

Cost of the Health Sector Component of the National Nutrition Programme of Sri Lanka



Nutrition Coordination Division
Ministry of Health Nutrition and Indigenous Medicine
Sri Lanka
August 2017





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Message from the Hon. Minister of Health Nutrition and Indigenous Medicine



I am privileged to send this message on the occasion of launching the “Health Sector Cost of National Nutrition Programme of Sri Lanka” by the Ministry of Health, Nutrition and Indigenous Medicine. This novel attempt to project the cost incurred by the health sector to improve the nutritional status of the people of this country is highly appreciated.

The estimates revealed that the cost of the health component of the National Nutrition Programme for the next 5 years (2017 to 2021) will be around 28.2 billion Sri Lankan Rupees. Government of Sri Lanka being committed to improve health and nutrition status of its people will be happy to absorb this cost. This report will help the process of planning and fund mobilization in an effective and efficient manner to improve the nutritional status of the Sri Lankans.

Hon. Dr. Rajitha Senarathne

Minister of Health, Nutrition & Indigenous Medicine

August 15, 2017

Message from the Secretary Ministry of Health Nutrition and Indigenous Medicine



The role of nutrition is vital in determining health of the nation. Ministry of Health, Nutrition & Indigenous Medicine is the main stakeholder of nutrition related interventions in the health sector. Government of Sri Lanka spends a considerable amount of money on nutritional interventions. The role and intervention of the non-governmental and UN agencies is also in the fore front to improve the nutritional status in Sri Lanka.

Despite the large amount of money spent on nutrition, the impact of the specific nutrition intervention undertaken over the years is yet to be studied in the Sri Lankan context. The identification of targeted and well focused intervention and programme costs will be useful to identify cost effective nutrition intervention programmes which could be incorporated into the future planning process.

I hope this important document will provide guidance in planning and objective resource allocation relating to nutrition programmes to achieve global nutrition targets in a more cost effective manner.

Janaka Sugathadasa
Secretary
Ministry of Health, Nutrition & Indigenous Medicine
August 15, 2017

Message from The Director General of Health Services



Ministry of Health Nutrition & Indigenous Medicine as a key stakeholder in the improvement of the nutritional status of the Sri Lankan population has implemented several nutrition programmes. However, health system cost of these programmes has not been assessed. This report fulfills a long felt need of the Ministry of Health, Nutrition and Indigenous Medicine by providing information on financial cost related to nutrition programmes implemented at both national and provincial levels.

Programme cost assessment is useful for resource allocation and planning of the future interventions. Therefore, it would be useful to get an insight on the amount of funds according to the cost elements for the nutrition related interventions. Thus it is crucial for relevant stakeholders and all programme managers to utilize the information given in this report when planning nutrition programmes to achieve Global Nutrition Targets by 2025.

Dr. J.M.W. Jayasundra Bandara

Director General of Health Services

Ministry of Health, Nutrition & Indigenous Medicine

August 15, 2017

Preface

Despite great achievements gained in health and social indicators during past few decades, Sri Lanka is still showing sub-optimal progress in nutrition related indicators. Ministry of Health, Nutrition & Indigenous Medicine is the main stakeholder of nutrition related interventions that take place in the country. Government of Sri Lanka spends considerable amount of money on nutrition, while the other non-governmental and UN agencies also provide financial support to improve the nutritional status of the people of Sri Lanka.

Nearly 100 million rupees is allocated for activities related to nutrition from 2016 annual health budget. In addition, UN agencies and other nongovernmental organizations also spend considerable amount of money to uplift the nutritional status of the people of Sri Lanka.

Despite the large amount of money spent on nutrition, the cost of the specific nutrition interventions and programmes has never been studied in the Sri Lankan context. Identification of intervention and programme costs will be useful to identify cost effective nutrition interventions/ programmes which will be incorporated into future planning. Therefore, this exercise is expected to provide guidance on selecting interventions for future planning and resource allocation to achieve Global Nutrition targets and SDGs in a more cost-effective manner.

The objective of the assignment is to cost the evidence based nutrition interventions identified in the 'Joint Strategic Plan for Nutrition Programming' and thereby estimate the financial cost needed by the government for National Nutrition Programme in Sri Lanka.

Findings of this study is expected to improve the process of planning and fund mobilization assuring the effective and efficient utilization of money for nutrition related activities while improving the nutritional status of the population.

Dr. Rasanjalee Hettiarachchi
Director
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List of Abbreviations

CFC	Consumption of Fixed Capital
FHB	Family Health Bureau
HEB	Health Education Bureau
HR	Human Resources
IT	Information Technology
NNP- HSP	Health Sector Component of the National Nutrition Programme
MCH	Maternal & Child Health
MIS	Management Information System
MOH	Medical Officer of Health
MOMCH	Medical Officer Maternal & Child Health
MRI	Medical Research Institute
NCD	Non Communicable Diseases
OHT	One Health Tool
PHC	Primary Health Care
PHI	Public Health Inspector
PHM	Public Health Midwife
PHNS	Public Health Nursing Sister
SAM	Severe Acute Malnutrition
SPHI	Supervising Public Health Inspector
SPHM	Supervising Public Health Midwife

Executive Summary

Malnutrition has become a lingering public health problem in Sri Lanka. Responding to this issue, many government and non-governmental organizations actively engage in nutrition programming in the country, at present. Ministry of Health, Nutrition & Indigenous Medicine in collaboration with nine Provincial Ministries of Health is responsible for delivering the Health Sector Component of the National Nutrition Programme.

This cost study is aimed to estimate the financial cost to the government of Sri Lanka in implementing nutrition related interventions, by health sector stakeholders, within 2017 to 2021 period. Health system costs that are exclusively devoted to nutrition programme and those that are shared between other health programmes were focused. The scope of costing covered material, human resource, infrastructure, logistic, and programme activities that included policy and strategic planning, technical guidance provision, capacity enhancements, advocacy and awareness, research etc...

The cost estimation was initiated by identifying all nutrition related interventions that are implemented by various institutions of the Ministry of Health. Cost elements related to each intervention that consume resources were enumerated. The quantities of each resource type, their unit costs, and time based patterns of implementation of interventions were determined. The cost was estimated using One Health Tool and several Excel spreadsheet programmes.

The estimates revealed that the cost of the health component of the national nutrition programme for the next 5 years (2017 to 2021) will be around Rs. 27.9 billion. Approximate annual costs in different years ranged from just above Rs. 4.9 billion in 2017 to Rs. 6.3 billion in 2021.

These total costs are comprised of both direct nutrition costs and shared nutrition costs. Direct cost means the expenditures that are exclusively aimed on the nutrition programme and therefore directly identified as nutrition programme related costs. Shared costs reflect the appropriate share of the total cost of the health system element that is shared between nutrition interventions and others.

The direct and indirect costs in each year seems to have approximately equal shares. Direct costs ranged from 2.3 billion in 2017 to 3.2 billion in 2021. On special request of stakeholders a further disaggregation of direct nutrition costs were made as costs that are specifically nutrition dedicated, meaning that they are exclusively dedicated to nutrition (Nutrition dedicated direct costs) and the rest, though they are direct nutrition costs they can be directed to other programmes if the nutrition programme is stopped (Nutrition non dedicated direct costs). Further details in this distinction are included in the main text.

The largest share of the nutrition programme cost (45.4%) is incurred on human resources. The second highest expenditure 36.6% is on the nutrition materials and supplies. Reflecting the relatively less focus on infrastructure development in nutrition action plans, infrastructure cost is estimated as 7% of total expenditure. Program costs and logistic costs are amounting to 6% and 5% respectively.

Material and logistic costs related to the nutrition interventions cannot be directly assigned to a single stakeholder. After excluding these 2 types of costs, the cost incurred on the Medical Officer of Health System (Rs. 13 billion over the 5 years) became the stakeholder consuming the largest expenses. The cost of nutrition related activities steered by the Non Communicable Diseases Unit seemed to be the largest cost bearer among central stakeholders (Rs. 726 million over the 5 years).

Per capita cost of the health sector component of the national nutrition programme ranged from Rs.236.00 in 2017 to Rs.305.00 in 2021.

Introduction

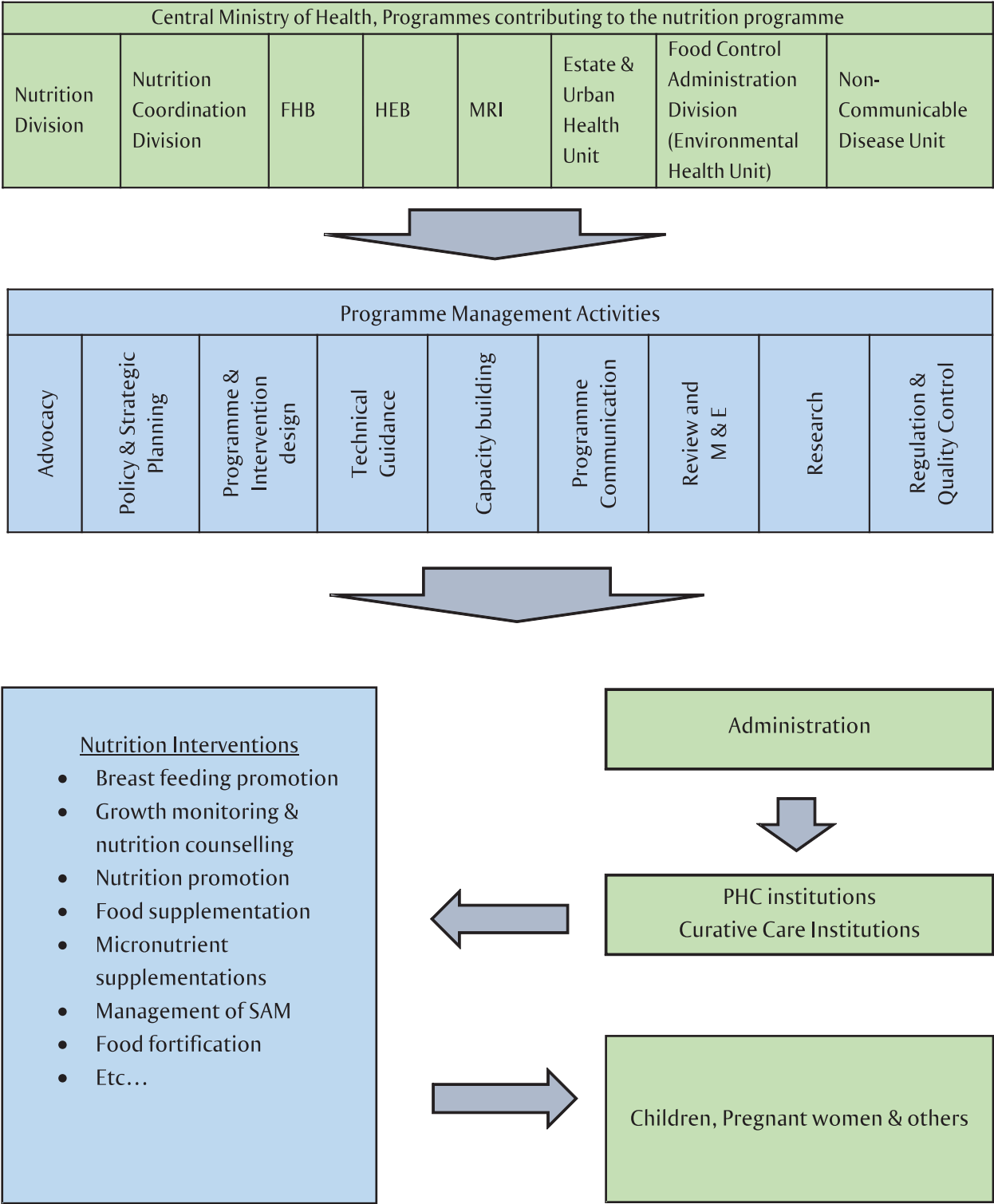
Sri Lanka has been showing exemplary achievements in relation to health and social status of the people over past years. However, the nutritional status of the Sri Lankan population, was not commensurate with this success. Malnutrition has become a lingering public health problem in the country. The Government, having recognized this important concern, had developed a National Nutrition Policy and established the National Nutritional Council and the Nutritional Secretariat to steer the multipronged national nutrition response arising from the Policy. At present, many government and non-governmental organizations are involved in nutrition programming.

