

Estimating District Level Costs for Nutrition-Specific Interventions in Karnataka

Public Expenditure Analysis Series 7 of 8

Policy Brief based on this study is also available

2020

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Research and Writing by the following members of Centre for
Budget and Policy Studies (CBPS), Bangalore:
Gayathri Raghuraman, Madhusudhan Rao B.V., Jyotsna Jha, Sowmya J., Vivek P Nair and Rajesh C.S.

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Abbreviations

ANMs	Auxiliary Nurses and Midwives
ASHA	Accredited Social Health Activists
AWC	Anganwadi Centre
AWW	Anganwadi Worker
BMI	Body Mass Index
CAS	Common Application Software
CBPS	Centre for Budget and Policy Studies
CNNS	Comprehensive National Nutrition Survey
DNI	Direct Nutrition Interventions
GDP	Gross Domestic Product
GIA	Grant In Aid
GSDP	Gross State Domestic Product
HCM	Hot Cooked Meals
ICDS	Integrated Child Development Services
IDCF	Intensified Diarrhoea Control Fortnight
IFA	Iron and Folic Acid
IFPRI	International Food Policy Research Institute
IIMB	Indian Institute of Management Bangalore
MDM	Mid-Day Meal Scheme
MMR	Maternal Mortality Rate
MSPTC	Mahila Supplementary Nutrition Production & Training Centres
NFHS	National Family Health Survey
NHM	National Health Mission
NNM	National Nutrition Mission
NRC	Nutrition Rehabilitation Centre
OBC	Other Backward Classes
ORS	Oral Rehydration Solution
P&L	Pregnant and Lactating
PDS	Public Distribution System
PIP	Programme Implementation Plan
PMMVY	Pradhan Mantri Mathru Vandana Yojana
POSHAN	Prime Minister's Overarching Scheme for Holistic Nutrition
SAG	Scheme for Adolescent Girls
SAM	Severe Acute Malnutrition
SC	Scheduled Caste
SDGs	Sustainable Development Goals
SNP	Supplementary Nutrition Programme
ST	Scheduled Tribe
SUN	Scaling Up Nutrition
THR	Take Home Ration
UNDP	United Nations Development Program
UNICEF	United Nations International Children's Education Fund
VNV	Village Nutrition Volunteers
WCD	Women and Child Development
WIFS	Weekly Iron and Folic Acids Supplementation Programme

Chapter 1: Introduction

The burden of malnutrition is ‘unacceptably high and progress unacceptably slow’ according to the recent global nutrition report. The report notes that of all the children under 5 years of age across the world, 150.8 million are stunted, 50.5 million are wasted, and 38.3 million are overweight. It also points out the criticality of malnutrition, which is responsible for 45% of deaths among children under 5 years of age (mostly in low- and middle-income countries) and 4 million deaths and 120 million healthy years of life lost due to overweight and obesity across the globe (Global Nutrition Report, 2018). India has continuously fared poorly in nutritional indicators and bears one of the largest malnutrition burdens across the globe. According to the Global Nutrition Report of 2020, 34.7% of India’s children under 5 are affected by stunting, while more than 50% of women aged 15 to 49 years suffer from anaemia¹.

Stunting (low height-for-age) is the leading population measure of chronic under nutrition (UNICEF, 2017) and has been included as a key indicator under the Sustainable Development Goals (SDGs) (Target 2.2). Childhood undernutrition has been linked to shorter adult height, less schooling, reduced economic productivity and for women lower offspring birthweight (Victora et al., 2008). Therefore, malnutrition exists in an intergenerational cycle, and malnourished mothers are more than twice as likely to have stunted children as well-nourished mothers. Stunting and underweight in childhood also negatively affects productivity, occupational status and wages (McGovern et al., 2017). In addition to stunting, wasting and being under-weight, micronutrient deficiencies affect nearly 2 billion people worldwide (IFPRI 2017). Deficiencies of iodine, iron, vitamin A, zinc, and folic acid are those most identified in populations and have significant impacts on health and human capital.

In April 2016, the United Nations (UN) General Assembly proclaimed the UN Decade of Action on Nutrition (2016–2025) to intensify action to end hunger, eradicate malnutrition worldwide, and ensure universal access to healthier and more sustainable living. In this scenario, Karnataka has led the way in fighting undernutrition through a slew of nutrition related programmes. Let us see Karnataka’s profile.

¹ <https://globalnutritionreport.org/resources/nutrition-profiles/asia/southern-asia/india/>

1.1. Karnataka State Profile

Figure 1. 1: Karnataka District Map Showing Its Four Revenue Divisions²



Source: <https://karnataka.pscnotes.com/karnataka-polity/administrative-system-of-karnataka/>. Accessed on 20 November 2020

Karnataka is one of the economically progressive states in the country; in 2019-20, the state's Gross State Domestic Product (GSDP) share in India's Gross Domestic Product (GDP) was 8.3%³. It has 30 districts and is divided into 4 revenue divisions, namely Bengaluru (or Bangalore) and Mysuru Divisions in the southern part of the state and Belagavi (or Belgaum) and Kalaburagi (or Gulbarga) Divisions in the northern part of the state (Figure 1.1). However, this growth has not translated equally to all districts. When ranked by per capita income, Bengaluru Urban district had the highest at Rs 4,48,485 in 2017-18, while Kalaburagi was at Rs 92,098 for all the districts in the Kalaburagi Division (Ballari, Bidar, Kalaburagi, Koppal, Raichur and Yadgir). It is also observed that exclusion of Bengaluru Urban district from the regional divisions drastically reduced the inter-district variations in district income⁴. In terms of demography, Bengaluru urban is also its most populous district; 17% of

² <https://karnataka.pscnotes.com/karnataka-polity/administrative-system-of-karnataka/>. Accessed on 20 November 2020.

³ Economic Survey Karnataka. <http://nammakpsc.com/wp/wp-content/uploads/2020/03/Economic-Survey-2019-2020-NammaKPSC.pdf>. Accessed on 20 November 2020.

the population is Scheduled Caste (SC) and 6.95% of the population is identified as Scheduled Tribe (ST)⁴. The Table 1.1 below shows that 33.48% of the population of the state are estimated to be children aged 0–18 years.

Table 1. 1: Population Proportion of children aged 0–18 years in Karnataka in 2011 and 2018

Year	2011			2018		
Age Group	Child population	Proportion of child population	Proportion in total population	Child population	Proportion in child population	Proportion in total population
0–5 years	6,134,041	10.04%	29.59%	6,137,762	9.94%	29.67%
6–10 years	5,378,238	8.80%	25.94%	5,339,056	8.64%	25.81%
11–14 years	4,512,595	7.39%	21.77%	4,496,261	7.28%	21.74%
14 years and above	4,704,687	7.70%	22.70%	4,711,357	7.63%	22.78%
Total Child Population	20,729,561		33.93%	20,684,436		33.48%
Total Population	61,095,297			61,765,592		

Source: Census 2011 was used for estimation by Centre for Budget and Policy Studies (CBPS)

1.2. Child Nutrition in Karnataka

As per the recent National Family Health Survey-5 (NFHS-5), Maternal and Child Health Indicators (MCHI) have improved in Karnataka. Infant mortality has dropped from 43 in 2005-06 per 1000 live births to 26.9 in 2015-16 and 25.4 in 2019-20. Similarly, the Under 5 Mortality Rate (U5MR) has also decreased appreciably from 55 to 29.5 per 1000 live births during the same period. The percentage of births in a health facility has increased dramatically in the last fifteen years from 65% in 2005 to 97% in 2019-20. There has also been an appreciable increase in the number of children in the age group of 12-23 months who have been fully immunized from 62.6% to 84.1%. The maternal mortality ratio (MMR), however, is still relatively worse and Karnataka's MMR of 97 per 100,000 live births is the highest among the South Indian states in 2016-18⁵.

⁴ Census 2011. <http://censuskarnataka.gov.in/data%20high%20lights-karnataka-pca-2011.pdf>.

⁵ Special Bulletin on Maternal Mortality in India 2016-18, SRS, Office of Registrar General, India. https://censusindia.gov.in/vital_statistics/SRS_Bulletins/MMR%20Bulletin%202016-18.pdf.

The same cannot be said about nutrition indicators in the state (Table 1.2). The NFHS-4 survey figures showed that most nutrition indicators in Karnataka had improved, for example, the percentage of children under five years of age who are stunted had decreased from 43.7% in 2005 to 36.2% 2015-16 and finally to 35.4% in 2019-20. However, the percentage of children under five years of age who are wasted increased from 17.6% to 26.1% in the same period. This situation is reversing itself with improvements in wasting numbers seen at 19.5% in 2019-20. However, the number of pregnant women with anaemia, which saw significant reduction between NFHS-3 and NFHS-4 remained stagnant at 45% in 2019-20. This is also true for anaemia in under five children, whose number has increased from 60.9% in 2015-16 to 65% in 2019-20. The percentage of newborn breast-fed within an hour of birth needs focus as this number has declined since 2015-16 to just below 50% in 2019-20.

Table 1. 2: Nutrition Indicators by State in 2015-16 and 2019-20 (for Karnataka)

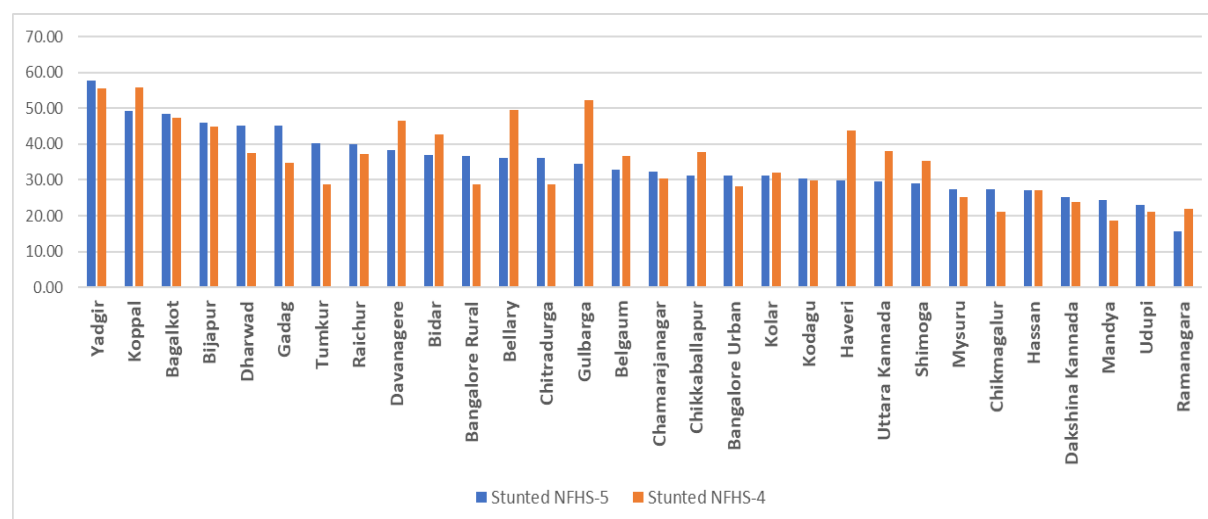
Indicators	Karnataka NFHS-3	Karnataka NFHS-4	Karnataka NFHS-5	Kerala	Tamil Nadu	Mahara shtra	India
	2005-06	2015-16	2019-20	NFHS-4 – 2015-16			
Under 5 Stunted (%)	43.7	36.2	35.4	19.7	27.1	34.4	38.4
Under 5 Wasted (%)	17.6	26.1	19.5	15.7	19.7	25.6	21.0
Under 5 Severely Wasted (%)	5.9	10.5	8.4	6.5	7.9	9.4	7.5
Under 5 Underweight (%)	37.6	35.2	32.9	16.1	23.8	36.0	35.8
Infant Mortality Rate	43	26.9	25.4	6	20	24	41
Under 5 Mortality Rate	55	31	29.5	7	27	29	50
Maternal Mortality Ratio (MMR)*	213	108	97	46	66	61	130
Children under age 3 years breastfed within one hour of birth (%)	35.6	56.3	49.1	64.3	54.7	57.5	41.6
Children under age 6 months exclusively breastfed (%)	58.6	54.2	61	53.3	48.3	56.6	54.9
Women – Low Body Mass Index (BMI) (%)	35.4	20.7	17.2	9.7	14.6	23.5	22.9
Under 5 Anaemia (%)	70.3	60.9	65.5	35.7	50.7	53.8	58.6
Pregnant Women – Anaemia (%)	60.4	45.4	45.7	22.6	44.4	49.3	50.4

Source: National Family Health Survey-4 (NFHS-4) and NFHS-5 State Factsheets, *MMR – <https://niti.gov.in/content/maternal-mortality-ratio-mmr-100000-live-births>

Although stunting appears to be on the decline, the district-wise figures show a different picture (Figure 1.2a). The number of children who are stunted has, in fact, increased in 16 districts and this is not restricted to northern Karnataka alone; southern districts like Bengaluru Urban, Dakshina Kannada, Mandya, and Mysuru have also shown an increase in stunting numbers. Within Karnataka, Yadgir still remains the worst affected with more than 57% of its children under five suffering from stunting. This number actually increased from 55% in 2015-16. Wasting, however, shows a more promising trend with its numbers improving in 25 districts. Only five districts, i.e., Dakshina Kannada, Chikkamagaluru, Shivamogga, Uttara Kannada, and Kodagu, showed an increase. These numbers are surprising as all these districts previously were better placed (Figure 1.2b).

