Working paper

International Growth Centre

Quantitative Assessment

Beneficiary Nutritional Status and Performance of ICDS Supplementary Nutrition

Andrew Fraker
Neil Buddy Shah
Ronald Abraham

Februrary 2013

DIRECTED BY LSE UNIVERSITY OF OXFORD

FUNDED BY UKaid from the British people

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Quantitative assessment: Beneficiary nutritional status & performance of ICDS Supplementary Nutrition Programme in Bihar

January 23, 2013

Authors: Andrew Fraker, Neil Buddy Shah, & Ronald Abraham

1. Introduction

Child malnutrition is a critical problem in Bihar, where the prevalence of underweight children is far worse than the Indian average and higher than any country in the world.[1] Recognizing this, the Bihar State government (along with the Central government) commits over Rs. 1,100 crore per year ($200 million) to the Integrated Child Development Services (ICDS) Supplementary Nutrition Programme (SNP). However, the government is aware that programme funds are regularly pilfered, and it is common for anganwadi centre staff to fail to provide meals and dry rations to the intended beneficiaries.

This assessment quantifies the shortcomings of ICDS' SNP by providing in-depth analysis of ground-level realities through independent, primary data collection. Evidence from this assessment will provide a foundation for ICDS to work on.

The main findings from this quantitative assessment are:

1. 53% of the SNP budget was "missing" due to leakage
    - 71% of the budget for food served at AWCs was missing
    - 38% of the budget for take home rations was missing
2. The main sources of fund leakage were
    - Anganwadi centres were open 76.5% of the time they should have been
    - Meals were only served 77% of the time when centres were open, and 59% of the time overall
    - When meals were provided, only 386 calories (77% of stipulated amount) and 11.7 grams of protein (78% of stipulated amount) were served per child per day
    - On days when the centres served meals, child attendance was only 56% of the number of children for which the centres get funds
    - 84% of beneficiaries received take home rations (THR), and those that got THR only received 61% of the stipulated amount, on average
3. Nutrition levels were very low
    - 43% of children are underweight-for-age, 58% have low height-for-age, and 20% have low weight-for-height, a prevalence beyond "critical" as per the World Health Organization.
    - 39% of nursing mothers are underweight

The remainder of this report is organized as follows:

[1] Menon, P., Deolalikar, A. & Bhaskar, A., 2009. India State Hunger Index: Comparisons of Hunger Across States. IFPRI

5. Conclusion

2. Background

Child malnutrition in Bihar

In India, 43% of children under age five are underweight for their age.[2] Bihar has the 3rd highest prevalence of underweight children (56.1%) among Indian states, after only Jharkhand (57.1%) and Madhya Pradesh (59.8%).[3] The prevalence of underweight children in Bihar is higher than any country in the world.[4]

ICDS and the Supplementary Nutrition Programme

The Integrated Child Development Services (ICDS) scheme was launched in India in 1975 to address issues critical for child development. The scheme addresses three inter-sectoral aspects of child development – nutrition, early childhood education, and health – and is one of the largest community-based child development programmes in the world. To specifically address child malnutrition, ICDS launched the Supplementary Nutrition Programme (SNP), which provides nutritional food to vulnerable populations such as children up to 6 years of age, pregnant women and nursing mothers.

The SNP has two components:

1. Hot cooked meal and morning snack served daily at anganwadi centres to children ages 3 to 6, and adolescent girls, for 25 days per month
2. Monthly take home rations (THR) for children ages 6 months to 3 years, pregnant and nursing mothers, and adolescent girls

The Government currently spends over Rs. 1,100 crore ($200 million) per annum on the SNP.[5] However, leakage of funds from public service delivery programmes like the SNP is endemic in India and Bihar.

Purpose of this quantitative assessment

ICDS in Bihar wanted to quantify the current level of performance and asked IDinsight to conduct this assessment as part of a larger initiative to refine the Supplementary Nutrition Programme (SNP). The main purposes of this assessment are to quantify:

1. Missing expenditure from the SNP
2. Quality and quantity of nutrition actually received by beneficiaries
3. Nutritional levels of beneficiaries

This assessment will serve as a quantitative description of the status quo, which will serve as the foundation that the ICDS leadership intends to use to support its work in improving the delivery of nutrition to children and the overall performance of the SNP.