Ministry of Health, Nutrition & Indigenous Medicine in collaboration with nine Provincial Ministries of Health is responsible for delivering the health sector component of the National Nutrition Programme (NNP- HSC). Several sections of the Central and Provincial Ministries of Health are involved in the NNP- HSP. Nutrition Division, Nutrition Coordination Unit, Family Health Bureau (Child Nutrition Unit, Maternal Care Unit, School

and Adolescent Unit), Medical Research Institute (Nutrition Unit), Health Education Bureau (Nutrition Unit), Non-Communicable Disease Control Unit, Estate and Urban Health Unit and the Environmental and Occupational Health Unit (Food Control Administration Branch) of the Ministry of Health, Nutrition and Indigenous Medicine are the main central level health sector organizations that contribute to the NNP- HSC. These central organizations collectively support the Ministry of Health in organizing the NNP- HSC and guiding implementation of its interventions. Overall actions of these units are supposed to ensure smooth steering of the nutrition programme. The implementation of health-related nutrition interventions are mostly carried out through the Primary Health Care (PHC) System governed by the Provincial Health Authorities, while management of Severe Acute Malnutrition (SAM) involves secondary health care system as well.

Figure 1 presents a framework that illustrates the institutional and functional arrangements related to the NNP-HSC.

Figure 1 Schematic presentation on the institutional and functional organization of the health sector component of the National Nutrition Programme



As depicted in the figure 1, most interventions except interventions used in the management of SAM are implemented by the PHC workers. These interventions are delivered as integrated components of the PHC package. The interventions aimed at those with severe acute malnutrition are provided at curative care institutions under the care of medical specialists.

Children and pregnant women are the principal recipients of health-related nutrition interventions, while entire population becomes the focus of nutrition promotion.

The central level institutions collaboratively function to provide programme management support such as : advocacy, policy and strategic planning, programme and intervention design, technical guidance, capacity building, programme communication, review & M & E research, and regulation and quality control.

Several policy and strategic directions are available for the guidance of nutrition programming in the country. These include, National Nutrition Policy of Sri Lanka ⁽¹⁾, Multisector Action Plan for Nutrition ⁽²⁾, National Policy on Maternal and Child Health ⁽³⁾, National Strategy for infant and Young Child Feeding 2016-2020 ⁽⁴⁾, National Child Health Strategic Plan 2017- 2025 (which presently in development), National Strategic Communication Plan on Nutrition ⁽⁵⁾ and Health Sector Guide to District Nutrition Action Plan (6). In addition the National HIV/AIDS Policy ⁽⁷⁾ and (7) National Multi-Sectoral Action Plan for Prevention and Control of Non Communicable Diseases ⁽⁸⁾ also have elements related to nutrition related actions. These policy and strategic directions and related guidelines collectively provide directions to the NNP-HSC.

Aims and Scope of Costing

This study aimed to estimate the financial cost to the Government of Sri Lanka in ensuring the implementation of nutrition related activities that are implemented by health sector stakeholders, within 2017 to 2021 period. Health system costs that are exclusively devoted to nutrition programme and nutrition related shares of the costs of other health programmes were focused in the study. After considering the policy relevance of cost information and feasibility of data collection, within available time and resources, the scope of costing was limited to the following items.

The scope of costing covered the following:

1. Material and supply cost: Cost of all materials and supplies used in providing nutritional interventions. These included drugs, food supplements, micronutrients etc...
2. Human resource cost: Salaries, and other incentives paid for health sector personnel, who are involved in nutrition programme delivery at central and provincial level.
3. Infrastructure cost: cost of new constructions carried out for the purpose of implementation of nutrition programme. Nutrition related share of the cost of infrastructure maintenance and utilities, Costs related to the consumption of fixed capital in infrastructure facilities, where nutrition programme activities are carried out. (Infrastructure types considered included buildings, vehicles, machines, medical and anthropometric equipment, IT equipment, and furniture).
4. Logistics cost: cost of storage & distribution of nutrition programme materials.
5. Programme management cost: cost of programme activities such as advocacy, awareness, capacity building, monitoring & evaluation, and information system costs.

The costs pertaining to the above-mentioned items were disaggregated as costs that can be directly assigned to nutrition specific actions and the nutrition related share of the costs of other health programmes (e.g. PHC programme and curative care system). On special request of stakeholders, a further distinction of direct nutrition costs was made. Accordingly, the direct nutrition costs were further disaggregated as costs that are specifically nutrition dedicated, meaning that they are exclusively dedicated to nutrition and the rest, though they are direct nutrition costs, they can be directed to other programmes if the nutrition programme is ceased to exist. For example, the permanent staff working in the nutrition division may be transferred to another health unit and their salaries are then paid by the new programme. However, in such a circumstance, the material cost on the food supplement, “Thripasha” will cease to exist. Therefore, the first item will be considered as nutrition non-dedicated but direct nutrition cost. The cost of providing Thripasha is considered as a nutrition dedicated direct cost. This type of disaggregation was made for all direct nutrition costs. The total nutrition dedicated cost will indicate the amount of money that should be specifically assigned for the nutrition programme budget every year. The other costs will be covered by already existing fixed budget lines. In addition, the cost estimates were disaggregated by stakeholders, health system blocks etc.

Basic training cost of the providers involved in the nutrition programme were not considered. Proportions of total basic training costs of relevant staff types that could be attributed to nutrition were deemed to be relatively small. On the other hand, the basic training programmes are usually financed by separate training budgets and unlikely to be factored in to nutrition targeted financing schemes. Governance and administrative cost above the level of nutrition programme related directorates (e.g. Ministry of health, Provincial and Regional Directorates) were also excluded.



Costing Process : Methodology

This cost analysis was carried out in three steps. Firstly, all the nutrition related interventions channeled through health sector was identified. Then various resources used in the health system while implementing interventions and therefore incur costs, were enumerated. Thirdly respective

costs pertaining to these resources were estimated. Review of literature^(9,10) suggested that the WHO One Health Tool software^(11,12,13) is an appropriate costing tool to be used in this costing study. Annexure 4 provides a summarized account on the One Health tool.

3.1 Identification of Interventions

A desk review was used to identify the nutrition related interventions implemented in the health system and incur costs to the government. A list of nutrition interventions was prepared by perusing: a) the work plans of health sector partners of national nutrition programme, b) nutrition related policy and strategic directions, and nutrition guidelines. The list was further refined based on the information obtained by consulting key programme and implementing personnel. Final set of interventions related to the health sector component of nutrition interventions were packaged under the following themes.

1. Interventions for under 5 years old children
2. Interventions for school children and adolescents

3. Interventions for pregnant women and lactating mothers
4. Interventions for other population groups

The analysis showed that more than one central level stakeholders are often involved in performing program functions facilitating nutrition interventions. Therefore, it was decided to classify these interventions irrespective of the provider, so that it prevents duplication of costs as well as improves the clarity of costing process. However, each cost elements were tagged by programmes to ensure that stakeholder related cost assessments were possible.

3.2 Determining Resource Needs

Detailed review of implementation of each nutrition intervention was carried out to find out what kinds of resources are required by them. Documentations on standard operational procedures were perused to identify various resource needs. Where ever necessary, expert advice of programme planners and implementers were sought to determine the implementation process and resource needs. The resource needs included materials, infrastructure & equipment, human resources, logistic and storage facilities, programme costs (In - service training, IEC materials, Communication, supervision, Monitoring and Evaluation etc...).

These resources were categorized as materials, infrastructure & equipment, human resources, logistic and storage facilities, programme costs (In-service training, IEC materials, Communication, supervision, Monitoring and Evaluation etc...). The costs associated with resources can be broadly classified as variable and fixed costs. Variable costs include the costs related to materials (Drugs, other supplies, equipment, staff amenities) where their quantities are directly proportional to the number of recipients, providers or institutions. Programme management costs (e.g. cost of actions such as: advocacy, awareness, in-service training, supervision, monitoring and evaluation, research,

and various other activities used for the facilitation of efficient and responsive programme implementation can also be considered as variable costs. Fixed cost elements include human resources, infrastructure (buildings, equipment and vehicles), and logistics systems.

Material costs included expenses on drugs and other supplies used in delivering nutrition interventions (e.g. Thriposha, vitamin A, Iron and Folic Acid tablets). Investigations were also considered as a variable cost clubbed under material costs as they could be costed on per investigation basis. Material costs also included equipment used in the service provision (e.g. weighing scales, height measuring tapes). Human resource costs include routine emoluments (e.g. salaries, overtime pay) of services providers.

However, in-service training costs were considered under programme costs and described below. Infrastructure costs were estimated as construction, maintenance and utility costs, consumption of fixed capital. Logistics cost involve the expenses used for purchase, storage and distribution of materials and equipment to the nutritional service points. Information cost means all expenditures sustained on generation, processing, storage, analysis and dissemination of nutrition related information in the health sector. Programme management costs include expenses on all activities that are aimed to improve the accessibility, effectiveness, utilization of nutrition interventions. The activities related to advocacy, awareness, in-service training, supervision, monitoring and evaluation including data management, research, are considered as programme management costs.

4

Data Collection

Data required for this cost assessment were collected using the following methods.

1. Conducting a Desk review
2. Paying onsite visits
3. Holding stakeholder discussions

A desk review of policy and strategic documents mentioned in section of introduction was carried out to identify the overall structure, the mandate and the interventions of the health sector component of national nutrition programme. In addition, action plans, and operational guidelines used by nutrition stakeholders were also perused. International literature related to nutrition programme costing were also studied.

Onsite visits were paid to all strategic partner institutions to obtain information on the nutrition related activities conducted by them. During these visits data on: the type and nature of activities, quantum of work involved, system capacity, and work targets across the years, and health system resources used in these institutions were recorded.

Subsequently a larger stakeholder discussion was conducted to have a consensus on the National Nutrition Programme related activities that were focused under this cost study and on the proposed scope, process and methods of costing.

Costs Estimation

Cost estimates were conducted using both the One Health Tool (OHT) and excel spread sheet programs. Estimation of material costs associated with interventions and human resource costs were determined using the intervention costing and human resource modules of the OHT respectively. Other types of health system costs (infrastructure, logistics) and programme management costs were calculated through programmed excel spread sheets. Using excel for these assessments were much easier and flexible than using the OHT for these purposes.