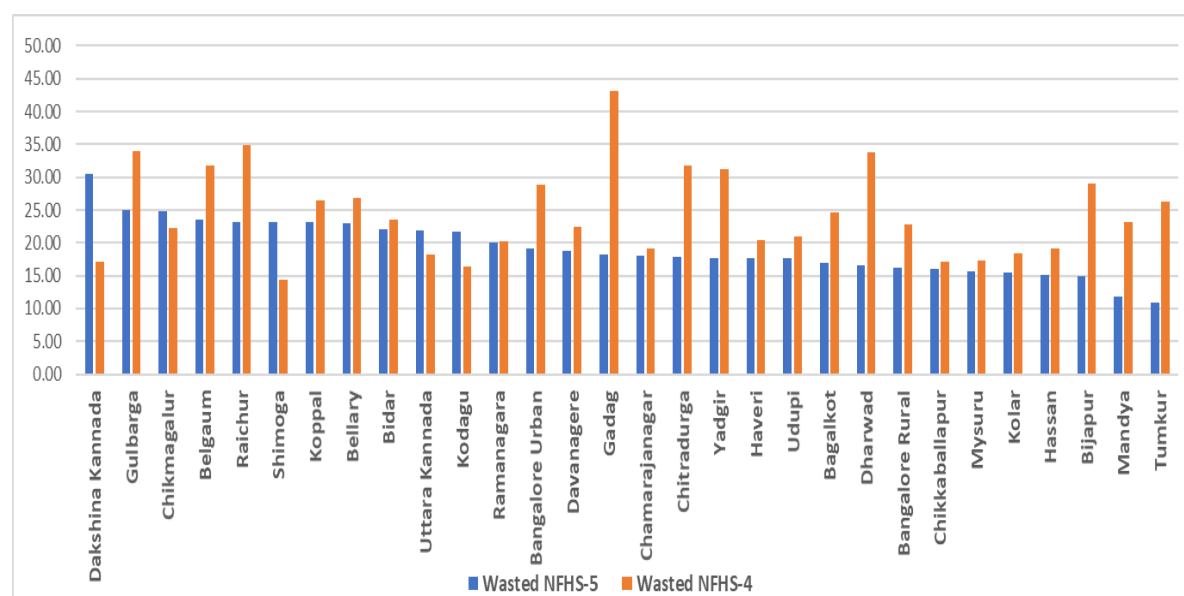
Another disturbing trend seen in the state figures as well as the districts is the number of women within the reproductive age group having anaemia (Figure 1.2c). This number has increased in 19 districts, with an average of 44.8% in 2015-16 to 47.8% in 2019-20. More alarming is the anaemia in children under five years of age, which has increased from 60.9% to 65.5% in the same period (Table 1.2). A higher increase in anaemia numbers is seen in the northern districts, with the highest in Raichur at 60%.

Figure 1. 2a: Percentage of Under-five Stunted children by district in Karnataka (NFHS-4 in 2015-16) and NFHS-5 in 2019-20)



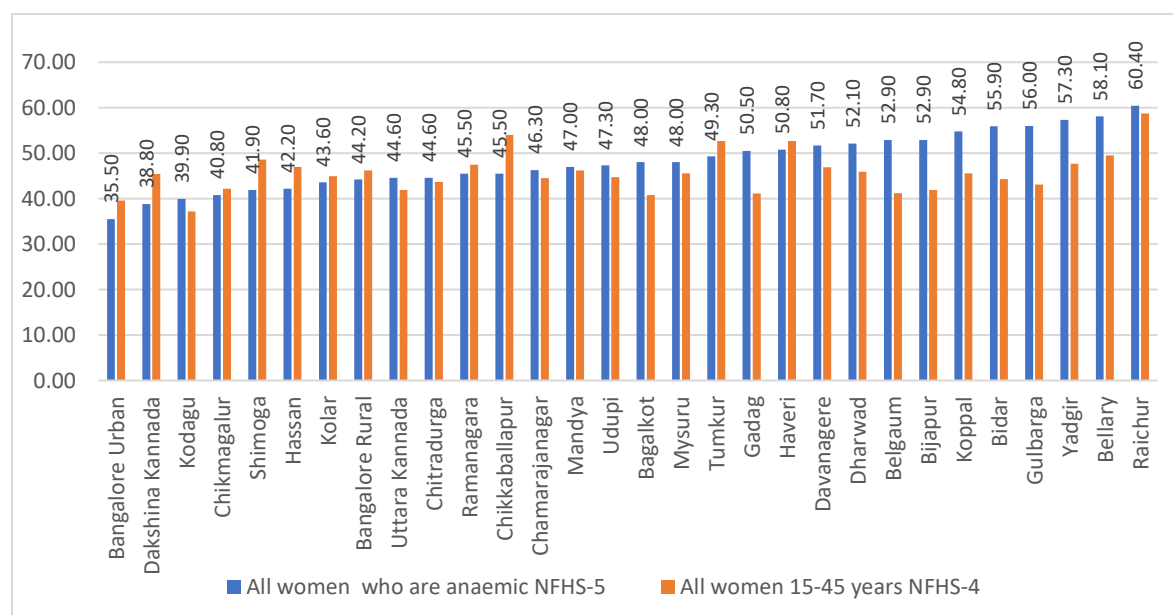
Source: National Family Health Survey-4 (NFHS-4) (2015-16) and NFHS-5 (2019-20) district wise report.

Figure 1. 3b: Percentage of Under-five Wasted children by district in Karnataka (NFHS-4 in 2015-16 and NFHS-5 in 2019-20)



Source: National Family Health Survey-4 (NFHS-4) (2015-16) and NFHS-5 (2019-20) district wise report.

Figure 1. 4c: Percentage of all women aged 15-49 years who are anaemic by district in Karnataka (NFHS-4 in 2015-16 and NFHS-5 in 2019-20)



Source: National Family Health Survey-4 (NFHS-4) (2015-16) and NFHS-5 (2019-20) district wise report.

1.3. Karnataka Nutrition Index

In order to compare the districts according to nutritional status of children under five years of age, a composite index comprising of three indicators has been

constructed to show the nutrition status of the different districts of Karnataka. The indicators selected are standard indicators of a child's nutrition status. The indicators included are as follows: children under five years of age who are stunted (height-for-age), children under five years of age who are wasted (weight-for-height), and all women age 15-49 years who are anaemic. All women aged 15-49 years were chosen due to lack of district level data on pregnant women with anaemia within the NFHS.

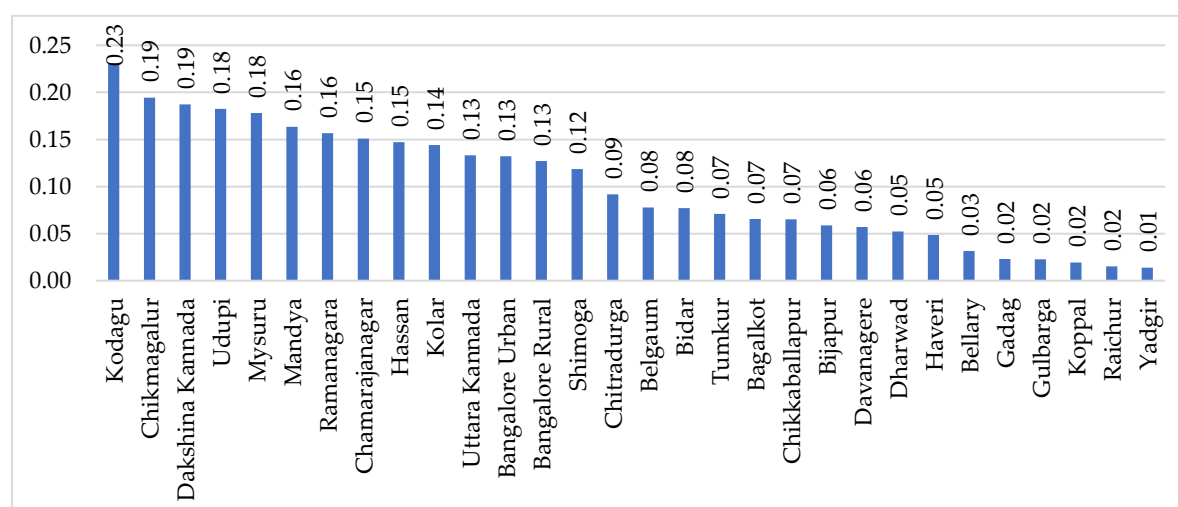
Table 1. 3: Sources and Year of Data Considered for Construction of Nutrition Index

Sl. No	Key indicators	Indicators	Year	Source
1	Nutritional status of children	Children under 5 years of age who are stunted (%)	2015-16 and 2019-20	NFHS-4, 5
2	Nutritional status of children	Children under 5 years of age who are wasted (%)	2015-16 and 2019-20	NFHS-4, 5
3	Anaemia among Adults	All women aged 15-49 years who are anaemic (%)	2015-16 and 2019-20	NFHS-4, 5

Note: NFHS stands for National Family and Health Survey.

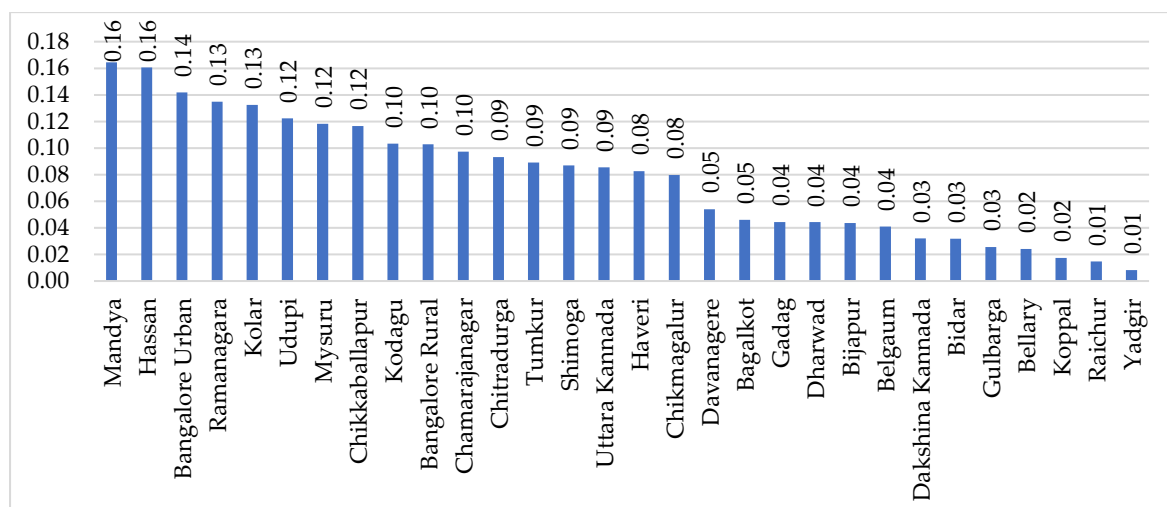
The index value is constructed to rank all these districts. For the sake of comparison, two indices were calculated based on NFHS-4 and NFHS-5. On comparing the two graphs we see that the indices for the districts have remained similar, especially the poorest performing districts of Yadgir, Raichur, Koppal, and Kalaburagi (Figures 1.3 and 1.4).