[2] The most recent data is seven years old, from NFHS-III, 2005.

[3] Menon, P., Deolalikar, A. & Bhaskar, A., 2009. India State Hunger Index: Comparisons of Hunger Across States. IFPRI

[4] World Bank, 2012. World Development Indicators. Accessed online at: http://data.worldbank.org/data-catalog/world-development-indicators

[5] http://www.icdsbih.gov.in/

Sample and methods

The survey was conducted between November 6 and December 15, 2012. Three districts (Gaya, Muzzafarpur and Madhubani) were selected in a manner to maximize representativeness of the sample to the state of Bihar. At least one district from the Magahi and Maithili cultural-language regions were chosen, and the districts were selected to be as close to the Bihar state averages on key indicators from the 2011 census.

Table 1: Comparing study districts and Bihar on key characteristics

Characteristic	Bihar average	Study districts
Female literacy	53.0%	53.7%
Male literacy	73.0%	74.3%
Population density (pop. per km^2)	1,222	1,102
Gender ratio (girls per 1,000 boys, ages 0-6)	933	936
Children ages 0-6 as % of population	17.9%	17.3%

Source: Census of India, 2011

Within the 3 districts, 20 blocks were selected and within each block an average of 10 panchayats were randomly selected. In each panchayat, one anganwadi centre was randomly selected for surveying.

To gather the data, surveyors[6] made unannounced visits to anganwadi centres between 11:45am – 1:00pm – the hours during which ICDS has specified that anganwadi staff must prepare meals.[7] The surveyors undertook the following eight activities at the anganwadi centre:

1. Direct observation of meal preparation or the lack thereof.
2. Weighing of amount of food prepared
3. Sample collection of food for nutritional analysis at a laboratory.
4. Staff and beneficiary attendance.
5. Examination of child attendance, THR, and monitoring registers
6. Random selection of 1 SNP beneficiary from the children attending on the day of the survey for home visit, anthropometric measurements, and nutrition survey
7. Random selection of 1 THR child beneficiary from the THR register for home visit, anthropometric measurements, and nutrition survey
8. Random selection of 1 THR mother beneficiary from the THR register for home visit, anthropometric measurements, and nutrition survey

The final sample includes:

1. 200 anganwadi centres
2. 200 children ages 6 months to 3 years (one per centre)
3. 200 pregnant or nursing mothers (one per centre)
4. 153 children ages 3-6 (one for each centre open on the day of visit)
5. 172 shopkeepers (minimum of 6 per block)

[6] The surveyors were hired, trained, and managed by a third-party evaluation organization, IDinsight, and have no relationship with the government or ICDS. This was done to ensure integrity of data collected from the random visits.

[7] During the winter, anganwadi centres are open from 10AM to 2PM.

3. Anganwadi Centre Performance

Missing expenditure

ICDS leadership is keenly aware that leakage exists in the SNP system, but does not know the precise level or the main sources. This assessment carefully quantifies missing expenditure according to each of the possible margins on which funds could go missing.[8] As stated previously, SNP has two components:

1. Hot cooked meal and morning snack served daily at anganwadi centres to children ages 3 to 6, and adolescent girls, for 25 days per month
2. Monthly take home rations (THR) for children ages 6 months to 3 years, pregnant and nursing mothers, and adolescent girls

Missing expenditure from the daily lunch component

If the anganwadi centre is open on all 25 days per month, and the anganwadi centre staff serve the government prescribed quality and quantity of food to the number of children that are officially recorded in their registers as attending, then average anganwadi expenditure per month would be Rs. 5,497, while the monthly allotment is Rs. 4,592. This difference is due to the higher prices of foodstuffs in the local markets, as compared to the price list used by ICDS.

