*
- The implicit assumption is that the calorie requirements are measured well.
 - Considerations to be taken:
 - Body mass;
 - Do these requirements presume different sets of tasks performed by men and women?
 - How is it that the energy use of these tasks is accurately estimated without pinning down a set of tasks completely?

"... there are good reasons to dispute the assumptions about the energy use of activities performed by women, which are not as 'sedentary' as calorie calculations tend to assume. Also the extra nutrition requirements of the pregnant women and lactating mothers require fuller acknowledgement."

Sen (1984)

Summary

- Poverty and undernutrition affect work capacity.
- The relationship between nutrition and work capacity can be expressed through the use of a *capacity curve*.
- The capacity curve creates the possibility of a low-income undernutrition *trap*.
- Just as low incomes are responsible for low levels of nutrition, low levels of nutrition work through the capacity curve to diminish earnings.
- The existence of such a trap is far more likely in countries that have low per capita incomes overall (because of labor supply effects):
 - It is difficult to borrow one's way out of an undernutrition trap.
 - Long-run contracts may not work to overcome the undernutrition trap.

- Extreme poverty promotes unequal treatment within the household.
 - Certain minima are needed for people to lead a productive life.
 - Equal treatment may simultaneously deny everyone those minima.
 - The elderly (notably widows) are among the groups that receive unequal treatment.
 - Females also, although this phenomenon requires more careful exploration.