Figure 1. 5: Nutrition Index of Children aged 0-5 years based on National Family Health Survey-4 (NFHS-4) (2015-16)



Source: Centre for Budget and Policy Studies (CBPS) Nutrition Index.

Figure 1. 6: Nutrition Index of Children aged 0–5 years based on National Family Health Survey-5 (NFHS-5)



Source: Centre for Budget and Policy Studies (CBPS) Nutrition Index.

The indices show that northern parts of Karnataka do poorly as compared to southern Karnataka. The exception here is Dakshina Kannada district, where the percentage of children with wasting increased by 12 percent points between 2015-16 and 2019-20. Similarly, Kodagu, whose indices made it the top-ranking district in 2015-16, has slipped down to the ninth place as it was one of the five districts where the number of children with wasting increased, along with increase in anaemia in women. Within southern Karnataka, the coastal districts are better placed than the eastern districts. Taking the above indicators into consideration, Mandya district ranks the first with the highest number on the index, while Yadgir is the lowest ranked state in terms of nutrition indicators.

1.4. Tackling Undernutrition

It is now widely known that the first 1,000 days, i.e., from the start of pregnancy to a child's second birthday, are critical for preventing damage to a baby's physical and mental growth⁶. However, tackling undernutrition in this time period does not just stop with providing nutrition and supplements to pregnant women and their children under two years of age. In 2010, the framework for Scaling Up Nutrition (SUN) interventions was introduced, and the stage was set for the SUN Movement (*Scaling Up Nutrition A Framework For Action*, 2010). It follows on the heels of the 2008 Lancet series on nutrition, which highlighted how undernutrition was amongst the lowest priorities in countries that led to serious health consequences in children. It

⁶ <https://in.one.un.org/task-teams/first-1000-days/#:~:text=The%201%2C000%20days%20from%20the,and%20rise%20out%20of%20poverty.>

stated that each country should develop its own specific nutrition interventions to address the undernutrition pandemic. Core to its strategies was developing cost-effective interventions that could be scaled-up to a large population like that in India. Strategies to address malnutrition can be broadly divided into nutrition-specific, (those interventions that directly affect nutrition status, e.g., supplementary nutrition) and nutrition-sensitive (those interventions that affect the nutritional status indirectly (e.g., Public Distribution System [PDS] of food grains, sanitation etc) (Table 1.4).

Table 1. 4: Nutrition Sensitive and Nutrition Specific Interventions

NUTRITION SPECIFIC	NUTRITION SENSITIVE
Adolescent health and preconception nutrition	Agriculture and Food Security
Maternal dietary supplementation	Social Safety Nets
Micronutrient supplementation or fortification	Early Childhood development
Breastfeeding and complementary feeding	Maternal mental health
Dietary supplementation for children	Women's empowerment
Dietary diversification	Child protection
Feeding behaviours and stimulation	Classroom education
Treatment of Severe Acute Malnutrition (SAM)	Water and Sanitation
Disease prevention and management	Health services
Nutrition interventions in emergencies	Family planning services

The Government of India launched the Prime Minister's Overarching Scheme for Holistic Nutrition (or POSHAN Abhiyaan) (previously National Nutrition Mission) in March 2018, to concentrate on the entire lifecycle of nutrition, including children aged 0–6 years, school-going children, adolescents, and, finally, Pregnant and Lactating (P&L) women. The scheme's main pillars include the following:

- (1) Multi-departmental convergence with an apex body for monitoring and supervision at the state level,
- (2) Usage of Integrated Child Development Services (ICDS)–Common Application Software (CAS) for real time monitoring. This also eliminates registers utilized by anganwadi workers (AWWs)
- (3) Using behavioural change and social audits to make nutrition a community responsibility.
- (4) Training and capacity building of frontline workers along with incentives
- (5) Innovations

- (6) Working with already operational schemes for addressing malnutrition in the states, focusing on undernutrition, stunting, anaemia, and low birth weight.

Thus, the scheme combines nutrition-specific as well as nutrition-sensitive interventions. It was rolled out in three phases, from 2017-18 to 2019-20, across the country. Although central allocations towards the scheme were high, nearly Rs 7,411 crore, the average expenditure was only 34% until November 2019 (Paul & Kapur, 2018). Karnataka was yet to take any concrete steps towards implementing POSHAN Abhiyan until November 2019. Only Rs 132 crore had been released to the state from the centre till November 2019, of which only 2% was utilized. The report also pointed out that 97% of this expenditure went towards Behavioural Change Communication (BCC). There was expenditure towards procurement of mobile phones as well as training of AWWs towards CAS. The state also did not use any funds towards innovations.

With the exception of BCC and improving implementation of already existing schemes, all other interventions are nutrition-sensitive interventions. Although Karnataka has been slow to implement POSHAN Abhiyan, it already has a large number of already existing nutrition specific interventions. These are described below.

1.5. Nutrition-Specific Schemes in Karnataka

Karnataka has recently increased its focus on nutritional interventions in the state in a bid to improve its undernutrition indicators to meet the SDGs. Nutrition-specific schemes fall under the following main categories: (1) supplementary nutrition in AWC, (2) micronutrient supplementation, (3) Mid-Day Meal (MDM) scheme, (4) food expenses in government-run and government-aided hostels and residential schools, (5) clinical treatment of Severe Acute Malnutrition (SAM), and (6) nutritional counselling.

1.5.1. Supplementary Nutrition

The basic unit of the ICDS is the Anganwadi Centre (AWC) and it has become synonymous with the provision of supplementary nutrition. Supplementary nutrition in various forms is provided to all children aged 0–6 years, adolescent girls, and P&L women and is the main stay of nutritional expenditure on children. Following are the supplementary nutrition schemes operational in Karnataka under ICDS:

- **Supplementary Nutrition Programme (SNP) for P&L women under Mathrupoorna scheme):** One full meal—consisting of rice, dal with leafy vegetables/sambar, vegetables for a minimum of 25 days, boiled egg and 200ml milk for 25 days in a month, and *chikke*—is provided to P&L women at Rs 21/ meal.
- **Nutrition to children aged 0-3 years and 3-6 years through ICDS:** Children aged 6 months to 3 years are given Take Home Ration (THR), while children aged 3–6 years are provided a hot cooked meal (HCM) at the AWC. The feeding norms are 500 calories of energy and 12-15 grams of protein to 0-6-year-olds, and 800 calories of energy and 20-25 grams of protein to severely malnourished children as a supplement to their normal intake. The unit cost is **Rs. 8** per beneficiary per day for normal children and **Rs. 12** for severely malnourished children.
- **Srusti egg scheme:** Children aged 3–6 years are provided eggs two days a week as part of their HCM. Children aged 6 months to 3 years who are severely malnourished are provided eggs three days a week. Children who do not consume eggs are given extra milk.
- **Nutrition Specific schemes like SABLA, Bala Sanjeevini and Sneha Shivira:** The two schemes—Kishori Shakthi Yojana (KSY) and Nutrition Programme for Adolescent Girls (NPAG)—were merged to form a single scheme known as the Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (RGSEAG) SABLA. All the schemes together constitute the Scheme for Adolescent Girls (SAG). Within this scheme, two adolescent girls at each AWC are provided HCM.
- **Ksheera Bhagya scheme (milk for children provided in AWC and schools):** Under Ksheera Bhagya scheme, children aged between 6 months and 6 years in AWCs are provided 150ml milk for five days a week (15 grams milk powder and 10 grams sugar). Children in classes 1 to 10, in government and government-aided schools also receive 150ml of milk (18g milk powder and 10g sugar).

Hot cooked meals (HCM), Mathrupoorna, Ksheera Bhagya and Srusti egg scheme have had all positive uptake within communities interviewed in Belagavi, Raichur, Tumkur, and Mysuru, in 2018. However, these have resulted in additional responsibilities on already burdened AWWs. Previous ICDS studies by Centre for Budget and Policy Studies (CBPS) showed that costs for everyday expenses were not figured into budgetary planning for cooking, e.g., provision for money for gas cylinders. Although, food norms have changed from the then Rs 6 to the current Rs 8 per child (in 2018 norms), the AWW's woes still exist. This was also seen with the Srusti egg scheme, where the cost of egg is included within the Rs 8 norm. Both the

egg and the milk powder for the children are delivered to the AWC; however, the vegetables and other supplies for the meals had to be bought on a regular basis by the AWW resulting in transportation costs, which had to be paid from their own pocket (Centre for Budget and Policy Studies, 2019).

In case of the Mathrupoorna scheme, the success of the scheme heavily depended on the bond between the AWW and community. It was difficult for the AWW to estimate the number of women who would come for eating the meal and they would end up wasting food and money. In some instances, the workers had to supply food to the women's homes as the women were unable to come to the AWC due presence of smaller children in the house. Here, the worker had to neglect the rules for the greater good of the women. Lack of washrooms and space in the AWC also inhibited the women from using the scheme. The lack of space for storage of food was the most common challenge faced by AWW. 'Almost all AWWs worry about ensuring that the food doesn't get spoilt or is not infested with pests. So, they take extreme precautions to ensure that the children and the women in their care do not get sick', said a AWW (Centre for Budget and Policy Studies, 2019).

1.5.2. Midday Meals in Schools (Akshara Dasoha)

Mid-day meal (MDM) is a wholesome, freshly cooked lunch served to children in classes 1 to 8 in government and government-aided schools in India. In order to successfully carry out this mandate, each state government started its own MDM Programme; Akshara Dasoha has been initiated by the Government of Karnataka and includes children in classes 9 and 10 too. According to various studies, the scheme has helped in improving the nutritional status of children attending school; however, gaps remain in terms of quality of food, participation of parents, pay of cooking staff as well as lack of social audit and grievance redressal (*Fourth Review Mission, Mid Day Meal Scheme*, 2013; Mirajkar et al., 2016). In addition to MDM, school children also receive milk five days a week under Ksheera Bhagya scheme. They also receive Iron and Folic Acid (IFA) tablets under the Weekly Iron and Folic Acids Supplementation Programme (WIFS) scheme as well as biannual deworming.

1.5.3. Micronutrient Supplementation

- **Weekly Iron and Folic Acids Supplementation Programme (WIFS):** This programme covers the adolescent population studying in classes 6 to 10, in government schools all over the State. Under this programme, a weekly dose of IFA Tablet (60 mg Elemental Iron + 500 µ gm Folic Acid) is provided to beneficiaries in schools, under supervision of teachers; IFA syrup is administered to

children under five years of age, bi-weekly on fixed days by Accredited Social Health Activists (ASHAs)/AWWs. Children in classes 1 to 5 are yet to be covered under this scheme in the state.

- **Vitamin A:** Vitamin A supplements are given to infants of 9 months and children aged 12-59 months of age bi-annually. Karnataka is providing Vitamin A supplements for people up to 19 years of age.
- **Bi-annual Deworming days:** These are carried out in February and August every year. Albendazole tablets for deworming are given to children in schools and anganwadis, and adolescent group up to 19 years of age. The medicine is meant to kill three types of stomach worms—round worms, whip worms, and hookworms—transmitted from the soil.
- **Oral Rehydration Solution (ORS) and Zinc Supplements:** Zinc and ORS tablets are distributed to children with diarrhoea in all health facilities as well as by ASHA workers and AWW. Intensified Diarrhoea Control Fortnight (IDCF) consists of a set of activities to be implemented in an intensified manner for prevention and control of deaths due to dehydration from diarrhoea across all states and union territories (UTs). These activities mainly include intensification of advocacy and awareness generation activities for diarrhoea management, strengthening service provision for diarrhoea case management, establishment of ORS-Zinc corners, prepositioning of ORS by ASHA in households with children under five years of age, and awareness generation activities for hygiene and sanitation.