OHT has an in-built mechanism to adjust for annual inflation. The inflation levels were based on the

values projected for the period by the Central Bank of Sri Lanka. The excel based calculations were also adjusted for inflation in the similar manner.

OHT is a software program developed for costing and impact assessment of health programmes. OHT also provides interim outputs such as staff time adequacy and utilization patterns, bed day's capacity assessments, training details, health system element summaries by project periods, financial space analysis and budget mappings etc. OHT is further described in Annexure 4. A detailed description on OHT can be obtained in the references given in the section of bibliography (11,12,13).

5.1 Estimation of the Material Cost:

One health tool estimates material costs in 2 steps. The tool first determines the *number of clients* who are expected to receive a particular intervention in a given year and then this number is multiplied by the estimated *average unit cost per*

servicing a client by the given intervention. The following equation illustrates the calculation of material cost of drugs/supplies (d), used for the intervention (i), through delivery channel (j), at a time (t),

$$\text{Material cost for an intervention } i,j,t = \text{Num_Clients } i,j,t \times \text{Avg, Mat. Cost } i,j,d,t \quad \text{--- (1)}$$

Where:

$\text{Num_Clients } i,j,t$ = Number of clients for an intervention (i) delivered through a particular facility type (j) at a time (t)

$\text{Avg, Mat. Cost } i,j,d,t$ = Average material cost of all types of drugs/supplies (d) (where number of items = k) for an intervention (i) delivered through a channel (j) at a time (t).

The following equation indicates the calculation steps for determining the number of clients for an intervention (i) delivered through a particular

facility type (j) at a time (t) is given by the following equation.

$$\text{Num_Clients } i,j,t = \text{POP}_{i,t} \times \text{Pl}_{i,t} \times \text{CV}_{i,t} \times \text{DC}_{j,t} \quad \text{----- (2)}$$

Where:

$\text{POP}_{i,t}$ = type of target population for which a particular intervention is intended at a time t . (in other words the population of which all or a proportion will be eligible for the intervention which is the $\text{Pl}_{i,t}$ described below). For example, the population in need for comprehensive emergency obstetric care would be defined relative to the number of women who are pregnant or give birth.

$Pl_{i,t}$ = population in need for intervention i at time t , expressed as the percent of “POP” who should be receiving the intervention annually

$CV_{i,t}$ = coverage of intervention i at time t

$DC_{i,j,t}$ = percent of clients for intervention i who receive the intervention at delivery channel/facility type j at time t

Population ($POP_{i,t}$) related to each intervention (e.g. births, under 5 population, pregnancies) was calculated by DemProj software integrated in to OHT. When the target population for which the intervention is intended is specified, DemProj provides the relevant number of target personnel in the country in each project year. These numbers are based on the census based estimates of the first-year populations, total and age specific fertility rates, sex ratios, lifetables and migration parameters related to each year. In addition, OHT further refines the target population numbers based on the impact of proposed interventions on mortality, if relevant.

The population in need ($Pl_{i,t}$) means the proportion of target population eligible for receiving the intervention. These are based on intervention guidelines. For example: If “Thripasha” is intended for all pregnant mothers then the $Pl_{i,t}$ will be 100 % of number of pregnant mothers (which is the target population). However, if “Thripasha” is intended for only malnourished children (under 5) then the $Pl_{i,t}$ will be the percentage of under 5 children who are malnourished. The figures related to $Pl_{i,t}$ should be identified based on nutrition intervention guidelines and they have to be specified to OHT for calculations.

Coverage of intervention ($CV_{i,t}$) is the proportion of eligible population (that is $POP_{i,t} \times Pl_{i,t}$) that is

actually covered by service providers. This information for nutrition interventions were available from routine information system (e.g. H509, Programme statistics).

OHT gives an option to estimate the intervention costs disaggregated by different channels of intervention (e.g. via clinic or hospital) by separating the proportions of each intervention by delivery channels ($DC_{i,j,t}$). As this kind of separation was not expected for this study, the value of $DC_{i,j,t}$ was set to be “1”, and all the interventions were assigned to a single delivery channel so that the cost will be calculated without this separation.

The values of all above mentioned parameters related to nutrition interventions were identified from programme data and entered into the OHT to estimate the number of annual target recipients for each nutrition intervention delivered through national nutrition programme.

The next requirement was to identify all the drugs, other supplies and investigations used in nutrition interventions along with unit cost of each of these items. OHT uses the average drug and material cost of an intervention in the following manner. The average material cost of all types of drugs/supplies (d) (where number of items = k) for an intervention (i) delivered through a channel (j) at a time (t). [Mat. Cost $_{i,j,d,t}$] is be equal to:

$$\text{Avg, Mat. Cost}_{i,j,d,t} = \sum_{k=1}^n (\text{Num_Drugs_Inter}_{i,j,d(k)} \times \text{Unit cost}_{i,j,d,t(k)} \times \text{Pro_cases_drug}_{i,j,d(k)}) \quad (3)$$

Where:

$\text{Num_Drugs_Inter}_{i,j,d(k)}$ = Number of drugs/supply, d in one particular drugs/supply k in an intervention i delivered through channel j

$\text{Unit cost}_{i,j,d,t(k)}$ = Unit cost of one particular drug /supply k in an intervention i delivered through channel j at a time t

$\text{Pro_cases_drug}_{i,j,d(k)}$ = Proportion of clients receiving the intervention who are having the drug/supply, k in intervention i , delivered through channel j at a time t .

Parameters values required for above calculations, were identified by reviewing the treatment/intervention protocols of each nutrition intervention to be costed. Help of the nutrition programme specialists were obtained to further review these protocols. The unit costs were obtained from the Medical Supplies Division and UNICEF supply cost registries.

The above information was sufficient for OHT to calculate the material costs related to all the interventions delivered through the National Nutrition Programme.

Further details pertaining to the estimate of materials cost of nutrition interventions are given in the Annexure 1.

5.2 Estimation of Human Resource (HR) Cost

The cost of paying all types of emoluments to personnel involved in nutrition intervention delivery, nutrition programme management and nutrition programme administration was estimated.

Almost all nutrition interventions, except management of cases of severe malnutrition, are delivered by the Primary Health Care Team Staff (PHMS, PHIs, MOHs, SPHMs, PHNS, SPHIs and MOMCHs). The SAM cases are managed by curative staff (Pediatricians, Medical Officers, nurses and supporting staff). These personnel were involved in work other than nutrition intervention delivery. Therefore, only the costs reflecting their contribution to nutrition programme had to be attributed to the nutrition programme cost. The shares pertaining to implementing staff personnel (PHMS, PHIs, MOHs) were assumed to be equal to the ratio computed after dividing the number of fulltime equivalents (FTE) of staff time required for providing nutrition interventions by the total FTE available among these staff personnel. A separate ratio was computed for each type of staff personnel. The same respective proportions were used to estimate the contribution made by the supervisory staff of PHMs and PHIs. OHT has provisions to estimate the FTE required for nutrition interventions once the time required for providing each intervention was specified. OHT could also be used to assess the total FTE of each type of staff. The times of each intervention were determined by triangulation of time periods determined by task observation and obtaining provider's opinions.

The cost of payments to nutrition programme and administration staff who are directly involved in nutrition programme management were entirely assigned to the HR cost. They included the personal serving in Nutrition Division, Nutrition Coordination Division, FHB (Child Nutrition Unit), HEB (Nutrition Unit), MRI (Nutrition Unit). The HR cost of MOH system, Estate and Urban Health Unit, Food control unit and curative care institutions were considered as shared costs and appropriately adjusted to reflect nutrition related contribution.

The payments to Central and Provincial Level general administration staff (e.g. Ministry officials, and the staff in Provincial and Regional directorates) were not considered directly relevant to the nutrition programme costs and therefore excluded.

The HR costs related to Thripasha factory was already included in the unit cost of Thripasha packet and therefore omitted from HR costs.

The calculations required the total number of different types of staff serving for the National Nutrition Programme, the median salaries and incentives received by each type of staff and the proxy values reflecting their shared contributions where ever relevant.

Calculations for the total emolument staff types in a time t were based on the following steps

$$\text{Total emolument of staff}_{s,t} = (\text{Median_Sal}_{s,t} + \text{Avg_insntv}_{s,t}) \times \text{Num_Staff}_{s,t} \quad \text{---(4)}$$

Where:

$\text{Median_Sal}_{s,t}$ = Annual sum of the Median Salary of the staff type s at time t

$\text{Avg_insntv}_{s,t}$ = Average annual incentives of the staff type s at time t

$\text{Num_Staff}_{s,t}$ = Total number of staff s at time t

The in-service training costs of providers were included in the programme management costs. The basic training costs were not considered in this study due to the reasons mentioned above.

Numbers and types of staff personnel contribution to nutrition programme and their level of contribution are presented in the Annexure 1.

5.3 Estimation of Infrastructure Cost

Infrastructure items include buildings, vehicles, machinery and equipment. Three types of infrastructure costs were factored in to the nutrition cost. They included:

1. The cost of new constructions to be carried out in relation to nutrition programme actions,
2. Cost of losing the capital value of the institutions involved in nutrition programme delivery due to usual wear and tear (consumption of fixed capital),
3. Utility and maintenance cost of these infrastructure items

The new constructions and purchasing plans of machinery and equipment related to nutrition activities were identified from the action plans pertaining to next 5 years. Construction costs were estimated based on surface area unit costs recommended by government building institutes (CECB) and assessing the potential size of proposed buildings based on type plans or actual blue prints when available.

Utility costs were based on the past programme experience.

The calculation formulas were as follows:

For constructions:

$$\text{Cost_cons}_{f,t} = \text{Num_fac_cons}_{f,t} * \text{Cost_cons}_f \quad \text{---(6)}$$

Where:

$\text{Cost_cons}_{f,t}$ = the cost of constructing facilities of type “f” in year “t”

$\text{Num_fac_cons}_{f,t}$ = the number of facilities of type “f” cons in year “t”

$\text{Cost_cons_per_fac}_f$ = the cost of constructing a facility of type “f”

For vehicles

$$\text{Cost_new_vehicles}_{v,t} = \text{Num_veh_purchased}_{v,t} * \text{Cost_per_vehicle}_v \quad \text{---(7)}$$

Where:

$\text{Cost_new_vehicles}_{v,t}$ = the cost of purchasing new vehicles of type “v” in year “t”

$\text{Num_veh_purchased}_{v,t}$ = the number of vehicles of type “v” purchased in year “t”

$\text{Cost_per_vehicle}_v$ = the cost of a new vehicle of type “v”

Cost of maintaining vehicles:

$$\text{Cost_maint_vehicles, } t = \sum_{v=1}^n (\text{Num_veh_type } v * \text{Cost_annual_maint}_v) \quad \text{---(8)}$$

Where:

Cost_maint_vehicles_t = the cost of maintaining and operating all vehicles in year “t”

Cost_annual_maint_v = the annual cost of maintenance and operation of vehicles of type “v”

Num_veh_type_v = Total number of vehicle type v in operation during the year t

Cost of equipment and machinery

Cost related to equipment and machinery purchases and maintenance/repairs was calculated using an approach similar to costing vehicle purchase and maintenance/repair expenditures.