However, from the allotment of Rs. 4,592 only 1,326 Rs. are spent per month, due to the following five factors: 1) closed anganwadi centres, 2) anganwadi centres that were open, but did not serve meals, 3) children that are not present for the meal, if a meal is served, 4) insufficient amount of ingredients, and 5) the cost of the ingredients. Graph 1 below illustrates the measured levels of each of these factors, and each is explained below.

1. **Closed anganwadi centres**: 24% of anganwadi centres were found closed on the day of the surveyor visit, reducing expenditure by 24 percentage points.[9]
2. **Meals not served when centre is open**: Of the open anganwadi centres, meals were not served 23% of the time. This pushes expenditure down a further 18 percentage points.[10] Thus, it follows that meals were only served on 59% of days when they should be.
3. **Children not present for meals:** On average only 22 children out of the 40 that should attend (and for whom the anganwadi worker is receiving funds) are present for meals. This pushes expenditure down a further 26 percentage points, from 59% to 33%.
4. **Ingredient underutilization**: Only 73% of the stipulated ingredients (mostly rice and dal) are used, further pushing the total expenditure down 9 percentage points from 33% to 24%.
5. **Ingredient cost**: Ingredients needed to prepare the meals on average cost 20% more on average than the amount allocated by ICDS. This increased total expenditure 5 percentage points, from 24% to 29%

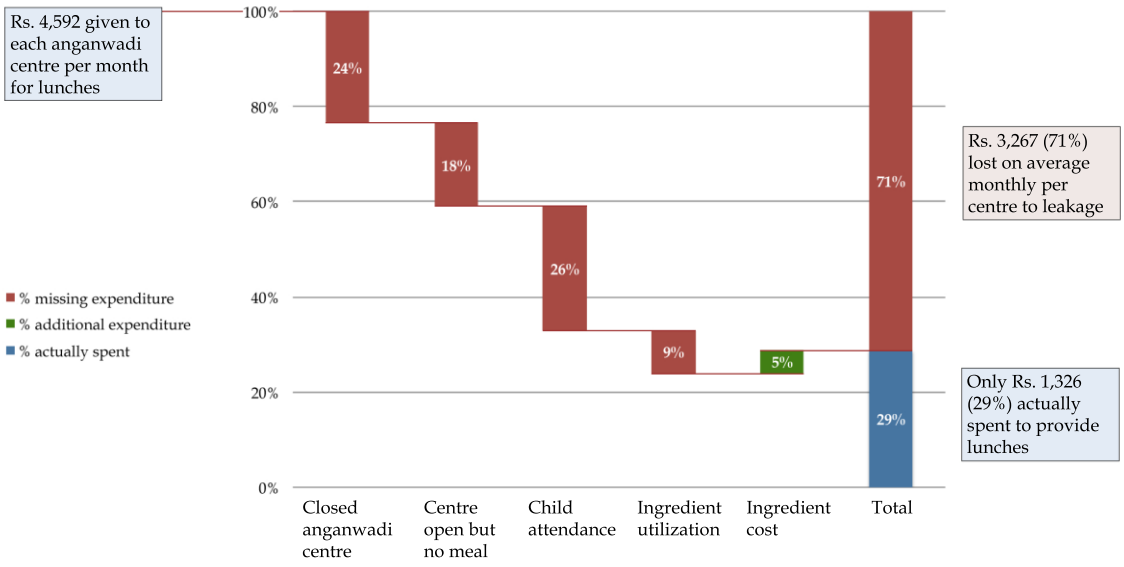
[8] Anecdotally, supervisory staff such as CDPOs sometimes extract rents from the Sevikas. This assessment was unable to capture what portion of the missing expenditure is goes in that channel. This report is also unable to quantify how much missing expenditure was due to not providing daily snacks to children (5.2% of the SNP budget), which anecdotally was not done frequently.

[9] We confirmed with villagers and ICDS that these centres were not permanently closed, but rather closed on that particular day.

[10] 17 percentage points is calculated as following: 76% of centres are open * 23% that do not serve meals = 17%.