1.5.4. Food Expenses in Hostels and Residential Schools

Residential schools as well as pre-matric, post-matric hostels (government and government-aided) are undertaken by minorities, social welfare, backward classes and tribal welfare departments. More than 2.93 lakh boys and 1.42 lakh girls stay in these hostels. In addition, 1.63 lakh children study and live in Karnataka's residential schools. Food expenses in orphanages and ashrama schools run by the government and government-aided institutions. Recently, food expenses have been increased from Rs 1,400–1,500/month for pre-matric government, and Rs 1,500–1,600/month in post-matric government hostels. Similar increases have also been done for government-aided hostels.

Table 1. 5: Strength of students in hostels and residential schools in Karnataka by department, 2016-17*

Type of institution	Backward classes			Minority			Scheduled Caste			Scheduled Tribe			Total		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Government pre-matric hostels	54025	15686	69711	800	1550	2350	67313	22307	89620	5230	2357	7587	127368	41900	169268
Government post-matric hostels	52463	65002	117465	8250	5705	13955	42898	24119	67017	4275	2294	6569	107886	97120	205006
Ashrama Schools(boys/girls)	1025	0	1025	3569		3569	6671		6671	9631		9631	20896	0	20896
Grant in Aid (GIA) Pre-matric private hostels	12040	1030	13070	2826	524	3350	9027	1087	10114	1265	30	1295	25158	2671	27829
GIA to Post-Matric private hostels	845	359	1204			0	3639	150	3789	350	50	400	4834	559	5393
GIA to private orphanages	7618	68	7686										7618	68	7686
Total	128016	82145	210161	15445	7779	23224	129548	47663	177211	20751	4731	25482	293760	142318	436078
KREIS schools															163070

Source: Departments of Social Welfare, Minority Affairs, Backward Classes and Schedule tribes. Strength of Karnataka Residential Educational Institutions Society (KREIS) schools, http://kreis.kar.nic.in/ENGLISH/schoolList_E.html. Accessed on 11 September 2020.

***Note:** as the number of students per school/hostel does not significantly change year to year, these have been taken as is.

1.5.5. Clinical Treatment

Facility based treatment is available for children suffering from SAM. The child and caregiver can stay at the Nutrition Rehabilitation Centre (NRC) for 14 days, where food and treatment is provided for them free of cost. Daily wages are also paid to the caregiver. However, studies have shown that lack of co-ordination between the departments of health (NRC) and Women and Child Development (WCD) (AWC and AWW) results in unsuccessful tracking of the child post treatment (Ningadalli et al., 2015) (Kamath et al., 2015).

1.5.6. Nutritional Counselling

Currently, counselling for mothers and pregnant women is provided by ASHA and AWW workers. An additional nutrition counsellor/volunteer has been long advocated by the working group on Nutrition (Ministry of Women and Child Development, 2011). Improving capacity building for nutrition counselling at all levels was advocated. The Karnataka Multisectoral Nutrition Project (KMNP) used nutritional counselling and food fortification with the help of specially trained Village Nutrition Volunteers (VNVs) in one of the most backward blocks each in Raichur and Kalaburagi districts. The VNVs co-ordinated with ASHA, AWW, and Auxiliary Nurses and Midwives (ANMs) and focused on the age group of 0–3 years, P&L women, and adolescent girls for nutritional counselling and distribution fortified mixes. After the project became effective, household counselling on good nutrition behaviours was conducted by VNVs, thus creating a significant increased demand for social programmes that could improve nutrition outcomes, such as applications for construction of toilets, and demand for IFA. By March 2018, 24,731 of 27,484 (89%) targeted households utilized one or more social sector programmes with a potential impact on nutrition (specifically ICDS, health services, and water and sanitation services); this is far better than the pre-set target of 60% of targeted P&L women reported practicing all six core child nutrition and health care behaviours (World Bank, 2019).

1.5.7. Cash Transfers: Pradhan Mantri Mathru Vandana Yojana (PMMVY)

Pradhan Mantri Mathru Vandana Yojana (PMMVY) was announced on 31 December 2016 and became applicable on 1 Jan 2017; PMMVY seeks to provide a cash incentive of Rs 5,000 in three instalments to pregnant women and lactating mothers for the first live child through Direct Benefit Transfer (DBT). The beneficiary enrolment rose consistently and was the highest in February 2018 and March 2018. The number of beneficiaries paid also rose consistently and was highest in August 2018. According

to a recent analysis, PMMVY excludes more than half of all pregnancies because first order births account for only 43% of all births in India. The application process is cumbersome and exclusionary. The compulsory linking of the applicant's bank account with Aadhaar often causes problems. The PMMVY provides little assistance to women who lose their baby, because the successive payments are made only if the corresponding conditionality is met.

1.6. Financing Nutrition

United Nations International Children's Emergency Fund's (UNICEF) Asian workshop on public finance on nutrition, specifies budget tracking and costing of plans to improve the quality of investments in nutrition, followed by focus on the management of finances (for nutrition) at the decentralised level (*Workshop on Public Finance for Nutrition in Asia*, 2016). Studies have estimated the cost of delivering nutrition specific interventions as well as providing evidence that nutrition interventions give a very high return for investment. Unlike investments in physical infrastructure, investments intended to reduce malnutrition generate benefits that are 'durable, inalienable, and portable' (Shekar et al., 2016). Additionally, there is a strong body of evidence (Alderman et al., 2017; Hoddinott et al., 2013; Spohrer, 2015) that confirms that investments in improving nutrition yield high economic returns – between \$4 to \$35 for every \$1 spent.

According to the cost estimates, at 2014 target population levels, it would cost about **US\$ 4.2 billion per year for the SUN interventions and US\$5.9 billion per year for the India Plus interventions** (a modified version of the SUN approach for the Indian context) at full coverage across India (Menon et al., 2016). Among the different elements, cash transfers to women and supplementary food account for the highest cost, whereas nutrition counselling, vitamin A supplementation, deworming, and treated mosquito nets account for the lowest costs. The Menon et al., paper also suggests a thumb rule of \$140 per child under 2 years of age per year, for delivering SUN interventions. A recent update on this paper factoring changes in nutrition norms and policies estimated Karnataka's annual costs for delivering Direct Nutrition Interventions (DNI) at scale to be at Rs 1,700 crore: Rs 61 crore on counselling, Rs 891 crore on food supplements, Rs 43 crore micronutrients, Rs 349 crore on health interventions, and Rs 356 crore on maternity benefits (Kapur et al., 2019).

Previous studies by CBPS on the state of nutrition expenditure in Karnataka show that nutrition formed 20% of the total expenditure on children in Karnataka in 2017-

18 (Rao, Madhusudan B.V., Nagaraj N., Maithreyi R, Jha J, 2017). The study pooled in expenditures for nutrition-specific, nutrition-sensitive, and nutrition-enabling schemes at the level of the state. It showed that Karnataka's total nutritional expenditure is 70%, through the supplementary nutrition of the ICDS programme.

1.7. Study Rationale and Objectives

Earlier CBPS studies on nutrition expenditure in Karnataka have shown that (Rao et al., 2018) expenditures at the level of districts are not well segregated. This has made the tracking of expenditures at district level a futile exercise for identifying any gaps that may be present below the level of the state. This raises questions on whether expenditures at the level of district are adequate. This is especially important as districts vary geographically and population-wise and so do their nutrition requirements. For e.g., districts in coastal Karnataka may have higher access to protein due to access to fish in diet.

In continuation of our study on nutritional expenditure in Karnataka, we propose to estimate district level cost of DNI in Karnataka. Therefore, the objective of the study was-

1. To estimate district level costs for DNI for children aged 0 to 18 years for Karnataka for 2018,
2. And to compare these estimates to known child indicators in the districts where possible.

Chapter 2: Methodology and Challenges

2.1. Methodology

The study consists of the following main parts (1) literature review, (2) construction of nutrition index, and (3) estimation of unit costs at district level.

2.1.1. Literature Review

Desk review was carried out to understand the current scenario of nutrition policies and nutrition schemes in India and Karnataka. Policy documents of nutritional schemes, National Health Mission (NHM) Programme Implementation Plans (PIP) as well as annual reports of various departments were reviewed.

2.1.2. Construction of Nutrition Index

In order to compare cost estimates to nutritional indicators at district level, a nutrition index was created. Five nutrition specific indicators were initially chosen from the NFHS-4 Karnataka fact sheets. These included percentage of children under five years who were stunted, children under five years who were wasted, children under three months who were breastfed within one hour of birth, percentage of children under six months who were exclusively breastfed, and percentage of pregnant women with anaemia. However, not all indicators including number of pregnant women with anaemia could be found in district level fact sheets. Finally, it was decided to go with only three indicators. The indicators included are children under five years who are stunted, children under five years who are wasted, and all women aged 15-49 years who are anaemic. Women aged 15-49 who were anaemic were included into the index to emphasise the fact that the cycle of nutrition starts with the pregnancy, which has a significant impact on child 's nutrition status including low birth weight as well as increased risk of stunting and undernutrition. Each indicator has been given equal weightage. All women were taken due to lack of district level data on pregnant women with anaemia. However, as the percentage of children stunted and wasted are based on under-five data, and anaemia of mother affects life of her unborn child, the index can be used for comparisons of under-five population.

2.1.3. Estimations of Unit Costs at District Level Included the Following Steps

1. Identifying DNI: Using the paper by Menon et al., 2016 as reference, a list of DNI were drawn. To this list, Karnataka-specific DNI like Ksheera Bhagya, Mathrupoorna, etc., were added. The list was also updated to include new schemes

like PMMVY. In addition, we have added food costs associated with children staying in government and government-aided hostels and residential schools. The final list of interventions is given in Table 2.1.

Table 2. 1: India Plus Interventions Revised for Karnataka*

- 1) Counselling optimal breastfeeding to mothers and caregivers of children aged 0–6 months during pregnancy.
- 2) Counselling for complementary feeding and hand washing to caregivers of children aged 0–6 months.
- 3) Vitamin A supplementation for children aged 6–59 months.
- 4) Oral Rehydration Solution (ORS) and therapeutic zinc supplements for treatment of diarrhoea for children 2–59 months.
- 5) Deworming for children aged 12–59 months.
- 6) Deworming for adolescents aged 11–15 years.
- 7) Iron supplements for children aged 6–59 months.
- 8) Iron-folic acid supplements for adolescents 11–15 years.
- 9) Complementary food supplements for children 6–36 months of age.
- 10) Hot cooked meals for children aged 3–years in Anganwadi centres (includes Srusti egg scheme).
- 11) Additional food rations for severely malnourished with Weight for Age Z-score (WAZ) <-3 for children aged 6–59 months.
- 12) Facility-based treatment for children aged 6–59 months with Weight for Height Z-score (WHZ) <-3.
- 13) Mid-day Meal (Akshara Dasoha) for all children in government schools for children aged 6–15 years (classes 1 to 10).
- 14) Cash transfers to women for the first 6 months after delivery as part of Pradhan Mantri Mathru Vandana Yojana (PMMVY).
- 15) Mathrupoorna Scheme (one hot cooked meal for pregnant and lactating women).
- 16) Ksheera Bhagya Scheme (milk to anganwadi and school children for 5 days a week).
- 17) Food expenses in pre-matric and post-matric government and government-aided hostels.
- 18) Food expenses in residential schools.

Note: *Table based on the India Plus Interventions (Menon et al., 2016) revised with addition of interventions specific to Karnataka.

1. Estimating Unit costs: Unit costs for each intervention were identified based on the latest policy documents or NHM PIP. The unit cost for each intervention is given in Table 3.1. The documents from which each unit cost was identified is given below in Table 2.1. The costs estimations only include that for food only and not for costs associated with transport, personnel, procurement, storage, etc. Public Distribution System (PDS) was not included within the analysis as unit costs were unavailable.