Cost of the consumption of fixed capital

Consumption of Fixed Capital (CFC) was calculated on a standard method recommended by Shepard et al.⁽¹⁴⁾. Consumption of Fixed Capital means the cost incurred due to the usual aging of infrastructure items. It reflects the annual opportunity cost due to

the gradual deterioration of each infrastructure item calculated in relation to its present replacement value at the end of year. It is calculated by dividing the replacement cost at the end of year by what is called annualization factor. For the purpose of these calculations, the real interest rate for the period was considered as 3%, the life span of a building used for nutrition activities were considered as 30 years, that of an equipment was 10 years and a vehicle was 7 years. The resulting CFC were further adjusted to reflect its shared contribution to nutrition programme if it is a shared infrastructure (e.g. MOH building or vehicle). The CFC was calculated as follows:

$$\text{CFC}_{it} = (\text{RC}_{it} / \text{Annualization factor}_{it}) - (9)$$

Where

CFD_{it} = Consumption of Fixed Capital of infrastructure item i in year t)

RC_{it} = Replacement cost of infrastructure item i at the end of year t = (Present cost * (1 + real r)

Real r = real interest rate = [(1 + nominal interest rate) / (1 + annual inflation)] - 1

Annualization factor = (1/r) x [1 - (1 / (1 + r)ⁿ)] where; r = real interest rate, n = life span of the infrastructure

The institutions that are involved in nutrition programme planning (at the central level) and implementation (at the provincial level) were identified for assessing the consumption of fixed capital. The hospitals were excluded as the contribution of them to nutrition programme is negligible in relation to their contribution to providing care for all patients. For example: in the year 2013, 5.9 million admissions were carried out in government hospitals and of them admission related to severe acute malnutrition was around 5672.

The infrastructure costs related to Thripasha factory was already included in the unit cost of Thripasha packet and therefore omitted from infrastructure costs.

The infrastructure items considered in this cost study and their respective unit costs are given in the given in Annexure 3.

5.4 Estimation of Logistics Cost

Logistics related to nutrition programme involve distribution of nutritional supplements and other supplies around the country. It was difficult to find the exact parameters required for costing these elements in formal manner. Instead the costs of all materials were inflated by 15% to account for logistics as this is the recommended procedure in such circumstances(15).

5.5 Estimation of Information System Cost

In health sector nutrition programme related information is gathered through 2 mechanisms. 1) MCH information system, 2) Nutrition surveillance system. The annual cost of MCH information system was calculated from the FHB financial reports and a proportion of it that could be assigned to nutrition programme was identified based on the relative number of nutrition related information reports and data fields in the information system. The material and system costs

of the FHB based MIS unit were considered as expenses. The data cost at the nutrition data generation end (MOH offices) was already factored as human resource cost and IT related costs. They were factored as the MOH office related HR and IT costs. Therefore, cost related to nutrition data generation are not directly reflected under the MIS cost. The cost incurred on the nutrition surveillance system was identified from the Nutrition Coordination Division financial reports.

5.6 Estimation of Programme Management Costs

A large number of programme management activities are associated with the nutrition programme. Almost all central and provincial level programming units (Nutrition Coordination Division, Nutrition Division, FHB, HEB, NCD, MRI etc...) have mandates to assure the quality and efficiency of the nutrition programme. These mandates require them to conduct routine or standalone activities such as advocacy, awareness, policy and strategic planning, programme design, development of technical guidance, piloting, capacity building, supervision, evaluation, research etc... These activities were identified as programme management activities.

The programme management activities carried out by the central and regional technical units were identified based on annual plans and expert

discussions. The most programme management activities identified in action plans were found as major tasks and not planned with adequate details to have an explicit idea on respective processes of implementation. Hence, in order to be able to identify relevant cost elements, a potential plan of operations for these tasks were prepared according to the usual programme patterns in the health system after discussing with respective programme managers.

Each programme management task was further disaggregated to reflect corresponding minor activities that would be actually carried out when they are being implemented. Then the resource requirements of these activities were enumerated. They were costed based on unit costs usually used on the health system. This process was repeated across 5-year period.

The costing of programme management activities was based on the following simple generic formula.

$$\text{Prom_Activity}_{c,t} = \text{Cost_per_Prom_Activity}_c * \text{Num_Prom_Activities}_{c,t} \quad (10)$$

Where:

$\text{Prom_Activity}_{c,t}$ is the total costs of programme activity for programme activity “c” in year “t”

$\text{Num_Prom_Activities}_{c,t}$ is the number of programme activities for programme management activity “c” in year “t”

$\text{Cost_per_Prom_Activity}_c$ is the cost per Prom_Activity in the programme management activity “c”

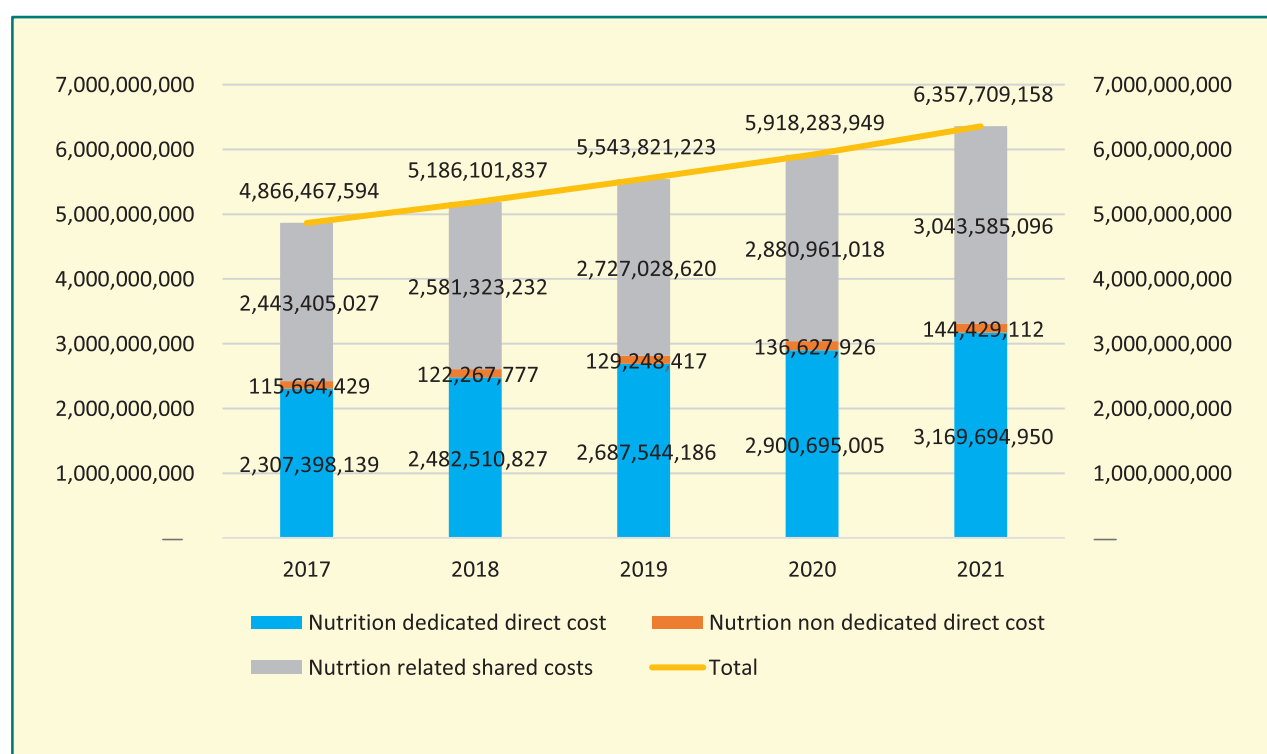
Costs Estimates

This section presents the various types of costs related to the NNP-HSC that were estimated based on the methods described above. Cost estimates were presented as overall cost of the NNP-HSC, how overall cost can be identified as the level of dedication of each category to their level of dedication to nutrition activities, by different cost elements, and by institutions. Per capita costs were also estimated.

6.1 Total Cost of the Health Sector Component of National Nutrition Programme

The total cost of the health component of the national nutrition programme for the next 5 years (2017 to 2021) was estimated to be around Rs. 27.9 billion. Figure 2 shows the expenditure patterns over the estimation period from 2017 to 2025. Approximate annual costs range from Rs. 4.9 billion in 2017 to Rs. 6.3 billion in 2021.

Figure 2 : Total costs of health sector component of the national nutrition programme over 2017 to 2021 period



As described in the section 2 the overall cost of health sector components of national nutrition programme was disaggregated as nutrition dedicated direct costs, nutrition non-dedicated

direct costs, and nutrition related shared costs borne by secondary stakeholders at different levels.

Table 1 : Distribution of health sector component of the National Nutrition Programme, by its components over 2017 to 2021

Cost item	2017	2018	2019	2020	2021	Total
Nutrition dedicated direct cost	2,307,398,139 47.41%	2,482,510,827 47.87%	2,687,544,186 48.48%	2,900,695,005 49.01%	3,169,694,950 49.86%	13,547,843,107 48.61%
Nutrition non-dedicated direct cost	115,664,429 2.38%	122,267,777 2.36%	129,248,417 2.33%	136,627,926 2.31%	144,429,112 2.27%	648,237,661 2.33%
Nutrition related shared costs	2,443,405,027 50.21%	2,581,323,232 49.77%	2,727,028,620 49.19%	2,880,961,018 48.68%	3,043,585,096 47.87%	13,676,302,993 49.07%
Total cost	4,866,467,594 100.00%	5,186,101,837 100.00%	5,543,821,223 100.00%	5,918,283,949 100.00%	6,357,709,158 100.00%	27,872,383,761 100.00%

Nutrition dedicated cost, i.e. the cost that the Ministry of Health should invest exclusively for implementing nutrition interventions during respective years, is nearly half of the total annual costs of the NNP-HSC. These figures ranged between 2.3 billion to 3.2 billion over the period of analysis (Table 1). Nutrition dedicated direct costs

covered all expenditures made on material purchases and production (e.g. Thripasha), logistics management, nutrition related constructions such as nutrition clinics, lactation management centers, and purchasing anthropometric and other nutrition related equipment.

