IMPROVING NUTRITION FOR BANGLADESH

RESEARCH PAPER

COMPLEMENTARY FEEDING PROMOTION:
COSTS AND BENEFITS OF PROMOTING COMPLEMENTARY AND SUPPLEMENTARY FEEDING AMONG WOMEN AND CHILDREN FROM THE SOCIETAL PERSPECTIVE

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Complementary Feeding Promotion: Costs and Benefits of Promoting Complementary and Supplementary Feeding among Women and Children from the Societal Perspective

Bangladesh Nutrition

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Introduction

The purpose of this note is to present estimates of costs and benefits of promoting complementary and supplementary food consumption for pregnant women and children in Bangladesh. The analysis is based on parameters, results and information available in published articles and reports. A quick review of relevant literature was conducted to estimate the costs and benefits of promoting complementary and supplementary food in Bangladesh. The purpose of promoting appropriate nutrient dense food is to improve consumption of nutrients by the target group, both quality and quantity, which should lead to better nutritional status of women and children. Therefore, promoting complementary and supplementary food is likely to create similar outcomes as direct provision of food items is expected to produce; however, the costs and effects will differ between a purely nutrition promotion program and a program that combines nutrition promotion with actual provision of food.

Background

Bangladesh has seen rapid improvements in nutritional status of women and children over the last few decades. One of the first (if not the first) nationally representative nutrition survey of children in Bangladesh, carried out by the Bangladesh Bureau of Statistics in 1985, reported high prevalence of child undernutrition. Underweight, stunting and wasting prevalence were found to be 70.9%, 67.5% and 15.3% of children in the age group 6-59 months in 1985 (BBS 2005). By 2014, nutritional status of children improved and prevalence of these three undernutrition measures declined to 32.6%, 36.1% and 14.3% respectively. Socioeconomic status of households was an important factor explaining the prevalence of undernutrition among children. For example, in 2014, stunting rate was 49.2% among the lowest wealth quintile group while it was 19.4% among the top quintile (BDHS 2014). It should be noted here that Bangladesh is not an exception in terms of child undernutrition in the area; excepting Sri Lanka, all other countries in the region show persistence of high rate of undernutrition among children despite significant social and economic development.

Maternal undernutrition has also remained high in Bangladesh. Percent of ever-married women in the age group 15 to 49 years (non-pregnant women) with BMI less than 18.5 kgm^{-2} was about 52.6% in 1996-97, 32.2% in 2005 and 18.6% in 2014 (BDHS 2014). Prevalence of extreme thinness (<18.5 kg/m^2) among women shows a declining trend with improving economic status of households. According to 2014 BDHS, 32.2% of women in the lowest wealth quintile group were extremely thin while it was 7.0% among women in the highest wealth quintile.

Presence of significant undernutrition of children and women even in the highest economic group implies that economic growth alone will not be able to resolve the undernutrition issue in Bangladesh without some targeted nutrition intervention activities. Bangladesh has been quite successful in reducing prevalence of undernutrition through nutrition interventions. Nutrition education and promotion of nutrient dense food were adopted as part of integrated nutrition program of the country. Although the nutrition interventions show significant positive effects, cost-benefit ratios of different nutrition interventions are often not known. The purpose of this paper is to conduct an economic evaluation of promoting complementary and supplemental feeding from the societal perspective. Such evaluation is needed to better understand how nutrition education and promotion compare with other interventions that can be adopted to address malnutrition issues in developing countries.