2. Comparison of Estimates with Actual expenditures: Budget documents for the years 2016-17, 2017-18, 2018-19 were analysed for direct expenditures related to ICDS, MDM and PDS. Expenditures under ICDS were found under National Nutrition Mission (NNM) and included THR for children aged 0-3 years, HCM for children under 6 years, and Mathrupoorna for P&L women (this also included adolescent girls). These expenditures are available by district but could not be segregated by intervention or age within the budget. Similarly, MDM expenditure within education department was available by district, but it cannot be segregated by age. For ICDS and MDM expenditures, only direct food costs were included. Costs for salaries and management were excluded from analysis, and expenditure under Ksheera Bhagya was excluded too. Other nutrition intervention expenditures were unavailable in the budget documents as items like IFA tablets are procured and supplied directly and are not reflected in expenditures. Expenditure under PDS was not included in the study as it was not possible to estimate unit costs for children in this scheme.

Table 2. 2: Source for Information on Unit Costs

Sr No.	Intervention	Source of Unit cost	Assumption
1.	Counselling optimal breastfeeding to mothers and caregivers of children aged 0–6 months.	Estimating the cost of delivering Direct Nutrition Interventions (DNI) at scale: national and subnational level insights from India (Menon et al, 2016).	We calculated either Accredited Social Health Activist (ASHA)/ Anganwadi Worker (AWW) would visit a house 2 times a month for a year, at Rs 30.1 per visit.
2	Counselling for complementary feeding and hand washing to caregivers of children aged 6–18 months.	Estimating the cost of delivering DNI at scale: national and subnational level insights from India (Menon et al, 2016).	We calculated either ASHA worker or Anganwadi worker would visit a house 2 times a month for a year, at Rs 39.1 per visit

Sr No.	Intervention	Source of Unit cost	Assumption
3.	Vitamin A supplementation for children aged 6–59 months.	National Health Mission (NHM) Programme Implementation Plan (PIP) for Karnataka year 2018-19.	
4.	Oral Rehydration Solution (ORS) and therapeutic zinc supplements for treatment of diarrhoea for children aged 2–59 months.	NHM PIP for Karnataka year 2018-19.	Additional expenses due to Intensive Diarrhoea control fortnight have been included.
5.	Deworming for children aged 1–15 years	NHM PIP for Karnataka year 2018-19.	We assumed only anganwadi and school-going children till age 15.
6.	Iron supplements for children aged 6–59 months and adolescents aged 11–15 years.	NHM PIP for Karnataka 2018-19.	No procurement details for children aged 6–10 years was found; hence, this was not added to estimations.
7.	Take Home Ration (THR) for children aged 6–36. - Hot cooked meals for children aged 3–6 years in Anganwadi centres (includes Srusti egg scheme) - Additional food rations for severely malnourished (WAZ<-3*) children aged 6–59 months. - Hot cooked meals for adolescent girls aged 11–18 years.	Unit costs are per department of Women and Child Development (WCD) Karnataka website with the latest food norms.	
8.	Facility-based treatment for children aged 6–59 months with WHZ<-3*.	NHM PIP for Karnataka 2018-19.	
9.	Mid-day Meal (Akshara Dasoha) for all children aged 6–15 years in government schools (classes 1 to 10)	Karnataka Education website	
10	Cash transfers to women for the first 6 months after delivery as part of Pradhan Mantri Mathru Vandana Yojana (PMMVY).	WCD department guidelines	
11.	Ksheera Bhagya Scheme (milk to anganwadi and school children for 5 days a	As per guidelines on department of education website	

Sr No.	Intervention	Source of Unit cost	Assumption
	week)		
12.	Food expenses in pre- matric and post-matric government and government aided hostels. Food expenses in residential schools	Revised as per Karnataka Budget speech 2019-20.	

Note: *WAZ - Weight for Age Z-score, WHZ - Weight for Height Z-score

3. Population Estimation: As the study is a continuation of previous expenditure review of nutrition in Karnataka, it was decided to use departmental estimates for populations to be covered to number of beneficiaries enrolled to give us estimates close to what the government would be spending on said intervention. Accordingly, population estimations for micronutrient supply were taken from PIP calculations. For schemes under ICDS, the number of children aged 0–6 years and P&L women under the ICDS were used. For the MDM scheme, the number of enrollees for each grade were taken from the education website. For number of children living in hostels and residential schools, departmental data was sought. Further details are available in Table 3.1.

2.2. Challenges

2.2.1. Unavailability of Data on Children Aged 15–18 Years

Children aged 15–18 years do not come under any of the education institutions except for post-matric hostels. The anganwadi centres also have a limited number of adolescent girls under their care (2 per AWC as per SABLA Scheme). So, even though children of this age group are targeted by the health department for micronutrient supplementation, there are seldom separate estimates for this group. Hence, this group maybe underrepresented in our study.

2.2.2. Lack of District Level Child Indicators

There is an acute lack of district level nutrition indicators for children aged 6–18 years. Reliable district level indicators were only available for three indicators for the age group 0–5 years. This is the age group which is most vulnerable to nutrition deficiencies as well as the age where some malnutrition effects can be reversed. Although the Comprehensive National Nutrition Survey (CNNS) survey has put forth indicators for children aged above 5 years, their use as standardised indicators is still to be ascertained (Goyal, 2020).

2.2.3. Population Level Estimates

The objective of the study was to estimate expenditure on nutrition intervention at district level. Coverage population was obtained from government documents; hence, it is not possible to compare coverage of the interventions.

Chapter 3: Direct Nutrition Intervention Expenditure Estimates

3.1. Direct Nutrition Interventions (DNI) and Their Expenditure Estimates in Karnataka, 2018

We estimate that Karnataka spends Rs 5,596.16 crore on DNI for children aged 0–18 years based on 2017-18 data. Table 3.1 gives details on 21 types of DNI operating in Karnataka and the estimated expenditure for each intervention at the level of the state.

Table 3. 1: Details of Expenditure on Nutrition-Specific Interventions in Karnataka in 2018

Sr no.	Intervention	Intervention	Unit per year	Unit Cost (Rs)	Target Population	Total cost (Rs in Crore)
1	Counselling for mothers during pregnancy	Accredited Social Health Activist (ASHA)/ Anganwadi Worker (AWW)	1 visit at Rs 30.1 per visit, at 2 visits per month	722	Pregnant and Lactating (P&L) women under Integrated Child Development Services (ICDS) project area	46.02
2	Counselling for complementary feeding and hand washing to caregivers of children aged 6 months to 3 years	ASHA/AWW	1 visit at Rs 39.1 per visit, at 2 visits per month	940.8	0 to 3 years population under ICDS project area	204.60
3	Vitamin A supplementation for children aged 6–59 months	Vitamin A Syrup	1 bottle = 5 children	60	Under 5 population, based on state Programme Implementation Plan (PIP) documents 2017-18	7.44
4	Therapeutic zinc supplements for treatment of diarrhoea for children aged 2–59 months	Zinc tablets	1strip (14 tablets) at 2.5 strips per child	10.625	Under 5 population, based on state PIP documents 2017-18	6.59

Sr no.	Intervention	Intervention	Unit per year	Unit Cost (Rs)	Target Population	Total cost (Rs in Crore)
5	Oral Rehydration Therapy (ORS) for treatment of diarrhoea for children aged 2–59 months	ORS sachet	1 sachet at 5 sachets for 2.5 diarrhoea episodes per child	11.25	Under 5 population based on state PIP documents 2017-18	6.98
6	Deworming of all children aged 1-15 years	Albendazole 400mg	1 tablet at 2 tablets per child	3	School enrolment and children under ICDS project areas	3.40
7	Iron supplements for under six and for 11-15 years children	Iron and Folic Acid (IFA) syrup self-dispensing (under 6 years)/IFA tablets for adults	1 ml per child under 5 years of age, and 1 tablet per child aged 11–15 years	9.79 under 5 years 14.6 for 11- 15 years	School enrolment and children under ICDS project areas	10.30
8	Iron supplements for Pregnant and Lactating women (P&L)	IFA for anaemic and non- anaemic P & L women	2 per day for anaemic and 1 per day for non-anaemic	215.712 for anaemic and 107.856 for non-anaemic women	45% of P&L are Anaemic of ICDS P&L coverage area	14.36
9	Supplementary Nutrition for children aged 0–6 years	Take Home ration for children aged 0–3 years, hot cooked meal to those aged 3–6 years, and additional ration for severely malnourished	Once a day for 300 days	8 per day per child (aged 0-6 years)	Children aged 0–3 years and 3–6 years under Women & Child Development (WCD) coverage area	844.45
10	Additional food rations for severely malnourished (Weight for Age Z-score [WAZ] < -3) children aged 6–59 months		Once a day for 300 days	12 per day per child for severely malnourished	Children aged 0–3 years and 3– 6 years and severely malnourished under WCD coverage area	5.49
11	Facility-based treatment for	Food and medicine cost	125 per day for drugs,	8,554 per child	As per Karnataka PIP	3.30

Sr no.	Intervention	Intervention	Unit per year	Unit Cost (Rs)	Target Population	Total cost (Rs in Crore)
	severely malnourished children under five years of age	for child and food and wages cost for caregiver	125 per day for food, 236 per day, and 125/day for mothers for 14 days		2018-19, number of children targeted 3,860.	
12	Supplementary Nutrition for adolescents	One meal per day	Once a day for 300 days	9.50 per child per day for 300 days	As per WCD data (2016-17)	128.50
13	Ksheera Bhagya scheme for children aged 6 months to 6 years	150 ml of milk per day	Once a day for 300 days	5.01 per child per day	Children aged 0-3 years and 3- 6 years under WCD coverage area	528.84
14	Mathrupoorna scheme for P&L women	One hot cooked meal	25 days per month for 15 months	21 per woman per day	Number of P&L women under WCD coverage area	723.14
15	Pradhan Mantri Mathru Vandana Yojana (Cash Transfer)	Rs 5,000 in three instalments		5,000 per woman	Number of P&L under WCD coverage area	459.14
16	Mid-Day Meal for children aged 6-15 years	Hot cooked meal	One meal per day for 300	4.13 for children in classes 1 to 5, and 6.18 for children in classes 6 to 10	Total number of children enrolled as per education department	899.73
17	Ksheera Bhagya scheme for children aged 6-15 years	150 ml of milk per day	Once a day for 300 days	5.18 per child per day	Total number of children enrolled as per education department	904.34
18	Hostels under Karnataka Residential Educational Institutions Society (KREIS)	All meals	1,000 per month for 10 months	10,000 per child	KREIS Department	163.07
19	Pre-matric Hostels for Scheduled Caste (SC), Scheduled Tribes (ST), Other Backward Classes (OBC),	All meals for classes 6 to 10	1,500 per month in government hostels and 1,000 per month in govt-aided	15,000 per child in govt- and 10,000 per child in govt-aided	Departments of SC, ST, OBC, and minorities	281.73

Sr no.	Intervention	Intervention	Unit per year	Unit Cost (Rs)	Target Population	Total cost (Rs in Crore)
	and minorities students		hostels for 10 months			
20	Post-matric Hostels for ST, SC, OBC and minorities students	All meals	1,600 per month in govt hostels and 1,100 per month in govt-aided hostels for 10 months	16,000 per child in govt and 11,000 per child in govt-aided	Departments of SC, ST, OBC, and minorities	333.94
21	Ashram Schools for SC, ST, OBC, and minorities students	All meals for classes 1 to 4.	1,200 per month for 10 months	12,000 per child	Departments of SC, ST, OBC, and minorities	20.79
	Total	Rs 5,596.16 Crore				

Source: Based on estimates by Centre for Budget and Policy Studies (CBPS)

3.2. Comparison with Actual Expenditures

Actual expenditures at district levels are available only for few components of NNM under ICDS, MDM under education department and PDS. Table 3.1 shows the average expenditure seen for SNP alone under ICDS in the budget for three years showed an average expenditure of Rs 1,645 Crore between 2016-17 and 2018-19. Our estimates showed Rs 2,101.9 crore were spent on THR for 0-3-year-olds. HCM for 3-6-year-olds, additional food rations for SAM children and CMs under Mathrupoorna scheme came to Rs 1701.9 crore.