The composition of nutrition dedicated cost is as follows :

Table 2 : Nutrition *dedicated direct costs* according to major cost elements over 2017 to 2021 period

Cost Item	2017	2018	2019	2020	2021	Total
Material cost (Drugs & other intervention materials)	1,678,114,266 72.73%	1,843,402,279 74.26%	2,020,143,982 75.17%	2,413,882,138 76.16%	2,209,562,843 76.17%	10,165,105,508 75.03%
Logistic cost	251,717,140 10.91%	276,510,342 11.14%	303,021,597 11.28%	362,082,321 11.42%	331,434,426 11.43%	1,524,765,826 11.25%
Programme management cost	321,526,733 13.93%	308,558,206 12.43%	310,338,607 11.55%	283,094,491 8.93%	310,657,736 10.71%	1,534,175,773 11.32%
Infrastructure (Equipment)- Capital	20,000,000 0.87%	20,000,000 0.81%	20,000,000 0.74%	81,596,000 2.57%	20,000,000 0.69%	161,596,000 1.19%
Infrastructure (Construction)- Capital	36,040,000 1.56%	34,040,000 1.37%	34,040,000 1.27%	29,040,000 0.92%	29,040,000 1.00%	162,200,000 1.20%
Total	2,307,398,139 100.00%	2,482,510,827 100.00%	2,687,544,186 100.00%	3,169,694,950 100.00%	2,900,695,005 100.00%	13,547,843,107 100.00%

The material supplies include all the drugs, food supplements and other materials used in the nutrition intervention provision. These costs which are exclusively dedicated for NNP-HSC range from 1.8 bn to 2.4 bn from 2017 to 2021. Approximately $\frac{3}{4}$ of costs are spent to purchase material supplies. Further analysis of detailed table on material costs shows that around 59% of material cost is conferred on providing “Thripasha” supplementation to pregnant mothers and underweight children. The second highest expenditure on material supply is attributed to Micronutrient supplements (Iron + folic acid + vitamin C + Calcium) for women during pregnancy and post-partum. Annexure 1 provides the complete list of material costs by type of intervention. Logistics related expenditures accounts for 11% and programme management costs also account for nearly 11 % of total nutrition dedicated direct costs. Nutrition dedicated construction costs and costs on equipment supplies related to nutrition related interventions require around 1.2 % & of total nutrition dedicated cost respectively (Table 2).

Nutrition non-dedicated direct costs accounted around 2.4 % of total cost of NNP-HSC. These included:

1. Human resource costs related to nutrition specific staff such as personnel work for Nutrition Division, Nutrition Coordination Division, MRI (Nutrition Unit), FHB (Nutrition Unit), and HEB (Nutrition Division).
2. Utility, Maintenance, transport costs of these institutions
3. Cost of consumption of fixed capital related to these institutions during the period from 2017 to 2021.

Nutrition related shared costs are comprised of **nutrition attributed cost shares** of human resources, and infrastructure (capital consumption and utilities and maintenance) incurred in PHC system (MOH offices and clinics), and in hospitals, where the management of SAM is carried out. Nutrition related shared costs are estimated between 2.4 bn to 3 bn during the 2017 to 2021 period.

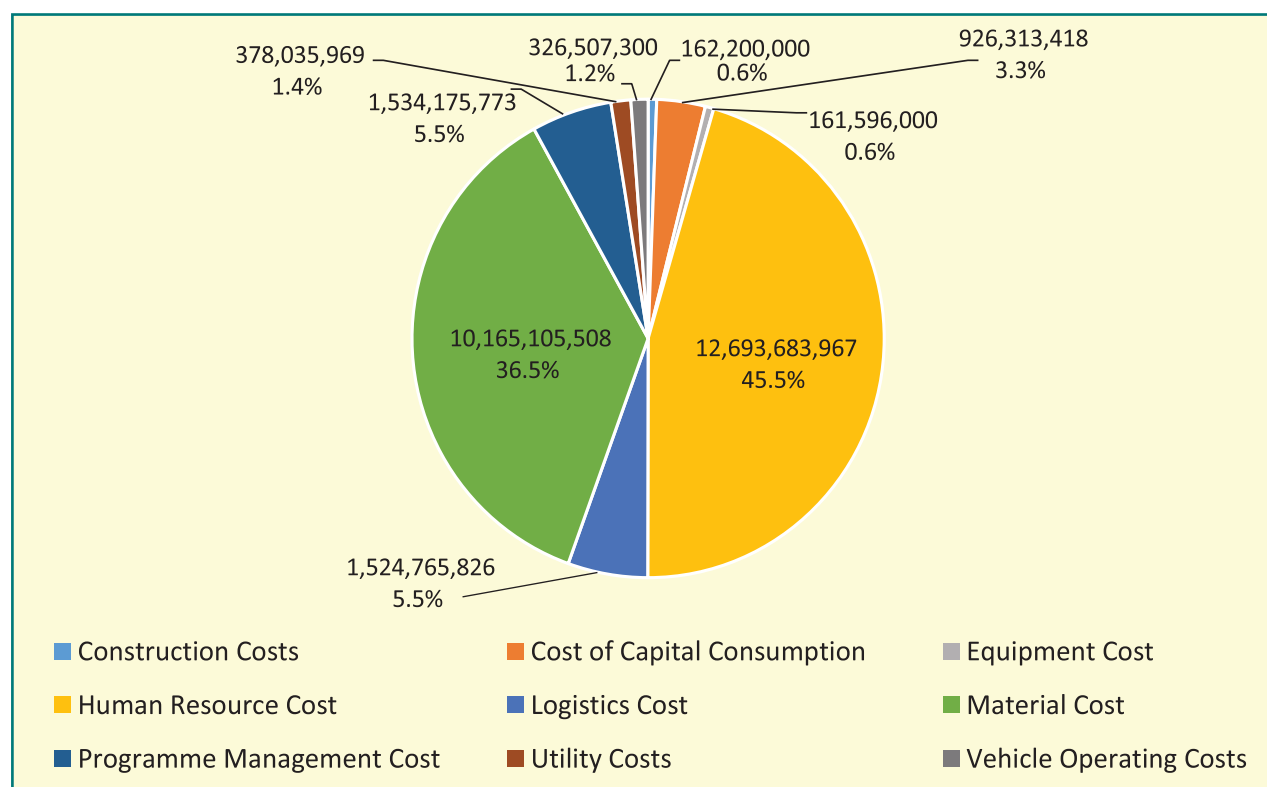
6.2 Cost by Health System Block Elements

Figure 3 presents the composition of 5 year total of the costs of NNP-HSC by various health system elements. Table 1 provides annual disaggregation of these costs.

Human resource costs accounts for the largest

proportion of the nutrition programme cost (46%). The second highest expenditure (36%) is spent on the nutrition materials and supplies. Infrastructure cost is around 7% of the total expenditure. Program costs and logistic costs are amounting to 6 % and 5 % respectively.

**Figure 3 : Distribution of total cost of the NNP-HSC for the 5 year period form 2017 to 2021
by different types of cost elements**



**Table 3 : Total costs of health sector component of the national nutrition programme
over 2017 to 2021, according to different types of cost elements.**

Cost item	2017	2018	2019	2020	2021	Total
Material Cost (Drugs & other intervention materials)	1,678,114,266 34.48%	1,843,402,279 35.55%	2,020,143,982 36.44%	2,209,562,843 37.33%	2,413,882,138 37.97%	10,165,105,508 36.47%
Human Resource Cost	2,269,128,336 46.63%	2,396,571,498 46.21%	2,531,172,458 45.66%	2,673,333,238 45.17%	2,823,478,437 44.41%	12,693,683,967 45.54%
Logistics Cost	251,717,140 5.17%	276,510,342 5.33%	303,021,597 5.47%	331,434,426 5.60%	362,082,321 5.70%	1,524,765,826 5.47%
Construction Costs	36,040,000 0.74%	34,040,000 0.66%	34,040,000 0.61%	29,040,000 0.49%	29,040,000 0.46%	162,200,000 0.58%
Utility Costs	67,579,472 1.39%	71,374,202 1.38%	75,382,011 1.36%	79,614,872 1.35%	84,085,414 1.32%	378,035,969 1.36%
Vehicle Operating Costs	58,036,982 1.19%	61,461,164 1.19%	65,087,373 1.17%	68,927,528 1.16%	72,994,252 1.15%	326,507,300 1.17%
Cost of Capital Consumption	164,324,666 3.38%	174,184,146 3.36%	184,635,195 3.33%	195,713,306 3.31%	207,456,105 3.26%	926,313,418 3.32%
Equipment Cost	20,000,000 0.41%	20,000,000 0.39%	20,000,000 0.36%	20,000,000 0.34%	81,596,000 1.28%	161,596,000 0.58%
Programme Management Cost	321,526,733 6.61%	308,558,206 5.95%	310,338,607 5.60%	310,657,736 5.25%	283,094,491 4.45%	1,534,175,773 5.50%
Total	4,866,467,594 100.00%	5,186,101,837 100.00%	5,543,821,223 100.00%	5,918,283,949 100.00%	6,357,709,158 100.00%	27,872,383,761 100.00%

Table 4 presents the disaggregation of the total cost by different types of infrastructure categories.

Table 4 : Composition of the infrastructure cost

Infrastructure item	2017	2018	2019	2020	2021	Total
Construction cost	36,040,000 10.42%	34,040,000 9.43%	34,040,000 8.98%	29,040,000 7.38%	29,040,000 6.11%	162,200,000 8.30%
Equipment cost	20,000,000 5.78%	20,000,000 5.54%	20,000,000 5.28%	20,000,000 5.09%	81,596,000 17.17%	161,596,000 8.27%
Utility cost	67,579,472 19.53%	71,374,202 19.77%	75,382,011 19.88%	79,614,872 20.24%	84,085,414 17.70%	378,035,969 19.34%
Vehicle operating cost	58,036,982 16.77%	61,461,164 17.02%	65,087,373 17.17%	68,927,528 17.53%	72,994,252 15.36%	326,507,300 16.70%
Cost of Capital Consumption	164,324,666 47.50%	174,184,146 48.24%	184,635,195 48.70%	195,713,306 49.76%	207,456,105 43.66%	926,313,418 47.39%
Total	345,981,120 100.00%	361,059,512 100.00%	379,144,579 100.00%	393,295,706 100.00%	475,171,771 100.00%	1,954,652,687 100.00%

Detailed cost estimates on these health system blocks are provided in annexures 1 to 3.

6.3 Cost by Stakeholders

The following account presents, the manner in which the total cost of the nutrition programme is shared by different stakeholders. It is important to note that the material cost and logistic costs could not be assigned to a particular stakeholder. Therefore, these costs were not shared and presented as separate elements (material costs and logistic costs) borne by the Ministry of health.

Figure 4 presents the disaggregation of the total cost of NNP-HSC from 2017 to 2021 by stakeholders.

Analysis of the distribution of total cost across different stakeholders indicated that around 47 % of it is attributed to the shared costs incurred by MOH units. The share of costs pertaining to curative sector, which is assigned to management of SAM cases is only 1.6%. Material supplies and logistics cost were not allocated to any stakeholders and they accounted for 42% of total cost. The cost incurred by all central stakeholders for their contributions to NNP HSC is around 9.8 %. Figure 4 presents the details of this distribution.