Taken together, **an estimated 71% of funds the anganwadi worker receives for this component of SNP are not spent on the beneficiaries.** This means Rs. 3,267 are effectively pilfered per anganwadi centre per month through the hot cooked meal and morning snack component of SNP.

Graph 1: Missing lunch expenditure: contribution of each factor



Missing expenditure from the take home rations (THR) component

The THR component is intended to provide bags of rice and dal to young children, and pregnant and nursing mothers once per month. Missing expenditure in THR is due to three factors: 1) the percentage of intended beneficiaries that do not receive any THR, 2) beneficiaries not receiving the intended quantity of THR, and 3) the price of rice and dal. Graph 2 below summarizes missing expenditure for rice, and graph 3 for dal.

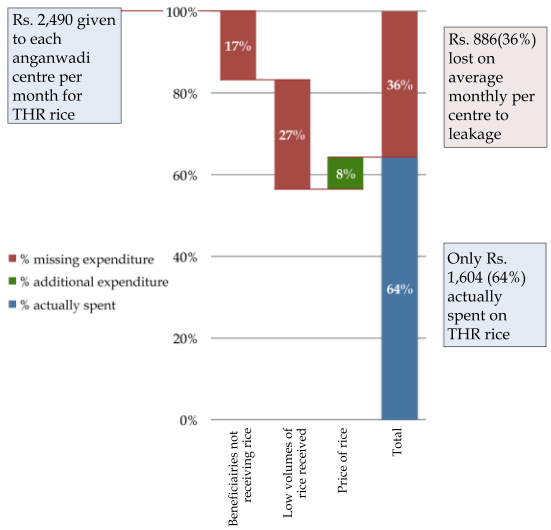
For rice:

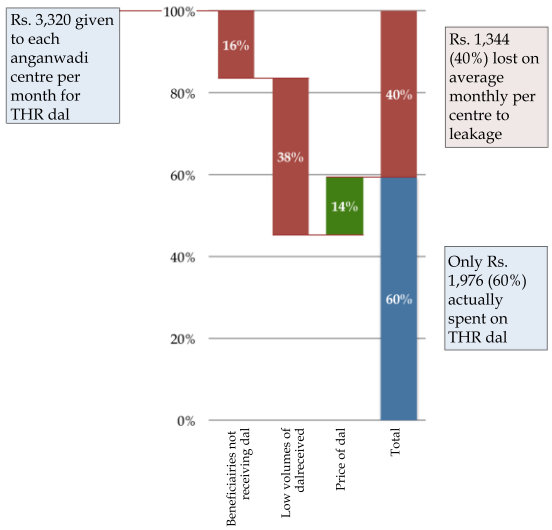
1. **Not receiving any rice**: 83% of beneficiaries reported receiving THR of rice, which translate to a leakage of 17 percentage points
2. **Receiving insufficient quantities of rice**: Beneficiaries reported receiving only 68% of the government prescribed quantity of rice, increasing leakage by 27 percentage points.
3. **Cost of rice**: Rice cost 14% more than what ICDS provides for, decreasing leakage by 8 percentage points.

In total for THR rice, 36% of funds received by the anganwadi worker are "missing".

Graph 2: Missing THR rice expenditure: contribution of each factor

Graph 3: Missing THR dal expenditure: contribution of each factor





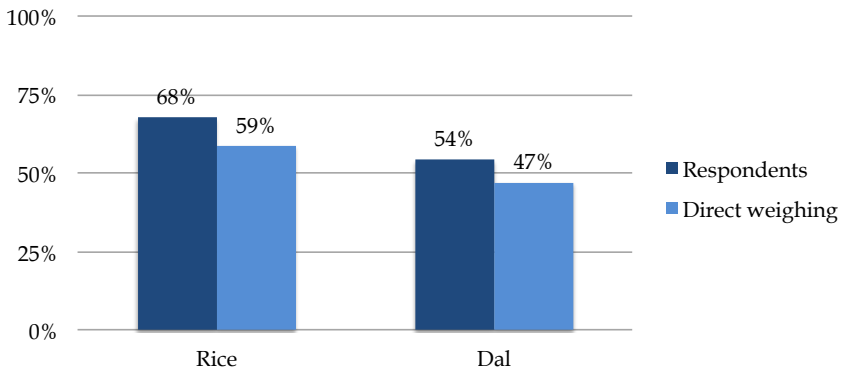
For dal:

1. **Not receiving any dal**: 84% of beneficiaries reported receiving THR of dal, which translates to a leakage of 16 percentage points
2. **Volume of dal received**: Beneficiaries reported receiving only 54% of the government prescribed volume of dal they should have, increasing missing expenditure/leakage by 38 percentage points.
3. **Cost of dal**: Dal cost 31% more than what ICDS provided for, decreasing missing expenditure by 14 percentage points.

In total for THR dal, 40% of funds received by the anganwadi worker are "missing" due to leakage.

There is some evidence that the missing THR expenditure is slightly underestimated. In addition to asking beneficiaries how much they received, on the November take home ration distribution day surveyors visited 34 anganwadi centres randomly selected from the 200 anganwadi centres in the survey sample and directly measured the quantity of take home rations being distributed. These average quantities are lower for rice and dal than what beneficiaries reported. See Graph 4 below. For the purposes of this analysis the beneficiary reported values are used.

Graph 4: Percent of intended take home ration quantity received, according to beneficiaries and direct weighing



Overall for THR, 38% of funds received were not spent on beneficiaries. This means Rs. 2,230 are pilfered on average per anganwadi centre per month through the THR component.

Overall missing expenditure

Table 2: SNP missing expenditure per programme component per anganwadi centre per month (in Rs.)

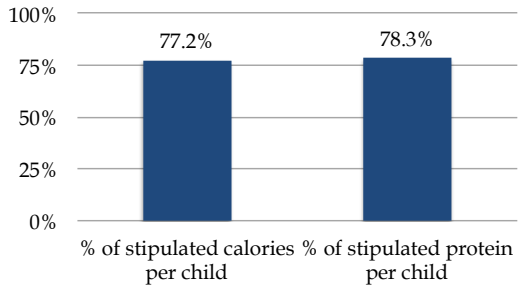
SNP Component	Budget	Amount spent	Missing expenditure	% of component funds missing	Share of total SNP funds missing
Lunch	4,592	1,326	3,267	71%	59%
THR	5,810	3,580	2,230	38%	41%
Total	10,403	4,906	5,497	53%	100%

More than half – 53% of funds received by the anganwadi workers – are not spent to provide food to the children and mothers. If the observed anganwadi centres are typical of others throughout Bihar, this amounts to an estimated loss of over Rs. 581 crores ($ 106 million) per year for the state and central exchequer. Some of the key anganwadi centre performance factors are analyzed below.

Nutritional quality of the meals: calories and protein

For the daily lunch and snack component of SNP, food samples were taken from the cooked meals at the anganwadi centre, preserved with formaldehyde solution and ice, and sent to Mitra S. K. Private Limited[11] in Kolkata to measure caloric and protein content. On the 59% of days when children were actually served a meal, children were provided with 386 calories per meal each, and 11.7 grams of protein, on average.[12] This is 77% and 78% of the government-required amounts of 500 calories and 15 grams of protein per meal, respectively.

Graph 5: Percent of required calories and protein per child actually provided



Staff attendance

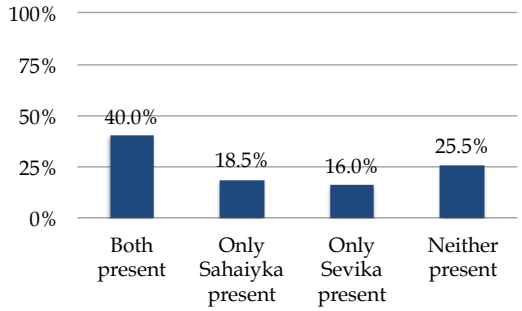
Each anganwadi centre is staffed by a Sevika, who runs the centre, and a Sahayika, who assists the Sevika, and is responsible for cooking the meal. However only in a minority (40.0%) of cases were both found present at the anganwadi centre at the time the surveyor arrives. Graph 6 also shows that in 18.5% of cases only the Sahayika was there, in 16.0% only the Se-

[11] Mitra SK's laboratories are recognized by the National Accreditation Board for Testing and Calibration Laboratories.