The Conceptual Model

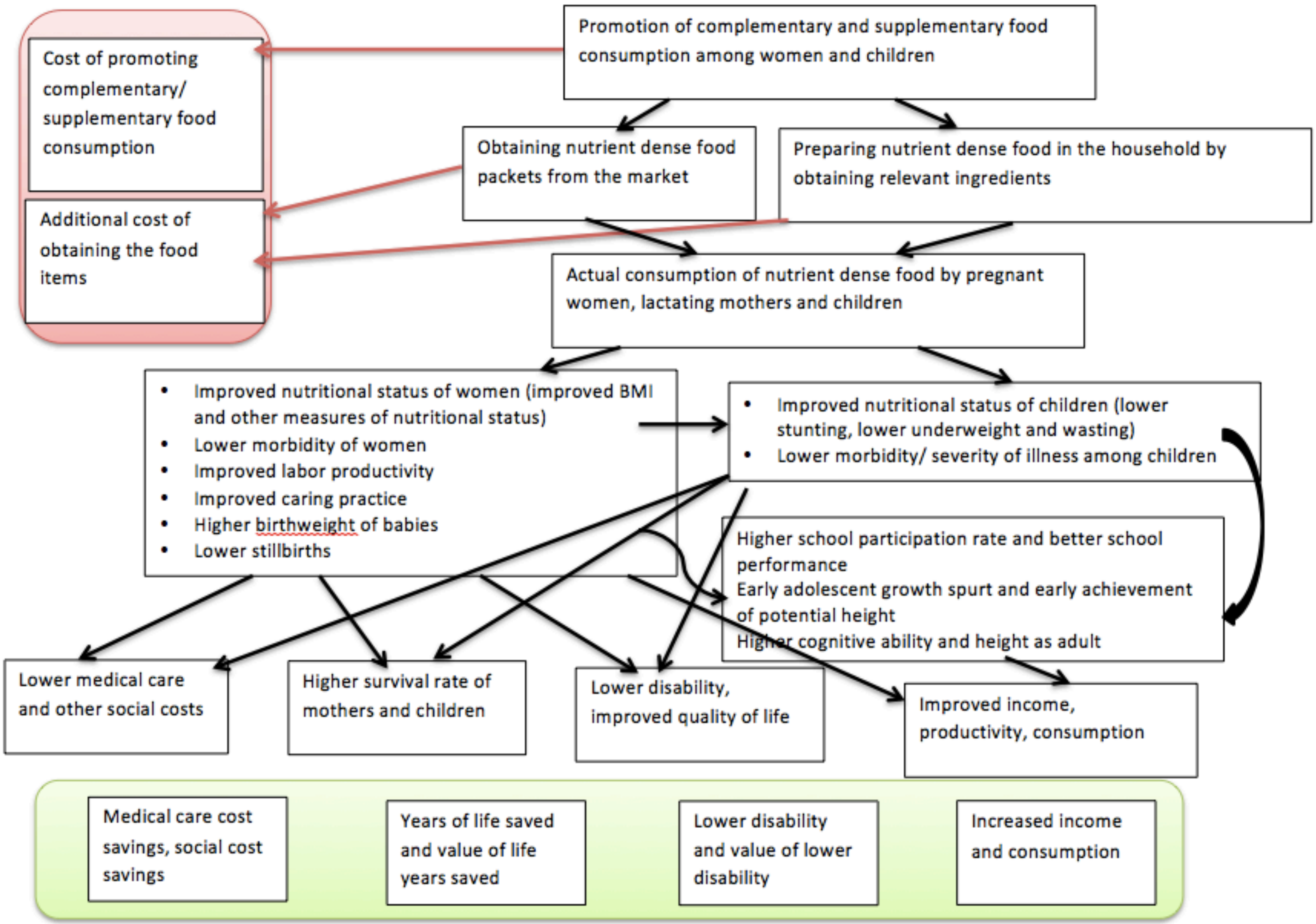
The simplified conceptual model for the analysis is presented in the diagram 1 below. Research studies have clearly indicated that food supplementation and provision of nutrient dense food improve the undernutrition situation. Improvements in fetal health, maternal nutrition, child nutrition and child survival have been achieved through food supplementations targeted towards pregnant women and children (Ceesay et al. 1997; Prentice et al. 1987; Prentice et al. 1998; Shaheen et al. 2006; Ota et al. 2012; Stevens et al. 2015; Roy et al. 2007; Tasnim et al. 2007; Huybregts et al. 2012; Kristjansson et al. 2015; van der Kam et al. 2016a; van der Kam et al. 2016b; Isanaka et al. 2009). Targeted food supplementation can also reduce social inequity (Shaheen et al. 2014). The promotion of supplemental and complementary food should improve actual consumption of nutrient dense food items and should show similar effects on nutritional status. Therefore, promotion of complementary feeding should affect consumption either through preparation of the food items at home or through purchase of the relevant foods from the market or both.

Nutrition education and promotion of supplementary and complementary food items require systematic approach of delivering nutrition services. The cost of organizing a program for the provision of nutrition education related to promotion of nutrient dense food requires use of human and other material resources. Valuing these resources will provide an estimate of the cost of the nutrition intervention program. A successful program will induce at least some of the households to acquire recommended food items, either in nutrient-dense mixture form or in the form of individual ingredients needed to prepare the mix. The additional expenditure to acquire the nutrient dense ingredients or the mixture represents another component of cost of the program from the societal perspective (although not from the perspective of the program itself, if food is not provided by the program). If the individual ingredients need to be processed, it will require additional time input of women. To value the total cost of the nutrient dense complementary and supplementary food, the market value of the packets could be used as a proxy. To find the additional cost of obtaining the foods, we need to know what proportion of households/ women with nutrition education exposure adopts nutrient-dense food items.