Figure 4 : Distribution of total cost of NNP-HSC over 2107 to 2021 period by stakeholders

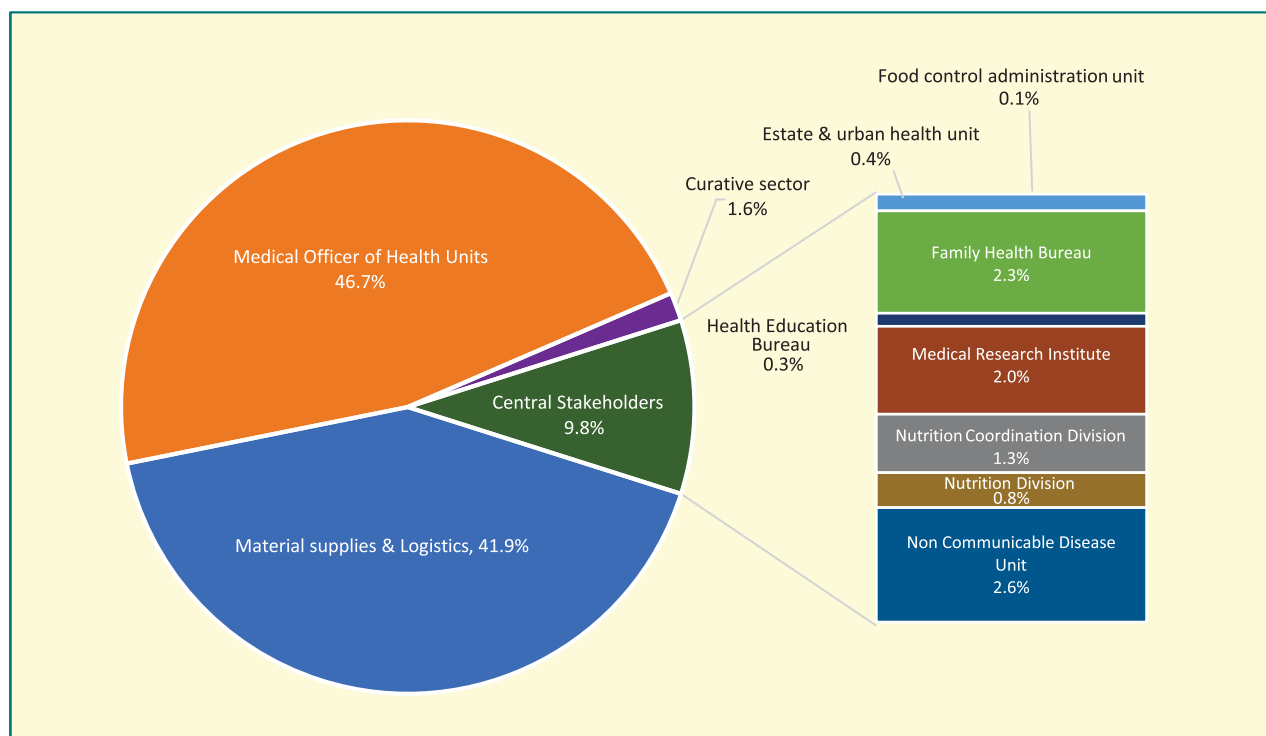


Table 5 shows the annual distribution of costs by stakeholders.

Table 5 : Cost of health sector component of the national nutrition programme by different stakeholders from 2017 to 2021

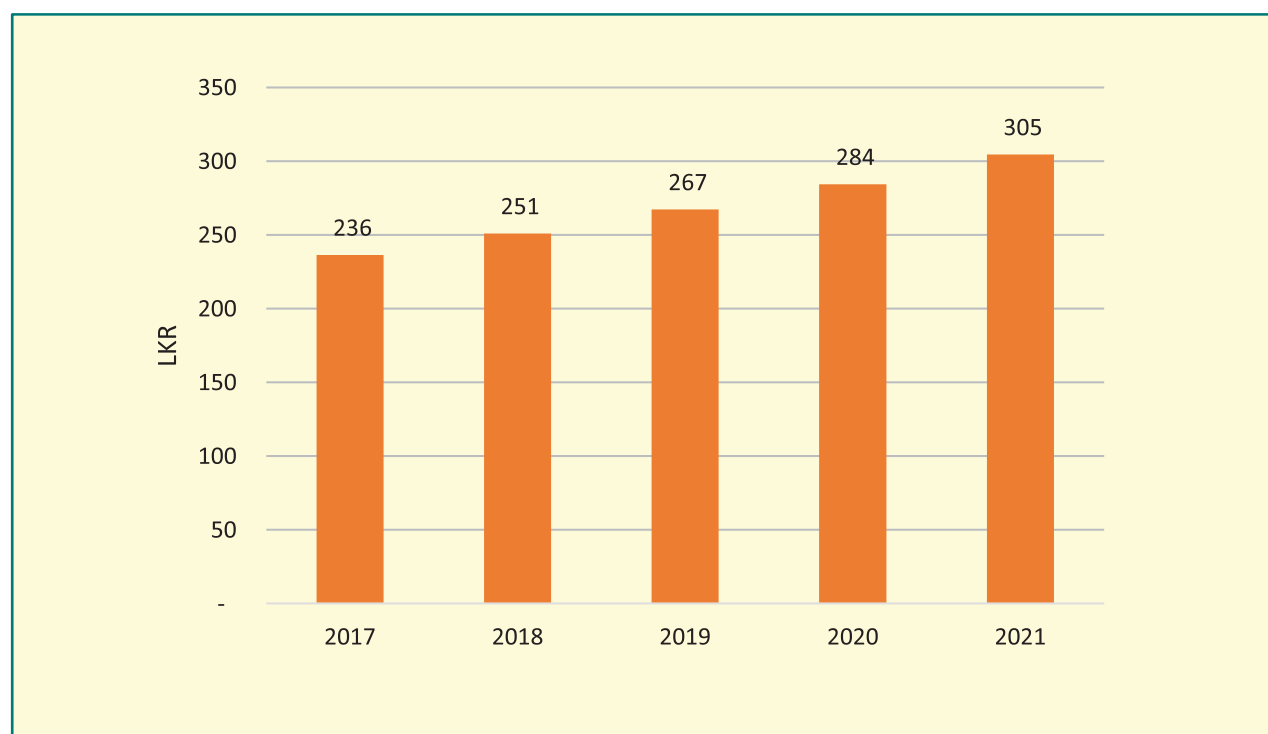
Stakeholder	2017	2018	2019	2020	2021	Total
Medical officer of Health Units	2,323,738,444 47.75%	2,454,918,602 47.34%	2,593,506,491 46.78%	2,739,920,562 46.30%	2,894,602,914 45.53%	13,006,687,012 46.67%
Hospitals	79,844,730 1.64%	84,328,180 1.63%	89,063,384 1.61%	94,064,480 1.59%	99,346,398 1.56%	446,647,173 1.60%
Nutrition Coordination Division	69,391,711 1.43%	71,664,584 1.38%	74,067,636 1.34%	76,608,327 1.29%	79,294,547 1.25%	371,026,805 1.33%
Nutrition Division	46,006,640 0.95%	43,694,452 0.84%	45,478,890 0.82%	42,365,493 0.72%	44,360,114 0.70%	221,905,589 0.80%
Family Health Bureau	112,422,554 2.31%	114,230,124 2.20%	116,143,313 2.10%	124,968,298 2.11%	181,907,613 2.86%	649,671,901 2.33%
Medical Research Institute	108,063,957 2.22%	109,715,888 2.12%	111,461,775 2.01%	113,306,963 1.91%	115,257,108 1.81%	557,805,691 2.00%
Health Education Bureau	15,602,331 0.32%	16,076,167 0.31%	16,577,035 0.30%	17,106,478 0.29%	17,666,128 0.28%	83,028,138 0.30%
Environmental and Occupational Health Unit	2,713,094 0.06%	2,749,428 0.05%	2,787,916 0.05%	2,828,687 0.05%	2,871,875 0.05%	13,951,000 0.05%
Estate & Urban Health Unit	21,076,808 0.43%	19,606,169 0.38%	20,587,829 0.37%	21,624,733 0.37%	22,719,990 0.36%	105,615,528 0.38%
Material supplies & Logistics Cost	1,929,831,406 39.66%	2,119,912,621 40.88%	2,323,165,579 41.91%	2,540,997,269 42.93%	2,775,964,459 43.66%	11,689,871,334 41.94%
Non Communicable Disease Unit	157,775,920 3.24%	149,205,622 2.88%	150,981,377 2.72%	144,492,659 2.44%	123,718,013 1.95%	726,173,591 2.61%
Total	4,866,467,594 100.0%	5,186,101,837 100.0%	5,543,821,223 100.0%	5,918,283,949 100.0%	6,357,709,158 100.0%	27,872,383,761 100.0%

6.4 Per capita cost

Per capita cost of the NNP-HSC was calculated based on the estimated population for the period extending from 2017 to 2021 and the annual estimated costs of the NNP-HSC. It showed that per

capita cost will be gradually increased from Rs. 236.00 in 2017 to Rs. 305.00 in 2021 (Figure 5).

Figure 5 : Per capita cost of the health sector component the national nutrition programme





Policy Insights & Recommendations

This study provides clear financial targets for the policy makers regarding the funds required for NNP-HSC activities during 5 year period extending from 2017- 2021. On average around Rs. 3 bn will be required for nutrition dedicated costs annually.

It was found that most planning data available in the system is not operational enough to guide costing. This lack of details also probably hinders the meaningful implementation of planned actions, especially to realize the intended coverages in the context of existing provider and system capacity. The costing was completed after developing tentative operational activity plans in concurrence with program experts. However, it is recommended that more detailed, joint operational planning activity is carried for the operational period concerned.

Food & micronutrient supplementation has been identified as the second largest cost driver of nutrition programme. It is important that the

utilization, cost effectiveness and impact of these supplementation interventions are established in scientific manner. At present this type of data are not available. Further, the material cost estimates assumed the government supplies and programme deliveries. Further studies should be conducted to find out potential duplication of material supplies by the private sector leading to a waste of resources. For example, it is common empirical knowledge that pregnant women often receive antenatal iron folate and calcium supplements from both government clinics and during private consultations of Obstetricians.

Compared to total costs of the NNP-HSC, programme management costs were found to be relatively small. It is important to assess and strengthen the programme management activities as the efficiency and effectiveness of investments are highly dependent on programme management functions.

Annexures

8.1 Annexure 1: Detailed cost of materials (drugs and supplies)

Table 6 : Detailed cost of materials (drugs and supplies) related to interventions from 2017 to 2021

Intervention	2017	2018	2019	2020	2021	Total
School and adolescent children						
Nutrition assessments & counselling among out of school adolescents	This intervention does not require materials (Drug & supplies) - Relevant costs are factored under program and health system costs					
Nutritional assessments and counselling among school children (SMI)	This intervention does not require materials (Drug & supplies) - Relevant costs are factored under program and health system costs					
Nutrition education in SMI by PHIs	This intervention does not require materials (Drug & supplies) - Relevant costs are factored under program and health system costs					
Nutrition education through school health clubs	This intervention does not require materials (Drug & supplies) - Relevant costs are factored under program and health system costs					
Intermittent iron and folic acid supplements in school girls and boys	69,699,194	79,984,828	91,001,014	102,759,279	115,277,776	458,722,091
Deworming among adolescents	13,829,205	15,870,006	18,055,757	20,388,746	22,872,575	91,016,288
Pregnant and lactating women						
Micronutrient supplements (Iron + folic acid + vitamin C) for women during pregnancy and post-partum	198,910,557	211,185,196	224,141,019	237,865,552	252,563,378	1,124,665,702
Calcium supplements for women during pregnancy	56,532,474	60,021,056	63,703,237	67,603,894	71,781,171	319,641,831
De-worming in pregnant women	2,326,439	2,470,002	2,621,532	2,782,053	2,953,958	13,153,985
Monitoring weight gain during pregnancy	This intervention does not require materials (Drug & supplies) - Relevant costs are factored under program and health system costs					
Thriposha supplementation during pregnancy	684,608,262	726,854,986	771,446,199	818,683,153	869,269,975	3,870,862,576
Vitamin A supplementation among pregnant women	9,524,442	10,112,189	10,732,554	11,389,726	12,093,503	53,852,414
Detection and management of anemia during pregnancy	3,700,817	4,089,485	4,506,268	4,953,932	5,437,967	22,688,469
Prevention and cessation of tobacco, alcohol and drug consumption in pregnancy, inclusive of exposure to passive smoke	This intervention does not require materials (Drug & supplies) - Relevant costs are factored under program and health system costs					
Reduction of indoor air pollution						
All populations						
Hand washing and hygiene interventions	This intervention does not require materials (Drug & supplies) - Relevant costs are factored under program and health system costs					
Children under 5						
Vitamin A supplementation for children between 6 months to 5 years	23,759,058	25,719,024	27,833,560	30,117,428	32,605,981	140,035,051
Thriposha for undernourished children (MAM)	359,571,208	390,727,438	423,958,324	459,509,122	497,744,913	2,131,511,004