Similarly, MDM actual expenditures also averaged at Rs 1,645 crore for three years in the budget. However, our estimates showed costs of only Rs 8,99 crore. Our estimates are likely an underestimate due to exclusion of charges on cooking like salaries, etc., which are part of actual expenditures.

Food subsidies under the PDS averaged at Rs 2,655 Crore for three years. As per CBPS' earlier studies on nutrition expenditure (Rao et al., 2018), 36% of this goes towards children's food, which comes to Rs 956 crore—this should be added as well. However, lack of data on unit cost does not permit us to calculate district-wise estimates for comparison.

3.3. Distribution of Nutritional Expenditure by Department

The nutrition interventions/schemes are spread over five major departments in the state (table 3.1). The departments of education and WCD spend almost equally on

nutrition interventions, i.e., 40.5% and 39.9%, respectively. Both expenditures are driven by SNP component, with education leading simply due to the sheer number of children aged 6–15 years in schools. The department of health and family welfare has the lowest share of expenditure on nutrition interventions at less than 1%. However, health and WCD departments share about 4.5% of expenditure. Social welfare expenditures come from SC, ST, Other Backward Classes (OBC), and minorities' department's residential schools, ashrama schools and pre- and post-matric hostels, which is at 14.3% of total nutrition expenditure.

Table 3. 2: Classification of Direct Nutrition Interventions in Karnataka by Government Department and Percentage Expenditure in 2018

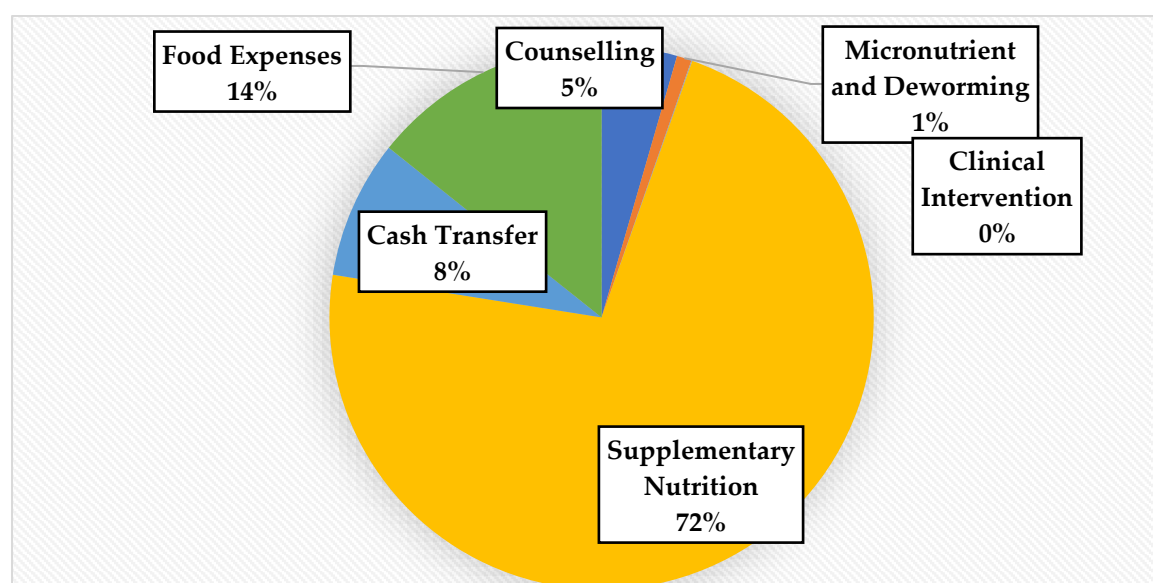
Sr no.	Intervention	Department	Percentage Expenditure
1	Counselling for mothers during pregnancy	Health and Women and Child Development (WCD)	4.5%
2	Counselling for complementary feeding and hand washing to caregivers of children aged 0–6 months		
3	Vitamin A supplementation for children aged 6–59 months	Health and Family Welfare	0.9%
4	Therapeutic zinc supplements for treatment of diarrhoea for children aged 2–59 months		
5	Oral Rehydration Solution (ORS) for treatment of diarrhoea for children aged 2–59 months		
6	Deworming of all children aged 1-15 years		
7	Iron supplements for children under six and for children aged 11-15 years		
8	Iron supplements for Pregnant and Lactating (P&L) women	Women and Child Development	39.9%
9	Supplementary Nutrition for children aged 0–6 years, and severely malnourished		
10	Facility based treatment for severely malnourished children under five years of age.		
11	Supplementary Nutrition for adolescents		
12	Ksheera Bhagya scheme for children aged 6 months to 6 years		
13	Mathrupoorna scheme for P&L women	Education	40.5%
14	Pradhan Mantri Matru Vandana Yojana (PMMVY) (Cash Transfer)		
15	Mid-Day Meal for children aged 6-15 years	Social Welfare	14.3%
16	Ksheera Bhagya scheme for children aged 6 to 15 years		
17	Hostels under Karnataka Residential Educational Institutions Society (KREIS) (Residential schools)		
18	Pre-matric Hostels for Schedule Caste (SC), Schedule Tribe (ST), Other Backward Classes (OBC), and minorities students		
19	Post-matric Hostels for ST, SC, OBC and minorities students		
19	Ashram Schools for SC, ST, OBC and minorities students		

3.4. Expenditure by Type of Nutrition Interventions

The interventions for nutrition can be divided into six major groups as below (Figure 3.1).

- **Cash Transfers:** This intervention consisted mainly of the PMMVY given by the department of WCD. It made up of 8.2% of total nutritional expenditure.
- **Clinical intervention:** This expenditure consisted mainly of facility-based management of children with SAM and comes under the department of health. It makes up of only 0.06% of nutritional expenditure.
- **Micronutrient supplementation and Deworming:** These consist of six different schemes which formed 0.8% of nutritional expenditure. These included WIFS, IFA for children under 5 years, IFA for P&L women, deworming of all children in the state during National Deworming Days, Vitamin A immunisation, distribution of zinc supplements and ORS packets for diarrhoea prevention. Although all these schemes are undertaken with the co-ordination between the departments of health and WCD, the expenditures for provision of these supplements are undertaken by the department of health under NHM.
- **Nutritional counselling:** This involved counselling by ASHA workers (health department) and AWW (WCD dept) to mothers of under-five children and pregnant women, and it formed about 4.5% of nutrition expenditure.
- **Supplementary Nutrition:** Seventy-two per cent of nutritional expenditure consisted of supplementary nutrition: SNP for children aged under 6 years and severely malnourished children, MDM scheme for school children, Ksheera Bhagya scheme for all children aged 6 months to 15 years, SNP under SAG, and Mathrupoorna for P&L mothers.
- **Food Expenses:** Expenditure on food for children residing in public and government-aided residential schools and hostels made up of 14% of nutrition costs.

Figure 3. 1: Nutritional Expenditure by Type of Intervention in Karnataka, 2018



Source: Based on estimates by Centre for Budget and Policy Studies (CBPS)

3.5. Distribution of Expenditure by Age Group

About 51% or Rs 2,858 crore is estimated to be spent towards nutrition interventions for children under six years of age. Expenditure on P&L women directly affects health of the newborn; hence, it is included with expenditure on 0-5-year-olds. When seen separately, expenditure on P&L women consisted of 43% of under-five expenditure and 22.1% of total nutritional expenditure. This is followed by expenditure on the adolescent age group of those aged 11–18 years at 34%. Closer inspection of the adolescent age group shows interventions skewed towards children aged 11–15 years as these are easily identified in schools than those who leave schools, after class 10. Hence, interventions for children aged 11–18 years have been shown together. Children aged 6–10 years have the lowest number of interventions; therefore, they also have the lowest nutrition expenditure, i.e., 14.9% of the total as compared to other age groups.

Table 3. 3: Expenditure on Direct Nutrition Interventions (DNI) on Children in Karnataka (2018), by Age

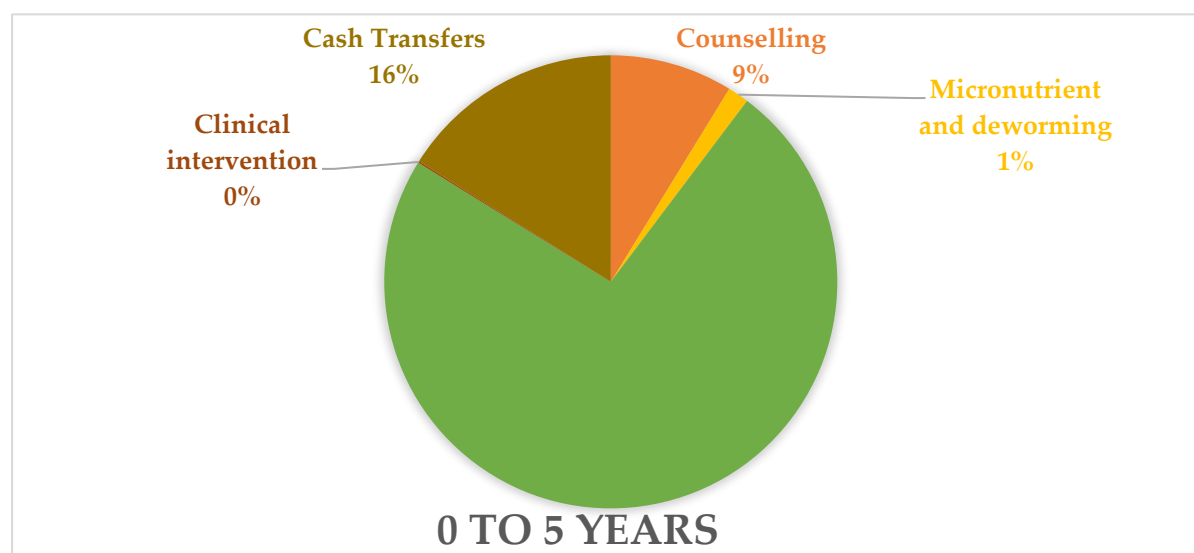
Age at Intervention	Expenditure (Rs. in Crore)	Percentage expenditure	Proportion in child population*
0-5 years	2,858.07	51.1	29.67%
6-10 years	835.45	14.9	25.81%
11-18 years	1,902.63	34.0	44.51%
Total	5,593.87	100.0	

Source: Based on DNI estimations calculated from Census 2011 data.

3.6. Distribution of Type of Schemes by Age-Group

Within different age groups too, expenditure on supplementary nutrition continues to dominate nutritional expenditure. The age group 0–6 years is the only age group that includes nutritional counselling as an intervention. Although SAG does have a nutritional counselling component, it was not possible to ascertain its degree of expenditure. Micronutrient supplementation and deworming amounted to 1% in 0–6-year-olds, and less than 1% in children older than 6 years. Cash transfers to mothers formed 16% of the expenditure on 0–5-year-olds. Expenditure on older children (aged 6–18 years) included food expenses for children residing in hostels and residential schools.