The effect of consuming nutrient dense food items should improve the nutritional status of women and children. With lower prevalence of thinness among women, proportion of low birth weight (LBW) will decline. Still births will also be lower due to improvements in nutritional status of mothers. Shaheen (2015) has summarized the possible consequences of maternal undernutrition. The immediate consequence is predominantly increasing infant mortality rate (IMR) while the longer-run effects involve higher prevalence of chronic diseases. Maternal nutrition should also improve nutritional status of infants, better cognitive outcomes of children, possibly lower maternal mortality ratio (MMR), lower maternal morbidity and improved labor productivity of women. Maternal mortality is an extremely important risk factor in infant and child mortality (Over et al. 1992). Therefore, some of the most important consequences of maternal undernutrition can be captured by considering infant and child mortality and child nutrition status.

Improved nutritional status of infants and children has a number of significant short-term and longer-term consequences. Child nutrition status and infant mortality rate is correlated – the higher is the prevalence of undernutrition, the higher is the likelihood of illnesses and mortality. The severity of illnesses may also be higher among under-nourished children (requiring higher medical care expenses). Better nutrition also means better cognitive development of children. All these different consequences of child nutrition status may be considered as the benefits of nutrition intervention programs. In the diagram, the cost items are shown in the left-side box and the benefits are shown in the box at the bottom of the page.

Diagram 1: Conceptual Framework for Benefit-Cost Analysis of Promoting Consumption of Nutrient-dense Food



Estimating the benefits

The benefits of promoting nutrient dense food consumption are mostly in terms of prevention of infant deaths, lowering of stillbirths, improved health and wellbeing of pregnant women, lower morbidity among women and children, higher labor productivity of women and higher income earning potential in the future because of lowering of stunting among children. Lower morbidity and illness should also imply savings of medical care expenses. This study will make an attempt to estimate the most important cost and benefit items. Due to lack of information, not all cost and benefit items will be evaluated.

The following paragraphs provide the methodology for estimating various components of benefits.

Reduction in Child Mortality

Promoting nutritional education should reduce the IMR and child mortality rate. The lower child mortality implies that "years of life" will be saved due to the adoption of the program. To estimate the benefits in terms of years of life saved, we need to estimate the effect of nutritional intervention on child mortality and/or IMR and then we can convert the number of deaths prevented into years of life that has been saved.

Estimation of reduction in IMR and child mortality can use information on how infant or child mortality is affected due to undernutrition among children. The study by Roy et al. found that promoting consumption of nutrient dense food and provision of nutrition education lowers the average WAZ from (-2.15) to (-1.9) after six months of intervention (Roy et al. 2007). Therefore, the improvement in WAZ due to the promotion of nutrition intervention was about 0.25 z-scores. This is consistent with what Lassi et al. (2013) reported in their systematic review (reported improvements in WAZ by 0.26). The next step would be to link this improvement in WAZ or other nutritional measures with child deaths. Unfortunately, no recent information was found to link reduction of WAZ with IMR or child mortality. One can use the relationship Pelletier and his co-researchers reported between child anthropometry and mortality in various developing countries of the world. Although all these studies were published in early 1990s, the results should be valid in general. In this paper we have not used the estimates reported by Pelletier.

Bhutta et al. (2013) estimated the effect of implementing a set of nutrition programs, including nutrition education and promotion of complementary feeding, on child mortality. Implementation of the program, their estimates suggest, would reduce child mortality by 15%. Out of a total of 903,000 child deaths that can potentially be prevented through nutrition programs, promotion of complementary feeding, breastfeeding and provision of complementary food to food insecure households explain 24% of reduction in deaths. In Bangladesh, promotion of complementary food and nutrition education alone without any supplementation was found to be as effective as the program in which food supplementation was provided in addition to nutrition education and complementary food promotion (Roy et al.). Therefore, we will assume that 24% of the 15% reduction in child deaths can be prevented by promotion of complementary feeding with nutrition education. In Bangladesh, the estimated child mortality rate was about 38 per 1000 live births in 2015. Promotion of complementary food and nutrition education should be able to prevent 3.6% of child deaths (15% reduction for all nutrition interventions x 24% reduction of deaths due nutrition interventions accounted for by nutrition education and complementary feeding promotion). Given the child mortality rate in Bangladesh, targeting 1000 women will be able to reduce child mortality by 1.39 deaths per 1000 live births (Under-five mortality rate of 38*proportion of deaths that can be prevented 0.036).