Intervention	2017	2018	2019	2020	2021	Total
Home fortification of foods intended for children under 5 (MMN)	124,957,430	139,075,960	154,227,034	170,519,170	188,110,601	776,890,195
Integrated management of severe acute malnutrition	115,760,886	161,063,785	210,308,962	263,905,711	322,497,195	1,073,536,539
De-worming in children (HR)	9,503,641	10,327,115	11,205,424	12,145,048	13,155,639	56,336,867
Deworming children LR	5,430,652	5,901,209	6,403,099	6,940,028	7,517,508	32,192,496
Total	1,678,114,266	1,843,402,279	2,020,143,982	2,209,562,843	2,413,882,138	10,165,105,508

8.2 Annexure 2: Detailed cost of human resources

Table 7 : Detailed cost of human resources considered for nutrition programme costing from 2017 to 2021

Health service providers	2017	2018	2019	2020	2021	Total
Environmental & Occupational Health Unit: Assistant Directors- Food and drugs	551,403	582,365	615,066	649,603	686,080	3,084,517
Environmental & Occupational Health Unit: CCP	1,446,729	1,527,966	1,613,765	1,704,381	1,800,086	8,092,927
Environmental & Occupational Health Unit: Clerical Staff	197,408	208,492	220,200	232,564	245,623	1,104,287
Environmental & Occupational Health Unit: Development Officer	1,045,800	1,104,524	1,166,545	1,232,049	1,301,231	5,850,148
Environmental & Occupational Health UNIT: Director	748,459	790,486	834,874	881,754	931,266	4,186,839
Environmental & Occupational Health Unit: Drivers	652,449	689,085	727,778	768,645	811,806	3,649,762
Environmental & Occupational Health Unit: Environmental medical officers	577,998	610,454	644,732	680,935	719,171	3,233,292
Environmental & Occupational Health Unit: Food and Drug inspectors	1,589,340	1,678,584	1,772,840	1,872,389	1,977,528	8,890,681
Environmental & Occupational Health Unit: Medical Officer	1,733,619	1,830,965	1,933,777	2,042,363	2,157,046	9,697,770
Environmental & Occupational Health Unit Minor Staff	794,649	839,270	886,397	936,170	988,738	4,445,223
Environmental & Occupational Health Unit Registrars	577,998	610,454	644,732	680,935	719,171	3,233,292
Environmental & Occupational Health Unit Senior registrars	1,155,997	1,220,908	1,289,465	1,361,871	1,438,343	6,466,584
Estate & Urban Health Unit Bio Informatics Officer	577,998	610,454	644,732	680,935	719,171	3,233,292
Estate & Urban Health Unit CCP	1,446,729	1,527,966	1,613,765	1,704,381	1,800,086	8,092,927
Estate & Urban Health Unit Clerical Staff	209,160	220,905	233,309	246,410	260,246	1,170,030
Estate & Urban Health Unit Development Officer	209,160	220,905	233,309	246,410	260,246	1,170,030
Estate & Urban Health Unit Director	748,459	790,486	834,874	881,754	931,266	4,186,839
Estate & Urban Health Unit Drivers	434,966	459,390	485,186	512,430	541,204	2,433,175
Estate & Urban Health Unit Investigator - PPO	209,160	220,905	233,309	246,410	260,246	1,170,030
Estate & Urban Health Unit Medical Officer	577,998	610,454	644,732	680,935	719,171	3,233,292
Estate & Urban Health Unit Minor Staff	476,789	503,562	531,838	561,702	593,243	2,667,134

Health service providers	2017	2018	2019	2020	2021	Total
Family Health Bureau CCP	2,192,014	2,315,100	2,445,098	2,582,395	2,727,402	12,262,010
Family Health Bureau DA	633,818	669,408	706,997	746,696	788,625	3,545,544
Family Health Bureau Laborer	481,605	508,649	537,210	567,376	599,235	2,694,075
Family Health Bureau MIS staff	4,492,844	4,757,921	5,038,639	5,335,918	5,650,737	25,276,059
Family Health Bureau MO	3,503,020	3,699,722	3,907,469	4,126,882	4,358,615	19,595,707
Health Education Bureau CCP	2,192,014	2,315,100	2,445,098	2,582,395	2,727,402	12,262,010
Health Education Bureau DA	633,818	669,408	706,997	746,696	788,625	3,545,544
Health Education Bureau MO	3,503,020	3,699,722	3,907,469	4,126,882	4,358,615	19,595,707
Hospitals MO- PEDIATRICS	30,126,189	31,817,838	33,604,477	35,491,439	37,484,357	168,524,300
MOH	307,827,877	325,113,059	343,368,840	362,649,721	383,013,264	1,721,972,761
MOH DRIVERS	68,704,807	72,562,726	76,637,275	80,940,619	85,485,605	384,331,031
MOH LABOURERS	82,354,516	86,978,895	91,862,943	97,021,240	102,469,187	460,686,781
MOH PHI	198,616,378	209,769,105	221,548,081	233,988,471	247,127,415	1,111,049,449
MOH PHM	1,173,068,095	1,238,938,332	1,308,507,321	1,381,982,755	1,459,583,989	6,562,080,493
MOH PHNS	63,856,967	67,442,670	71,229,717	75,229,415	79,453,705	357,212,474
MOH PPA/DA	54,191,439	57,234,402	60,448,234	63,842,529	67,427,421	303,144,024
MOH SPHI	35,954,736	37,973,670	40,105,971	42,358,006	44,736,497	201,128,880
MOH SPHM	78,079,556	82,463,887	87,094,407	91,984,941	97,150,089	436,772,879
MRI CCP	2,192,014	2,315,100	2,445,098	2,582,395	2,727,402	12,262,010
MRI Chemist	793,572	838,132	885,195	934,901	987,397	4,439,197
MRI DA	1,901,454	2,008,225	2,120,991	2,240,089	2,365,874	10,636,632
MRI Laborers	1,926,421	2,034,594	2,148,841	2,269,503	2,396,940	10,776,299
MRI MLT	1,647,977	1,740,515	1,838,248	1,941,470	2,050,488	9,218,698
MRI MO	5,254,530	5,549,583	5,861,204	6,190,322	6,537,922	29,393,561
MRI Nutrition Assistant	793,572	838,132	885,195	934,901	987,397	4,439,197
MRI Nutritionist	1,646,317	1,738,761	1,836,396	1,939,514	2,048,422	9,209,411
MRI PHI	6,687,420	7,062,933	7,459,531	7,878,399	8,320,788	37,409,071
MRI Research Officer	701,712	741,114	782,729	826,681	873,101	3,925,338
Nutrition coordination division Assistant directors	4,009,998	4,235,168	4,472,982	4,724,149	4,989,420	22,431,717
Nutrition coordination division CCP	2,192,014	2,315,100	2,445,098	2,582,395	2,727,402	12,262,010
Nutrition coordination division Development Assistants (DA)	1,901,454	2,008,225	2,120,991	2,240,089	2,365,874	10,636,632
Nutrition coordination division Development officers (DO)	1,267,636	1,338,816	1,413,994	1,493,392	1,577,250	7,091,088
Nutrition coordination division Information & communication technical assistant	793,572	838,132	885,195	934,901	987,397	4,439,197
Nutrition coordination division MO	7,006,040	7,399,444	7,814,938	8,253,763	8,717,229	39,191,414
Nutrition coordination division: Public Management Assistants	1,267,636	1,338,816	1,413,994	1,493,392	1,577,250	7,091,088
Nutrition coordination division SR (com med)	1,751,510	1,849,861	1,953,735	2,063,441	2,179,307	9,797,854
Nutrition coordination division Dep. Director (planning service) , Medical service	1,076,679	1,137,137	1,200,990	1,268,428	1,339,653	6,022,888
Nutrition coordination division Director	2,268,057	2,395,413	2,529,921	2,671,981	2,822,018	12,687,391
Nutrition coordination division Drivers	2,540,342	2,682,987	2,833,642	2,992,757	3,160,807	14,210,535

Health service providers	2017	2018	2019	2020	2021	Total
Nutrition coordination division Laborers	1,444,816	1,525,946	1,611,631	1,702,127	1,797,705	8,082,224
Nutrition coordination division Nutritionist	730,020	773,821	820,250	869,466	921,633	4,115,191
Nutrition Division CCPs	4,384,028	4,630,201	4,890,196	5,164,791	5,454,805	24,524,021
Nutrition Division Deputy Director	1,076,679	1,137,137	1,200,990	1,268,428	1,339,653	6,022,888
Nutrition Division Development Officer/Assistants	3,169,090	3,347,041	3,534,984	3,733,481	3,943,124	17,727,721
Nutrition Division Director	2,268,057	2,395,413	2,529,921	2,671,981	2,822,018	12,687,391
Nutrition Division Drivers	1,270,171	1,341,494	1,416,821	1,496,379	1,580,403	7,105,268
Nutrition Division Laborers	963,211	1,017,297	1,074,420	1,134,751	1,198,470	5,388,149
Nutrition Division Medical Officers	7,006,040	7,399,444	7,814,938	8,253,763	8,717,229	39,191,414
Nutrition Division Nutritionist	2,920,080	3,095,285	3,281,002	3,477,862	3,686,534	16,460,762
Nutrition Division PPA	633,818	669,408	706,997	746,696	788,625	3,545,544
Nin-Communicable Disease Director	567,014.27	598,853.31	632,480.18	667,995.27	705,504.61	3,171,848
Nin-Communicable Disease_dep Director	567,014	598,853	632,480	667,995	705,505	3,171,848
Nin-Communicable Disease CCP	1,644,011	1,736,325	1,833,824	1,936,797	2,045,552	9,196,508
Nin-Communicable Disease SR	437,877	462,465	488,434	515,860	544,827	2,449,463
Nin-Communicable Disease_Reg_MO	12,260,570	12,949,027	13,676,142	14,444,086	15,255,151	68,584,975
Nin-Communicable Disease_DA/PPA	1,109,181	1,171,464	1,237,245	1,306,718	1,380,093	6,204,702
Nin-Communicable Disease_laborer	963,211	1,017,297	1,074,420	1,134,751	1,198,470	5,388,149
Hospital Nurses	30,867,192	32,600,450	34,431,034	36,364,409	38,406,347	172,669,431
Pediatricians	18,851,349	19,909,891	21,027,874	22,208,633	23,455,694	105,453,441
Total	2,256,686,907	2,383,417,411	2,517,264,854	2,658,628,912	2,807,931,704	12,623,929,789