Figure 3. 2a: Proportional Expenditure of Schemes by in the Age Group 0–5 Years



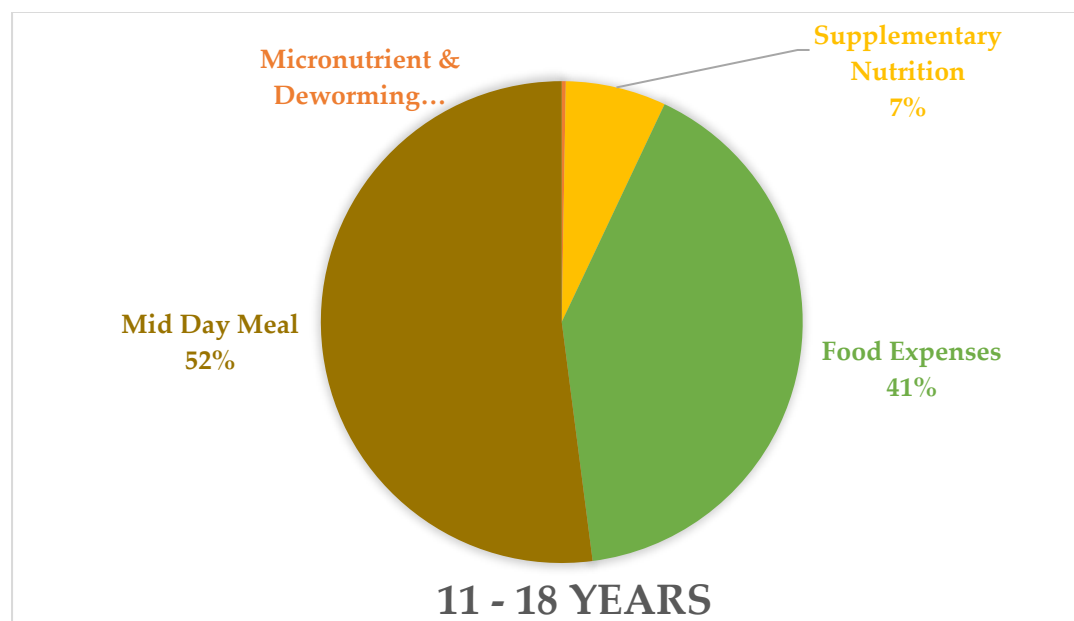
Source: Based on estimates by Centre for Budget and Policy Studies (CBPS)

Figure 3. 3b: Proportional Expenditure of Schemes by in the Age Group 6–10 Years



Source: Based on estimates by Centre for Budget and Policy Studies (CBPS)

Figure 3. 4c 1: Proportional Expenditure of Schemes by in the Age Group 11–18 Years



Source: Based on estimates by Centre for Budget and Policy Studies (CBPS)

3.6. District-Wise Distribution of Expenditures

Looking at expenditures by district, we see that Belagavi's estimations are the highest at Rs 530 crore, i.e., 10% of the state's total DNI expenditure, while Kodagu district's expenditure is the lowest at Rs 44.20 crore, which is only 0.8% of total nutrition expenditure in the state (Table 3.4). This is to be expected as the estimations are based on population proportions. However, it is interesting to note that Kodagu gets lowest expenditure but is also ranked highest in child nutrition index, while Kalaburagi has the highest expenditures but is ranked poorly in the in the nutrition index.

Table 3. 4: District-Wise Estimated Nutrition Expenditure

(Rs. in Crore)

Sr No	Districts	Estimated Expenditure (in Rs in Crore)	Percentage Expenditure	Sr No	Districts	Estimated Expenditure (Rs in Crore)	Percentage Expenditure
1	Belagavi	561.47	10.0	16	Yadgir	176.11	3.1
2	Kalaburagi	413.47	7.4	17	Shivamogga	160.91	2.9
3	Bellary	306.20	5.5	18	Dakshina Kannada	143.62	2.6
4	Bijapur	292.65	5.2	19	Kolar	140.69	2.5

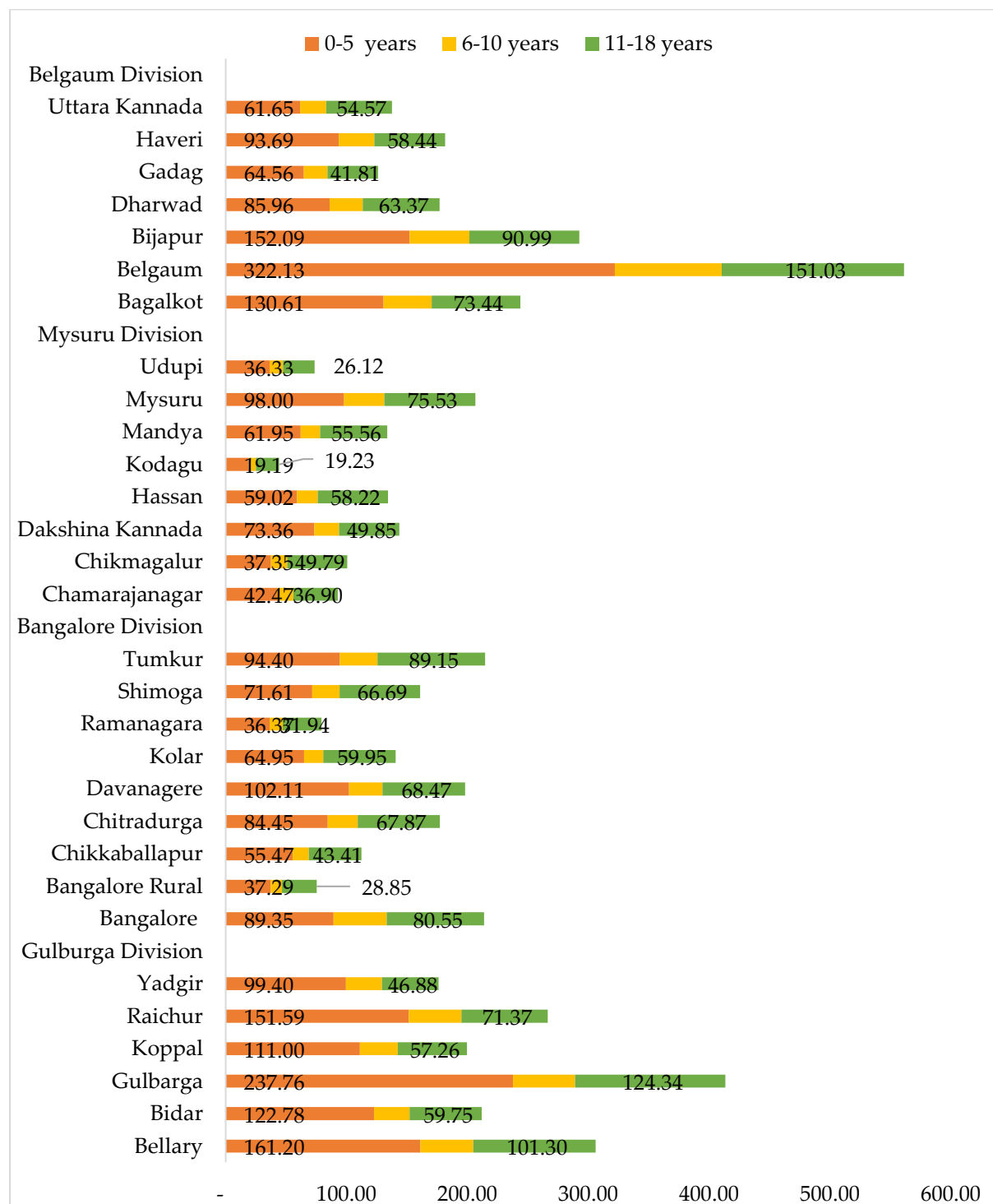
Sr No	Districts	Estimated Expenditure (in Rs in Crore)	Percentage Expenditure	Sr No	Districts	Estimated Expenditure (Rs in Crore)	Percentage Expenditure
5	Raichur	266.49	4.8	20	Uttara Kannada	137.65	2.5
6	Bagalkot	243.87	4.4	21	Hassan	134.44	2.4
7	Tumkur	214.79	3.8	22	Mandya	133.74	2.4
8	Bengaluru	213.78	3.8	23	Gadag	126.01	2.3
9	Bidar	211.94	3.8	24	Chikkaballapura	112.28	2.0
10	Mysuru	206.73	3.7	25	Chikkamagaluru	100.67	1.8
11	Koppal	199.60	3.6	26	Chamrajanagara	92.76	1.7
12	Davanager e	198.60	3.5	27	Ramanagara	79.22	1.4
13	Haveri	181.55	3.2	28	Bengaluru Rural	75.39	1.3
14	Chitradurga	177.16	3.2	29	Udupi	73.66	1.3
15	Dharwad	176.92	3.2	30	Kodagu	44.25	0.8
	Total	5,596.16					

Source: Based on estimates by Centre for Budget and Policy Studies (CBPS)

Looking at the expenditure estimates by division, we see that the Belagavi division has the highest expenditures, nearly double of the other districts the division (Figure 3.3). The estimates are also high for Kalaburagi division. While Belagavi, Kalaburagi, and Bellary have the highest expenditures, they are ranked poorly in the in the nutrition index. However, our estimates also depend on the usage of ICDS services by the population in the district, which may be the reason why Yadgir and Raichur though ranked poorly still get a sizable allocation. In addition, aspirational districts under NITI receive additional funding under NHM and state budgets for administration of programmes. Additional monitoring and review support might also be a reason for better expenditure of funding at district level.

3.7. Proportional Distribution of Nutritional Expenditure by Age in District

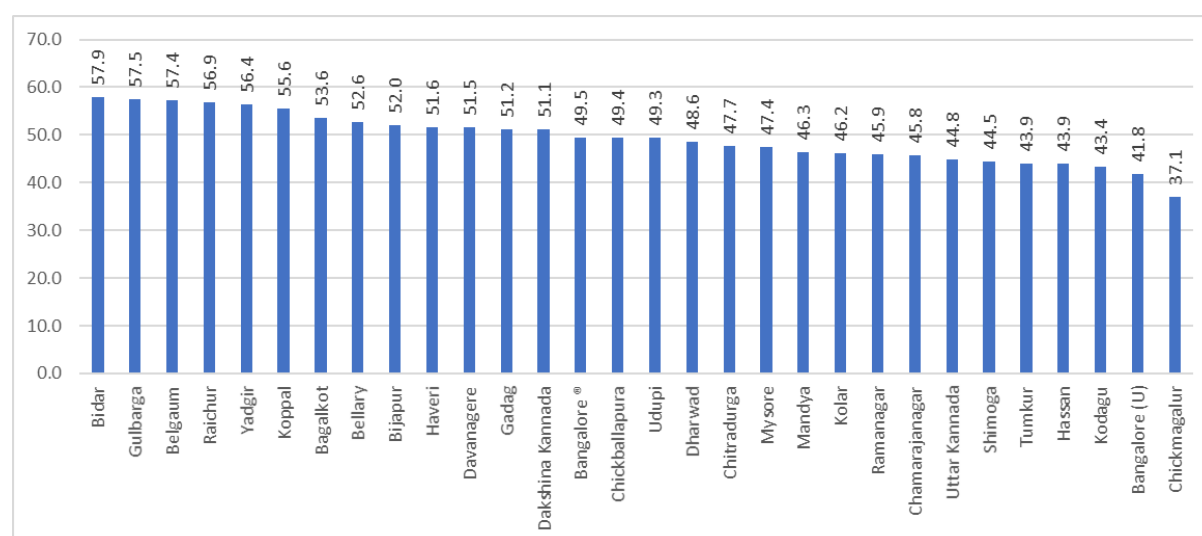
Figure 3. 5: District-Wise and Division-Wise Direct Nutrition Intervention Expenditure (Rs in Crore)



Source: Based on estimates by Centre for Budget and Policy Studies (CBPS)

Looking at the proportion of distribution of nutritional expenditure by age followed the state pattern of distribution, we see that 51% of state level nutrition expenditure was for children aged 0–5 years, whereas the expenditure on children aged 0–5 years within districts ranged from 57.9% in Bidar to 37.1% in Chikkamagaluru.