The standard approach of measuring DALY is to consider the highest life expectancy technologically feasible. This is based on the assumption that all lives, in terms of loss of health, should be same in all countries of the world irrespective of its socioeconomic development. In this analysis, the highest life expectancy observed in the world in 2013 has been used (83.5 years, the life expectancy at birth for Hong Kong and Japan). Some researchers consider use of technologically feasible length of life as "unrealistic" for developing countries of the world and propose to use country-specific life expectancy. If we use country-specific life expectancy, the life expectancy target for Bangladesh will be about 71 years. However, use of a country's own life expectancy as the "target" to calculate years of life creates a number of significant analytical problems. First, economic evaluation of health and nutrition projects often requires estimation of years of life saved due to the implementation of the projects. If a project saves some years of life, it implies that the project will lower the death rate and therefore life expectancy will be affected, creating internal inconsistencies. One may argue that this should not affect the outcome significantly as the effect of a program on life expectancy should not be very high. This statement may or may not be valid. If an intervention reduces infant and child mortality, we can expect a large impact of the program on life expectancy. Second, it should be noted that methodology of economic evaluation of health and nutrition interventions should be general enough to be applicable to all relevant projects/interventions. Choosing a life expectancy of 71 years implies that any health program that improves the health of the population after 70 years of age will be considered as having no economic value at all – which is clearly not consistent with the social preference related to health of the population by age groups. In all societies, improving the health of elderly is considered very important, as reflected by the health expenditures by age groups.

Using the standard life expectancy value (83.5 years at birth), the years of life saved per 1000 under-fives targeted for promoting nutrition can be estimated. To estimate the years of life lost in Bangladesh due to premature death of a child, the average age at death is needed. It is assumed that the average age death is the mid-point of the age group, i.e., 2.5 year. It is also assumed that the years of life lost at age 2.5 is 81 years. Using 3% discount rate (and using discrete discounting), the years of life lost due to the death of a child in Bangladesh becomes 31.2 years. Therefore, for 1.39 deaths prevented per 1000 live births, the number of years saved will be [1.39*31.2] =43.37 years. The value of years of life lost is therefore 43.37* Taka 95864=Taka 4,157,532, using the GDP per capita estimate of Bangladesh.

Savings due to prevention of still births

The study in the project area of BRAC found that the stillbirth rate declines by 0.88 per 1000 births due to an intervention that promotes consumption of complementary and supplementary food as well as provision of other related health education. In the real world, no nutrition education is purely limited to promotion of complementary or supplementary food. The BRAC intervention does not provide food supplements. Although this is just one study, BRAC's program has country-wide scope and therefore, the impact the survey identified should be reflective of what we can expect in terms of stillbirths if nutrition education is delivered in an intensive manner.

We are considering stillbirths as loss of years of life in the same way as the death of under-five. Using the same approach outlined above to estimate the years of life lost, loss of 0.88 lives at birth implies loss of 27.6 discounted years of life (discounted years of life saved for one death at birth is 31.38 years). In monetary terms, this loss should be equivalent to Taka 2,647,276 (using GDP per capita of Bangladesh to value the discounted years of life lost).

Other health benefits of promoting nutrient dense food

Improved nutritional status of women and children may also affect the incidence of infectious diseases like Acute Respiratory Illness (ARI), diarrhea, etc. Lower incident, if valid, should save medical care resources. A number of studies indicate that the infectious diseases are more severe among malnourished individuals, for example Ferdous et al. (2013) reported that a significantly higher proportion of malnourished children (HAZ and WHZ less than -2.0) experienced moderate to severe episodes of diarrhea than children not malnourished (35% versus 24%). Medical care expenses and other social costs associated with illnesses are additional expenses incurred by households over and above the cost in terms of years of life lost (which only considered mortality, not morbidity) or cost of being stunted or wasted. However, it is not clear from the literature whether the incidence of illness among malnourished individuals is higher. It is unlikely that these additional costs will affect the benefit calculations significantly.