(EOH= Environmental & Occupational Health Unit; EUH= Estate & Urban Health Unit; FHB = Family Health Bureau; HEB = Health Education Bureau; MRI= Medical Research Institute; MOH= Medical Officer of Health Area; NCD = Nutrition Coordination Division; ND = Nutrition Division)

8.3 Annexure 3: Detailed cost of infrastructure items

Table 8 : Detailed cost of infrastructure items considered for nutrition programme costing from 2017 to 2021

Items	2017	2018	2019	2020	2021	Total
Constructions						
Nutrition clinics	5,000,000	5,000,000	5,000,000			15,000,000
Lactation management centers	29,040,000	29,040,000	29,040,000	29,040,000	29,040,000	145,200,000
Renovation of nutrition division	2,000,000					2,000,000
Equipment						
Anthropometric equipment	20,000,000	20,000,000	20,000,000	20,000,000	20,000,000	100,000,000
Hemcure sets					61,596,000	61,596,000
Vehicle management						
Fuel (Central institutions)	2,178,514	2,307,047	2,443,162	2,587,309	2,739,960	14,313,135
Fuel (MOH)	31,043,829	32,875,415	34,815,064	36,869,153	39,044,433	174,647,894
Maintenance (Central institutions)	2,178,514	2,307,047	2,443,162	2,587,309	2,739,960	12,255,992
Maintenance cost (MOH)	22,636,125	23,971,656	25,385,984	26,883,757	28,469,899	127,347,421
Utility cost						
ND						
	314,311	331,960	350,600	370,287	391,080	1,758,238
NCD	358,669	378,809	400,080	422,546	446,272	2,006,376
FHB	191,375	202,121	213,470	225,457	238,117	1,070,540
FHB MIS	95,688	101,061	106,735	112,729	119,059	535,270
MRI	339,798	358,878	379,030	400,313	422,792	1,900,811
HEB	143,214	151,256	159,749	168,720	178,194	801,133
MOH	65,900,951	69,601,427	73,509,694	77,637,417	81,996,921	368,646,410
EOH	117,524	124,124	131,093	138,455	146,229	657,425
EUH	58,971	62,283	65,780	69,474	73,375	329,883

Items	2017	2018	2019	2020	2021	Total
Capital consumption						
ND	4,048,812	4,291,741	4,549,246	4,822,200	5,111,532	22,823,532
NCD	8,204,401	8,696,665	9,218,465	9,771,573	10,357,867	46,248,971
FHB	1,840,265	1,950,681	2,067,722	2,191,785	2,323,292	10,373,744
MRI	2,062,139	2,185,867	2,317,019	2,456,040	2,603,403	11,624,467
HEB	5,179,170	5,489,921	5,819,316	6,168,475	6,538,583	29,195,465
MOH	139,309,937	147,668,533	156,528,645	165,920,364	175,875,586	785,303,066
EOH	2,193,231	2,324,825	2,464,315	2,612,173	2,768,904	12,363,448
EUH	495,570	525,304	556,823	590,232	625,646	2,793,575
Total	345,426,579	360,471,924	378,521,976	392,636,000	474,472,750	1,951,529,229

8.4 Annexure 4: One Health Tool and costing approaches

OHT is primarily organized in to 3 main modules (Figure 1): a) Health services module b) Health systems modules, c) Impact modules(4,7,8).

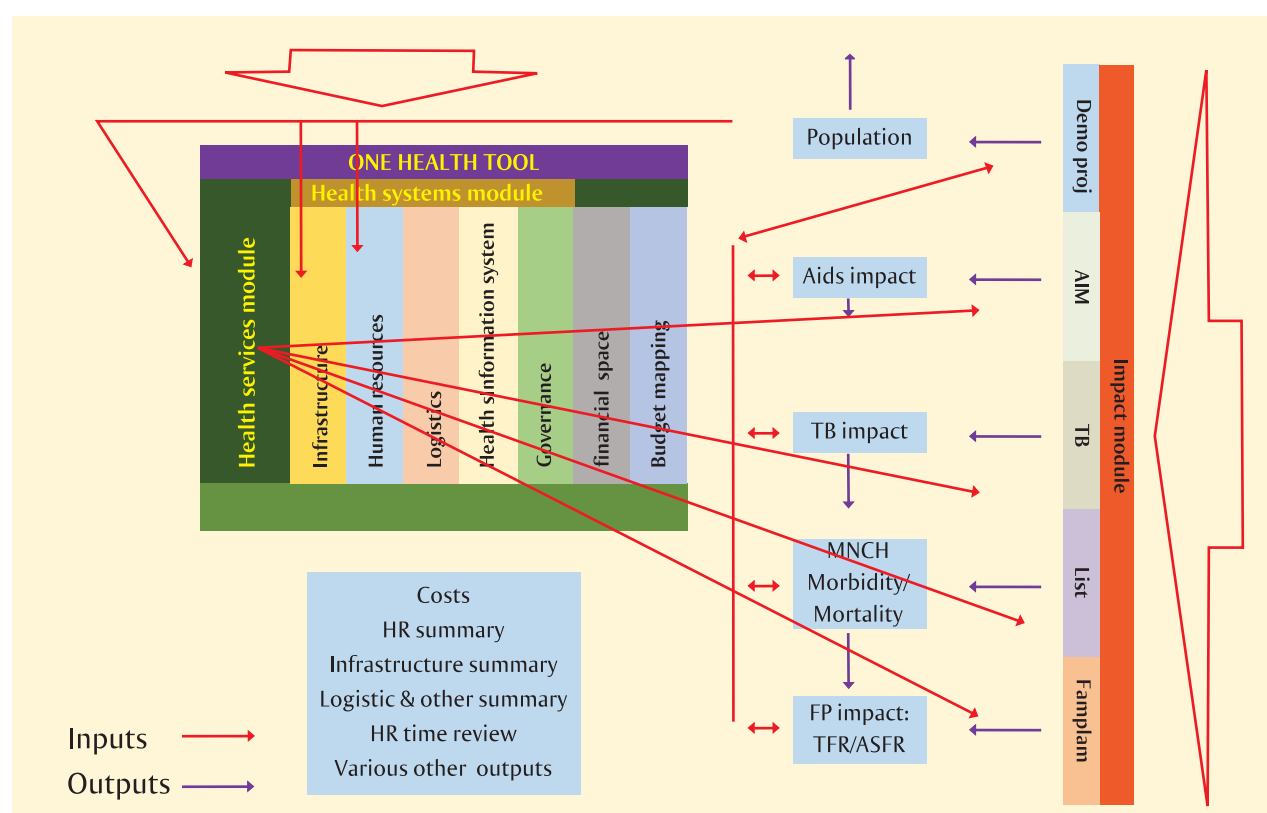
Health Service Module: The health services module is programed to estimate the cost of items that varies by the number of intervention recipients. These items include drugs, commodities and other supplies such as nutrient supplements and medical investigations. The tool utilizes user defined inputs such as type of interventions, target populations that interventions focus, populations in need of interventions (i.e. proportions of target populations that actually eligible for interventions), percentage coverage of intervention and the delivery channel.

In addition, various treatment inputs (Drugs, injection supplies, blood or urine tests etc...) related to interventions that are provided by different types of health staff have to be specified to the tool. The unit costs of these items also have to be indicated.

Figure 6 Schematic representation of OneHealth Tool organization

The tool estimates the size of the target population to be used in the costing using DemProj software integrated in to OHT.

Figure 6 : Schematic representation of OneHealth Tool organization



The number of target recipients (cases) for each intervention in a particular delivery channel at a given year, who actually receive an intervention, is calculated by serial multiplications of the respective target population, percent of population who requires the intervention, intervention coverage and the percentage of interventions delivered by a particular delivery channel.

Then, the number of target population will be multiplied by an average cost of providing treatment inputs (drugs, supplies, and investigations) specified for each intervention. This will result in the total material cost of providing a particular intervention in a given delivery channel, at a given year.

Health systems module: Health systems module consists of several other sub modules. They include Infrastructure module, human resource module, logistic module, health information systems module and governance module.

Infrastructure module: Infrastructure module estimates the cost incurred on buildings

(construction, rehabilitation/maintenance, and utility costs). It also estimates the cost involved in vehicle purchase, maintenance and operational costs and cost for ICT equipment. The user has to specify the baseline number of institutions, and baseline parameters used for assessing the cost (average construction, maintenance, utility costs) of infrastructure components as well as targets for infrastructure developments. Infrastructure development targets could be based on existing plans or population norms. This study targets were based on existing plans.

Human resource module: Human resource module calculates the cost of paying emoluments to health staff, cost of their basic training and cost of providing retention incentives, if any. Context specific human resource types have to be specified by the user and staff baseline and their distribution by various levels of care, annual salary and incentives and increment patterns and numbers and unit cost of different types of staff who are enrolled for pre service training have to be identified. The human resource development targets can be specified, either according to the existing plans or based on population norms. This

study chose the existing plans to set the human resource targets. As many types of staff involved in newborn and child care activities are also contribute to the care of older population the baseline salaries and other payments has to be adjusted to reflect their actual contribution to the newborn and child care. These proxies are explained below.

Logistic Module: Logistic module estimates the expenditure incurred on the logistic activities related to a health programme. The module estimates the cost of warehouses (construction, maintenance and utilities), cost of transport (vehicle purchase, maintenance and operational cost, third party contracts) cost of paying warehouse workers (e.g. Managers, store keepers, clerks, drivers, manual laborers etc...). In addition, this module assesses the cost incurred on the material items that are usually not based on the target recipients. For example, items given to health staff, (e.g. uniforms, midwife kits, bicycles etc...) could be cost in this section. As in the case of infrastructure and human resource modules baseline levels and future targets of each element and unit cost have to be pre specified by the user.

Health information system module: Health information system (HIS) module is designed to estimate the cost of maintaining the management information system related to a health programme. In this module the cost of personnel involved in MIS, printing cost of hard formats, cost of ICT equipment's and software development and application can be estimated. The MIS related management functions such as training, supervision, review and updating of the MIS etc... are also be considered in the His module.

Governance module: Governance module is used

to estimate the cost of activities related to optimizing strategic vision and ethics, responsiveness, participation and consensus, legal reforms and maintaining the transparency and accountability of a health programme. However, in the NCHDSP only a very limited activities related to these items were focused. Hence they were considered as programme management functions and accordingly included as components of the programme management costing module.

Programme management costing modules: Programme management/cost modules of OHT are used to cost the programme management activities such as advocacy, awareness building, in-service training, development of guidelines, supervision, health system development exercises, monitoring and evaluation and research. Separate programme management modules are linked to all modules of the OHT. (E.g. programme cost sub module in the health services, programme management sub modules of the infrastructure, human resource, logistic and HIS modules, administration sub module of the governance modules).

The user has to identify and specify the relevant programme activities along with their unit costs. These modules can also be used to calculate the cost of programme specific human resources such as project consultants who may not be permanent employees of the health system.

OHT is originally developed for costing entire health systems at national level. However, it can be adapted to cost sub programmes or costing sub national levels programmes provided careful context specific adjustments are made to costing parameters so that generic costing calculations could be used to achieve the cost objectives related to specific programme contexts.

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