Figure 3. 6a: Distribution of Estimated Expenditures Within District on Children Aged 0–5 Years (Rs. in Crore)

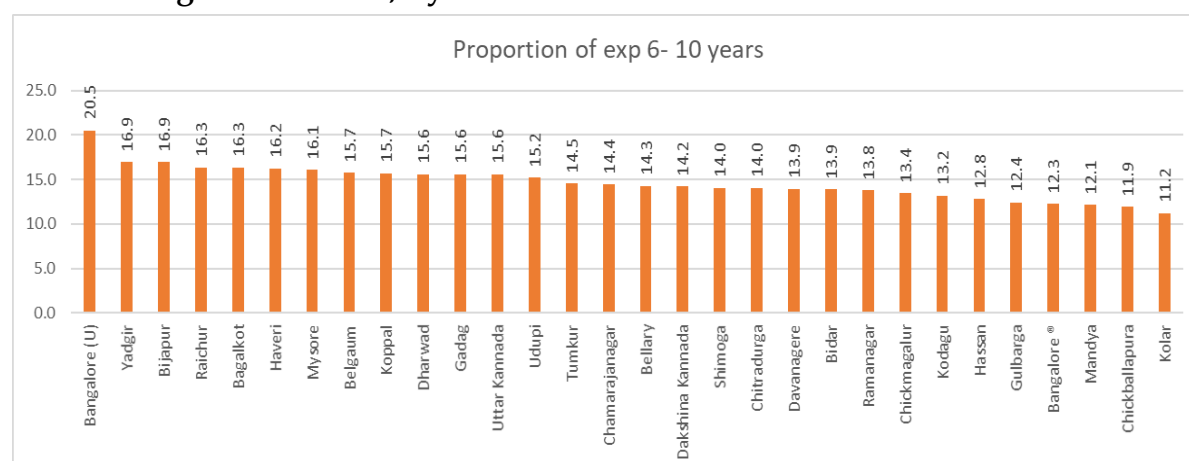


Source: Calculated based on Direct Nutrition Interventions (DNI) unit costs and district population levels of 0- -5-year-olds.

It is estimated that Bidar, Kalaburagi, Koppal, Raichur, Belagavi, and Yadgir should get the highest allocations for DNI in the state. However, comparing the indices for 2015-16 and 2019-20, the positions of Yadgir, Raichur, Koppal and Kalaburagi remain unchanged. In fact, Yadgir and Raichur saw an increase in stunting numbers and the number of women with anaemia increased in all the above four districts. This points towards gaps in allocations and expenditures. This may also question the validity of estimating expenditures just based on uniform unit costs for all districts as higher costs just based on population coverage has not brought on desired results.

Bengaluru Urban shows one of the lowest proportions of expenditure on children aged 0–5 years in the state. In contrast, Bengaluru Urban’s proportional expenditure on children aged 6–10 years is the highest in the state, while Kolar district is estimated to spend only 11% of its total nutrition expenditure on children aged 6–10 years. In this instance too, supplementary nutrition drives expenditures through MDM in schools and poorer districts like Yadgir and Raichur show higher proportion of expenditure as compared to better off districts like Mandya and Kolar (see Figure 3.4b).

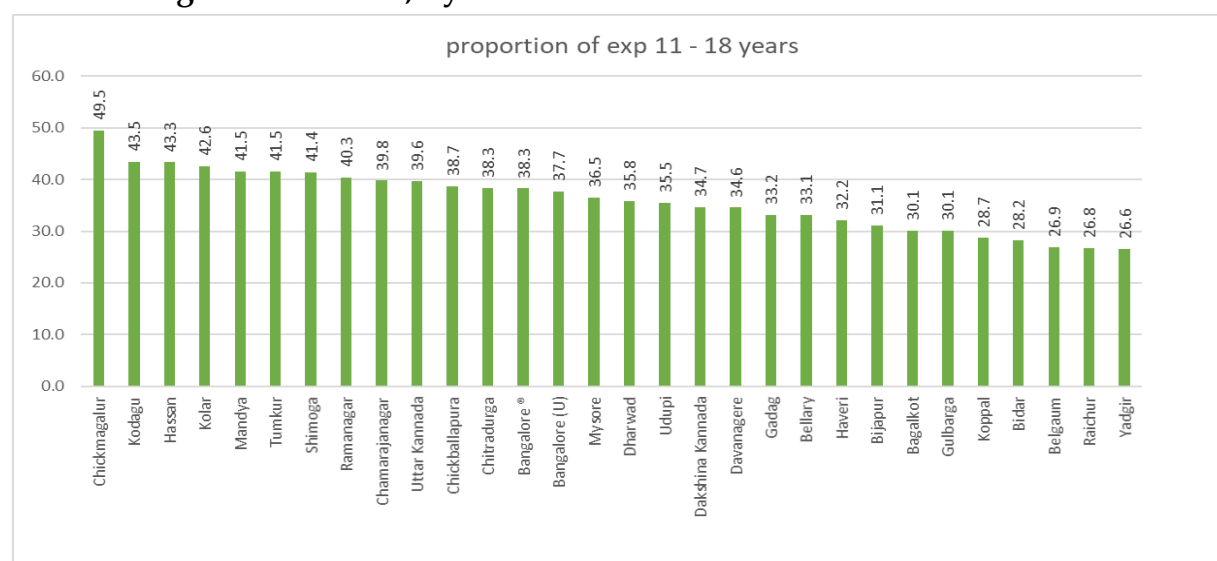
Figure 3. 7b: Proportional Expenditure of Total Nutritional Expenditure on Children Aged 6–10 Years, By District



Source: Based on estimates by Centre for Budget and Policy Studies (CBPS)

Estimates of proportional expenditures on children aged 11–18 years showed poorer districts showing the lowest expenditure estimates. Yadgir, Raichur, and Koppal show the lowest estimated expenditures on adolescents. In this age group, 41% of the total expenditure goes towards food expenses in hostels and residential schools. This means that on exclusion of these food expenses, the spending on this group will further decrease. Hot cooked meals to two adolescent girls from each anganwadi centre was the only expenditure that could be traced to children aged 15–18 years. It is interesting to note that while state level expenditure on this age group averaged at 34%, the highest proportion spent by the districts was 49.5% in Chikkamagaluru, and the lowest was by Yadgir at 26.6% (see Figure 3.4c).

Figure 3. 8c: Proportional Expenditure of Total Nutritional Expenditure on Children Aged 11–18 Years, By District



Source: Based on estimates by Centre for Budget and Policy Studies (CBPS)

Chapter 4: Discussion and Recommendations

It is estimated that Karnataka spends more than Rs. 5,500 crore on nutrition-specific interventions alone. This is far more than that predicted by earlier studies. Provision of food remains the most popular intervention consisting of 72% of estimated expenditure. Children aged 0–6 years receive the highest allocations within nutrition, and rightly so, as this age group is most vulnerable to irreversible changes due to malnutrition. Karnataka government has tried to address its poor nutrition indices through nutrition-specific schemes like Mathrupoorna, Ksheera Bhagya, and Srusti egg scheme. This seems to have paid off with a majority of the districts showing improvement in wasting levels between 2015-16 to 2019-20. However, stunting levels have improved only marginally. Anaemia both in women and children is also an area that requires prioritisation. Both stunting and anaemia are priorities under the POSHAN Abhiyaan scheme. However, Karnataka has yet to take concrete steps under this scheme as already seen.

4.1. Unit Cost? Does One Size Fit All

Currently, the state government decides nutritional allocation based on population proportion. Even though districts like Belagavi and Kalaburagi have the highest allocations for nutritional interventions, the health indicators of the children is poor. To have a positive impact on nutrition, there might be a need to look beyond population estimations to bring about a cure for undernutrition. Hanagodimath and Annigeri (2019) have developed a hunger index for Karnataka, which showed that 'a higher level of hunger is observed among people who have lower literacy rates, human development, and per capita income, face gender discrimination, and are dependent on agriculture more than other citizens. It was also seen that although estimations based on unit costs saw higher estimated expenditures, this did not necessarily bring about an improvement in health indicators. Therefore, there is a need to improve costing estimates factoring nutrition-sensitive indicators of the region as well. Hence, unit costs should be calculated taking into account factors like literacy rates, per capita income of the population availing anganwadi services and public schools, etc.

4.2. Nutritional Counselling for Intergenerational Change

Our estimates showed that Karnataka state spends a dismal 5% of its total nutritional allocation on counselling. This is also concentrated on those belonging to the age group 0–5 years. Previous studies have shown that counselling on nutrition provides one the highest returns on investment. The work profile of ASHA workers and AWW leaves very little room for consistent dialogue on nutrition with care givers of children. Both these women are often over-worked and receive very little training on the importance of nutritional counselling. The working group report on nutrition strongly recommended that capacity building for nutrition counselling be

done at all levels of the government. It recommended training of Panchayati Raj members as well as other grass roots members on the importance of nutrition to ensure better community support. An additional VNV whose work focuses only on nutritional interventions and counselling can bring about positive change as seen in the Karnataka Multisectoral Nutrition Project. This volunteer can also relieve some of burdens that the AWWs face. Introducing nutritional education as part of course curriculum in schools can also help bring about awareness in children and their parents about local foods and their nutrition content, preventing future under- and over-nutrition problems. The POSHAN Abhiyaan promotes nutritional counselling as one of its pillars. It has also emphasised the need for community ownership of the programme to improve its reach and efficiency. The scheme also promotes the usage of mobile phones by AWW in digitising the records maintained by them to improve efficiency and reduce errors. This may also help the AWW focus on other tasks like counselling. Karnataka has yet to increase its POSHAN Abhiyaan expenditure.

4.3. Better District-Wise Data for Better Impact

As seen above, nutrition deprivation in children cannot be measured merely by a few health indicators, and even if they can be, these are seldom available at sub-district levels. Currently, a large amount of data is amassed in anganwadi centres and government school health check-ups; when collated with data on birth and death registrations, these can be used for effective tracking of each child in a Panchayat. This may also help in capturing data of deprived out-of-school children who are no longer in the school system and hence unable to avail nutrition benefits. In Karnataka, where almost 97.5% of births is registered (NFHS-5), the time is ripe to develop strong child-tracking systems using already available resources that can be a more effective way of tracking nutritional status in children by age group, gender, and area.

4.4. The Missing 15-to-18-Year-Olds

Currently, anganwadi children (aged 0–5 years), school children (aged 6–15 years), and P&L women are all benefitting from one free meal/THR. However, little data exists on adolescents aged 15–18 years and only 2 adolescent girls per anganwadi are eligible for a free meal. Expenditures on adolescent girls, especially those out of school, cannot be traced. Estimates by age group showed that 7% of expenditure in the age group 11–18 years goes through SNP through anganwadis to out-of-school adolescents. Looking at distribution on nutrition expenditure by districts, expenditure on this age group was lowest in the poorest districts of the states,

namely Yadgir, Raichur, Kalaburagi, etc. However, these districts showed higher expenditures in age group 0–5 years.

The survey by CNNS showed that iron deficiency anaemia is prevalent in 30% of children aged 10–19 years in Karnataka, which is much higher the national average at 21%. The survey also showed that out-of-school girls aged 15–19 years had a higher prevalence of anaemia. Statistics at the level of districts in terms of population of 15-18-year-olds as well as their health and nutrition is still lacking. Public expenditure reviews of health programmes in both Maharashtra and Rajasthan revealed that adolescent health programmes receive one of the lowest priorities in these states, showing decreasing allocations for these programmes (Raghuraman et al., 2019a, 2019b). Girls in this age group are at the start of the reproductive cycle and require micronutrient supplementation and adequate nutrition to prepare them for a safe motherhood ahead. Our study showed a lack of data on how many children aged 15–18 years actually receive benefits of micronutrient programmes under WIFS and deworming.

In conclusion, estimating nutrition expenditures at the sub-district level is not only about calculating costs according to population proportions, but also requires efforts to understand the underlying causes of food deprivation in a particular area; foremost of this is a need for developing sub-district level child nutrition tracking systems. This might be especially effective in tracing children who are out of the school system. A higher emphasis on low-cost interventions such as nutritional counselling will go a long way in addressing intergenerational nutrition disparities, which cannot be solved by food supplementation alone. The start of the intergenerational nutritional cycle begins at adolescence and there a need to concentrate on children aged 15–18 years. In the time of the Covid-19 pandemic, there is a need for more sustainable nutrition intervention as undernutrition has become even more relevant with rising unemployment and inability of children to go to schools and anganwadis, thus missing out on MDM/other meal schemes.

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Nr. Lodhi Road, Nr. 73, Lodhi Gardens,
Lodhi Estate, New Delhi, Delhi 110003
Tel : +91 011 2469 0401



Maitri Bhavan, Number 4, M.N. Krishna Rao Road,
Basavangudi, Bangalore – 560004

Tel: +91 2656 0735

Fax: +91 2656 0734

Email: info@cbps.in

Website: www.cbps.in