In addition to the impacts described above it is possible that children supplemented with food may feel safe and secured when out of hunger which may have other tangible and intangible benefits. However, measuring those benefits and converting them into monetary terms that would enable conducting economic evaluation will be challenging.

Effects of lower rate of stunting on income

To estimate the effect of stunting on income earnings as adults, a number of approaches can be adopted. The first approach would be to find the relationship between stunting as a child and the height of the individual as an adult. Not all those who are stunted as children end up being relatively shorter and if the exact relationship between HAZ and adult height is known, it will be possible to predict adult height from the HAZ scores as a child. Once this relationship is known, wage function showing the relationship between wage rate and height can be used to estimate the effect of childhood stunting on wage. Note that wage is simply one component of labor income. Labor income, by definition, can be obtained by multiplying the wage rate with the hours of work in a year for a person in the labor force. Childhood undernutrition may also affect labor market participation as well as hours of work among participants. Therefore, wage function alone will not be enough to get an estimate of income effect of child undernutrition.

It should also be remembered that wage rate is determined by a host of other factors, possibly including height of the worker. However, some studies question the validity of height-wage relationship. Once the measures of cognitive development are included in the wage function, effect of height becomes quite low (Case & Paxson 2006). Since height and cognitive development is related, it may still be true that better child nutrition affect wage rate via its impact on cognitive development. If height discrimination exists, the wage differential based on height will be an overestimation of marginal productivity of labor.

Hoddinot et al. (2013) adopted what they termed as a “direct approach” of estimating the effect of child stunting on income earning later in life. Individuals who participated in nutritional supplementation trials in Guatemala during late 1960s and early 1970s were traced back when they were in between 25 and 42 years. The results indicate that individuals who were stunted as a child (at 36 months) had 66% lower per capita consumption. Consumption is a function of income and therefore, those who were stunted at 36 months in Guatemala had significantly lower income. Using consumption per capita to estimate the income or consumption effect of stunting is likely to be highly biased for a number of reasons. Level of consumption per capita depends on labor income, non-labor income, wealth status and monetary savings of the household. To find the effect of stunting on consumption, we need to understand how stunting as a child affects (a) labor income attributable to skills, efficiency and cognitive ability of the worker, (b) labor income attributable to capital used in the production process, (c) non-labor income of the individual, (d) ownership of assets and wealth and (e) monetary savings of the household. The question is, how does childhood stunting affect each of these five determinants of consumption as adult? Given the relationship observed between childhood stunting and cognitive development, educational attainment and height of the individual as adult, the effect of stunting on labor income attributable to skill, efficiency and cognitive ability should be relatively high. Capital used in the production process may also be related to childhood stunting but the effect should be much lower than the effect on income due to use of labor hours. In developing countries of the world, factor productivity of labor has been declining with productivity of capital increasing. Since stunting rate declines with economic status of households, a higher proportion of workers who were not stunted as children should be from higher income groups implying that they would have access to higher level of capital inputs. Non-labor income is also expected to be higher for individuals who come from upper income categories. Therefore, out of the five potential factors affecting consumption, only a part of the first factor is likely to be influenced by childhood stunting. Even though the stunted and non-stunted groups are being observed at the same point in time, initial endowment of households should affect the ownership of physical capital or access to physical capital. Access to physical capital as well as social connections also affect the choice of occupation by individuals belonging to richer sections of the society (at childhood) which further widens the gap between stunted and non-stunted groups. Given the importance of capital in labor income generation, it is unlikely that more than 50% of consumption difference is due to labor productivity, the principal mechanism through which childhood stunting affects consumption. Although the paper mentions that inter-generational effect of stunting has not been considered, the intergenerational effects should be already present when average income or consumption values are compared between adults who were stunted as children and adults who were not stunted.

Assuming that 50% of the difference in consumption is due to other factors not directly related to stunting as a child (in absence of information on potential effects of physical capital, wealth status in childhood and choice of occupations, 50% was considered arbitrarily), the per capita consumption difference becomes 33% rather than 66%. In calculating the monetary value of labor productivity, we have used the same approach widely used for calculating the value of life years saved due to prevention of deaths and disabilities. This approach does not allow GDP per capita to grow with time. If we allow the GDP per capita to grow, the value of preventing stunting will be mainly determined by growth assumption rather than reduction in prevalence of stunting alone (it becomes a combined effect of economic growth and reduction in stunting). To isolate the effect of lower stunting, it will be preferable to discount the years of working life rather than discounting projected GDP per capita. Since the average consumption per capita of adult workers who were not stunted at age 36 months is about 49% higher than the workers who were stunted at 36 months (consumption of non-stunted worker is 100 compared to 67 for stunted workers), this will imply some economic growth due to reduction in stunting alone. Assuming that per capita consumption level is 75% of average GDP in 2014-15 of Bangladesh for the workers who were stunted as children and allowing the consumption to be 49% higher for non-stunted workers, consumption per capita becomes Tk. 107,308 if one case of stunting is prevented. The income increase for preventing one case of stunting at 36 months becomes Tk. 35,410 in terms of 2015 prices.

The stunting rate in Bangladesh in 2015 is estimated at about 33%. The number of stunted children reached through 1000 women will be about 330 and since an estimated 20% of stunting cases can be prevented by nutrition interventions, total number of stunting prevented by age 36 months should be (330*0.2)= 66. To calculate the total effect of stunting on income or consumption, it is assumed that children at 36 months in 2015 will start working when they reach 18 years of age and the working life is considered from age 18 to 60 years. If working life is discounted by using 3% discount rate, the discounted years of working life of each child in 2015 should be about 15.85 years. Total years of working life for 66 prevented cases of stunting in 2015 terms becomes (15.85 x 66) or 1,046.42 years. Since the increase in consumption in 2015 prices attributable to prevention of stunting per year is Tk. 35,410, total benefit of preventing 66 cases of stunting becomes (1046.42 years * Tk.35,410)= Tk. 37,053,765.

If the discount rate is 5% or 10%, years of working life per worker becomes 584.88 years and 170.91 years. Increase in labor productivity in terms of 2015 difference in consumption should be Tk. 20,710,740 and Tk. 6,052,048 respectively.

Estimating the cost of nutrition promotion

Bhutta et al. in their 2013 paper presents cost estimates of promotion of complementary feeding at the global scale, although estimated using country-level parameters. It appears that the paper used the software Spectrum and "LiST" module of Spectrum for calculating the costs. The program allows the users to select a country to obtain country-specific cost parameters. The "LiST" module default cost parameters for Bangladesh are possibly based on very general assumptions and we could not find specific methodology of obtaining the parameters in the documentations of the module. For example, the module assumes that each case requires 60 minutes of medical personnel time for complementary feeding education and supply/drug cost is zero per case (no other drugs and supplies needed for complementary feeding education). This is not consistent with the field level cost information collection conducted by a study in Bangladesh. The field level data collection indicated that even nutrition education and education on complementary feeding requires some supplies (pots and pans, containers to show portion size, spoons and using spoons to measure the quantities of complementary and supplementary food items to be provided, etc.). Using 60 minutes of medical personnel time per case also appears to be not based on field level observations or data collection in Bangladesh. Note that the success of feeding promotion program depends on timely identification of pregnancy cases as well as following the cases over the whole pregnancy. The costing parameters of Bhutta et al. probably asked the "experts" to report time needed to provide the nutrition education, ignoring the time needed for community level identification of cases and the cost of targeting. The BINP of Bangladesh implemented a very intensive form of nutrition promotion, requiring frequent contact with the enrollees or beneficiaries. Therefore, the cost parameters reported in the Spectrum program have not been used here.

To estimate the cost of promoting nutrient dense supplemental and complementary food items, we have used the detailed costing presented in the evaluation of BINP (Khan & Ahmed 2003). Although the costing was carried out in 1999, a number of recent studies have used the cost-estimates as the basis for deriving nutrition intervention costs because of absence of any other costing based on ingredient approach at the community level. The costing exercise was designed to estimate the cost of running Community Nutrition Centers (CNCs) in Bangladesh as part of evaluation of Bangladesh Integrated Nutrition Project. The CNCs in Bangladesh under BINP were operated by a NGO and by the Government of Bangladesh. In estimating the cost of nutrition intervention, the average costs of NGO and Government run CNCs have been used, excluding the cost items that are specific to actual delivery of food supplementation. BINP provided food supplementation to women and children through the CNCs and therefore, a significant proportion of personnel cost time was spent in organizing food supplementation. In the survey, personnel appointed in CNCs were observed to spend about 12 hours in the CNCs in organizing and supervising food supplementation activities. We have assumed that one-third of total hours of CNC personnel were allocated to food supplementation activities.

The community volunteers in BINP were the women who participated in the preparation of the food packets for which they were paid a small amount of money. The time needed for these local women members of CNC to prepare the food packets may be used to reflect the additional time mothers will need to prepare nutrient dense food for themselves and for children in the household. For this reason, we have included the value of time donated by volunteers to reflect the additional cost households will incur to prepare the recommended complementary food. The cost of food itself represents the actual cost of obtaining the food items to prepare the nutrient dense food packets, excluding the cost of personnel time and other supplies related to packaging. The average of the food cost per enrollee will be a measure of additional cost for acquiring the food items. Table 1 shows the cost incurred for providing nutrition education through a CNC. Using the target number of women on the average in the CNCs, cost per woman has also been derived and presented in the table.

Note that although the cost is shown as cost per woman targeted, the target population also included the infants of the mothers in the program. Therefore, the cost includes the cost of providing nutrition education on infant feeding as well as the cost of providing nutrient dense foods to pregnant women, lactating mothers as well as children. Since the study reported the costs in 2000 US dollars, the cost has been converted into 2015 prices using CPI-Urban for USA for the years 2000 and 2015. An approximation of costs in 2015 prices was obtained by multiplying the total cost per CNC by the ratio of two CPI indices (CPI of 2015/CPI of 2000). Finally, all the costs should be converted into PPP dollars for easy international comparison. The international exchange rate assumption is Tk.77.63 for 2015 for Bangladesh and the World Bank reports that the PPP exchange rate was Tk.27.05 per one US dollar. Using these exchange rates, cost of obtaining nutrient dense food and cost of providing nutrition education was obtained for the purpose of this analysis.

Table 1: Cost of promoting nutrition, nutrition education and consumption of nutrient dense food (based on BINP experience) per Community Nutrition Center and per 1000 women in Bangladesh (in USD and in PPP dollars)

Cost items	NGO	GOB	Average	Comments
Community-donated resources (valued at base year 2000)	91	86	44.25	Community resources are needed to carryout nutrition promotion as well such as storage of educational materials
Goods procured by the program (valued at 2000 dollars)	28	39	0.00	Most of the locally procured items were for preparing food packets and so excluded
Community-donated time (valued at 2000 dollars)	49	49	24.50	Assuming that time donation will be 50% if no food supplementation is carried out
Personnel cost of program (valued at 2000 dollars)	162	203	122.28	CNC personnel spend 12 hours per week in the CNCs for the provision of food supplementation
Cost of equipment and supplies (in 2000 dollars)	20	19	19.50	These items are used in nutrition promotion activities
Target women (average number)	31.43	32.57	32	
Average nutrition promotion cost per CNC			210.53	Adding cost items indicated above
Non-food cost items per woman			6.58	Total cost/target women
Food costs/woman enrollee			9.66	Food cost per woman participant
Total cost per woman in 2000 prices			16.24	
Total cost per woman in 2015 prices			22.38	CPI in 2000=172.2, CPI in 237.0
Total cost in 2015 in PPP dollars			64.22	World Bank. PPP rate 1 USD= TK 27.05
Cost per 1000 target population (PPP dollars 2015)			64,215	

Source: Derived from the numbers in Khan and Ahmed (2003)

Benefit cost ratio of promoting nutrient-dense food consumption

We have now estimated the benefits and the costs related to promotion of nutrient dense complementary and supplementary food including general nutrition education. The benefits estimated are summarized in Table 2 below. The benefit estimation has used 3% as the discount rate.

Table 2: Summary of the money value of benefits derived

Benefit categories	Benefits in monetary terms	Percent of benefits
Child mortality reduction	4,157,532	9.48%
Stillbirth reduction	2,647,276	6.04%
Stunting reduction	37,053,765	84.48%
Total in Taka	43,858,573	100.00%
Total in PPP dollars	1,621,389	

Note that about 84% of total benefits is due to benefits associated with the prevention of stunting among 20% of stunted children. It should also be mentioned that additional benefits of preventing episodes of severe illnesses due to improved nutritional status of children were not included in the analysis. This component should be a relatively small part of total benefits as the incidence of diseases (non-fatal cases) do not show significant differences by nutritional status of children.

Now, using the benefit estimate of PPP$ 1,621,389 and the cost estimate of PPP$ 64,215 per 1000 women in the program, the benefit cost ratio becomes ($1,621,389/$64,215)= 25.25.

In conclusion, promoting consumption of nutrient dense food show high benefit cost ratio and most of the benefits are derived due to prevention of stunting associated with improved nutrition. The program effect on stillbirth has been derived from BRAC's program, which possibly overestimates the benefit of nutrition education alone. This is because BRAC's intervention provides information not only on nutrition and nutrient-dense food but also on other health concerns and availability of health care services in the area. We also do not have any direct estimate of expenditures associated with the procurement and preparation of recommended nutrition-dense food within the household. The BINP cost of procuring the food items has been used here which may over-estimate the costs due to relative price decline of food items compared to non-food items over the years.

Table 3 presents sensitivity analysis with discount rates varying from 3% to 10%. In this exercise, the benefit stream required discounting since all cost items were in current year items (costs in current year). The aspects that required discounted are the years of life saved due to prevention of child deaths, prevention of stillbirths and years of working life in discounted years for today's children as adults if not stunted in childhood. The benefit-cost ratio of the intervention declines from 25.25 with 3% discount rate to only 4.86 when the discount rate becomes 10%. At 10% discount rate, as expected, the benefit item that declines rapidly is the income earning of individuals as adults if not stunted as a child. In fact, income premium of not being stunted for the cases of stunting prevented declined from Tk. 37.1 million at 3% discount rate to Tk. 6.1 million with 10% discount rate.

Table 3: Sensitivity Analysis by varying discount rate (benefit and cost numbers are in PPP $)

Intervention	**3% discount rate**			**5% discount rate**			**10% discount rate**		
	Benefit	Cost	BCR	Benefit	Cost	BCR	Benefit	Cost	BCR
Complementary feeding promotion	1,621,389	64,215	***25.25***	931,458	64,215	***14.51***	312,192	64,215	***4.86***

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Annex: Screen shot of LiST parameters

Lives Saved Tool (LiST) - Treatment inputs - Nutrition

Display: Average drug and supply costs per case (BDT)

Year: 2016

	Community	Outreach	Clinic	Hospital
Breastfeeding				
Changes in breastfeeding	0.00	0.00	0.00	0.00
Preventive				
Postnatal care				
Clean postnatal practices	135.01	135.01	135.01	135.01
Chlorhexidine	33.19	33.19	33.19	33.19
Feeding and supplements				
Complementary feeding--education only	0.00	0.00	0.00	0.00
Complementary feeding--supplementation and education	1,075.54	1,075.54	1,075.54	1,075.54
Vitamin A supplementation	11.97	11.97	11.97	11.97
Zinc supplementation	1,268.56	1,268.56	1,268.56	1,268.56
WASH				
Improved water source	0.00	0.00	0.00	0.00
Water connection in the home	0.00	0.00	0.00	0.00
Improved sanitation - Utilization of latrines or toilets	0.00	0.00	0.00	0.00

Find next | Find previous | Highlight

Enable searching

Notes

- Double-click on any cell with a value in it to view or modify detailed ingredient data.
- Changing a unit cost in a pop-up will cause the unit cost to change wherever it is used.
- Default intervention inputs such as the unit costs of drugs and supplies and provider time spent with clients are drawn from the OneHealth Tool. These inputs were developed based on a consensus building process with the World Health Organization, and draw on sources such as the MSH Drug Price Indicator Guide and the WHO Treatment Guidelines for various health programs. For more detail, please click the link below to access the document with detailed intervention inputs.

Click here to download the OneHealth Intervention Input Assumptions Manual

Close

Lives Saved Tool (LiST) - Treatment inputs - Nutrition

Display: Average medical personnel minutes per case

Year: 2016

	Community	Outreach	Clinic	Hospital
Breastfeeding				
Changes in breastfeeding	140.00	140.00	140.00	140.00
Preventive				
Postnatal care				
Clean postnatal practices	320.00	320.00	320.00	320.00
Chlorhexidine	0.00	0.00	0.00	0.00
Feeding and supplements				
Complementary feeding--education only	60.00	60.00	60.00	60.00
Complementary feeding--supplementation and education	37.50	37.50	37.50	37.50
Vitamin A supplementation	12.00	12.00	12.00	12.00
Zinc supplementation	18.00	18.00	18.00	18.00
WASH				
Improved water source	0.00	0.00	0.00	0.00
Water connection in the home	0.00	0.00	0.00	0.00
Improved sanitation - Utilization of latrines or toilets	0.00	0.00	0.00	0.00

Find next | Find previous | Highlight

Enable searching

Notes

- Double-click on any cell with a value in it to view or modify detailed ingredient data.
- Changing a unit cost in a pop-up will cause the unit cost to change wherever it is used.
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