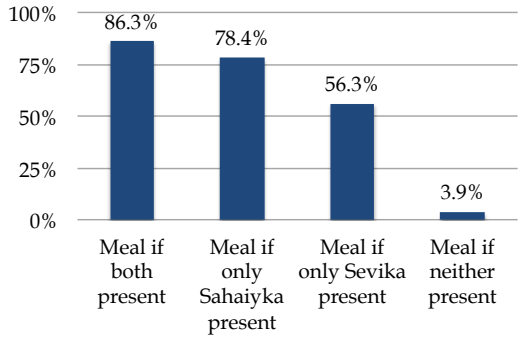
[12] We did not find systematic evidence of surveyor effects on the amount of food being prepared or the type of ingredients used. Comparing cases where surveyors arrive at the food preparation stage vs. after the meal had already been cooked, the amount of protein per child was very similar, after accounting for 1 extreme outlier. Likewise the number of calories per child was somewhat higher on average for the preparation stage observations, but this was not statistically significant.

vika was there, and in 25.5% neither were present, usually resulting in the anganwadi centre being closed. Overall Sevikas were present 56.0% of the time, and Sahayikas 58.5%.[13]

Graph 6: Attendance of anganwadi centre staff



Graph 7: Meal provision rates by staff attendance



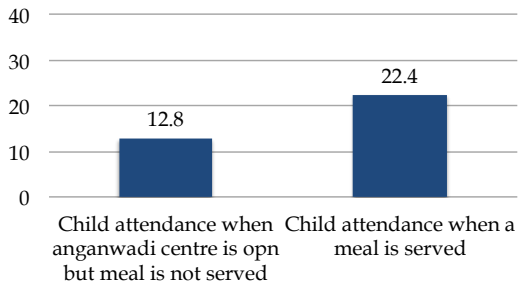
Staff presence is closely correlated with meal provision. Graph 7 shows that in cases where both staff members were present, meals were served 86.3% of the time. When the Sevika was absent, the meal provision rate fell to 78.4%, and if the Sahayika was absent, meal provision was only 56.3%. If neither were there meals were only served 3.0% of the time.[14]

Child attendance

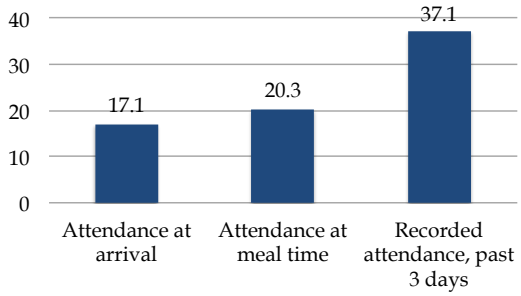
Anganwadi centres are provided funds to feed 40 children. In cases where the anganwadi centre was open, on average only 17.1 children were present when the surveyor arrived. Attendance increased slightly to 20.3 children[15] by the time the meals are usually served. Of the children in attendance, 58% were girls.

Child attendance is closely associated with meals being served. An average of 22.4 children attend when a meal is served, but when the anganwadi centre is open but not serving a meal, average attendance is only 12.8. According to the official attendance registers for the past 3 working days, Sevikas reported an average attendance of 37.1 children, which is evidence of over reporting by a factor of almost 2, as shown in Graph 9.

Graph 8: Child attendance and meal provision



Graph 9: Observed and reported child attendance



[13] Sevika attendance was lower (42.1%) during the quarterly polio immunization campaign and higher (61.5%) for the majority of the survey that occurred after polio week. Sahayika attendance remained the same, and meals were served less frequently, though this was not statistically significant at p=0.10.

[14] In these cases one of the staff members had been there to prepare the meal, and would return when she learned a surveyor was there.

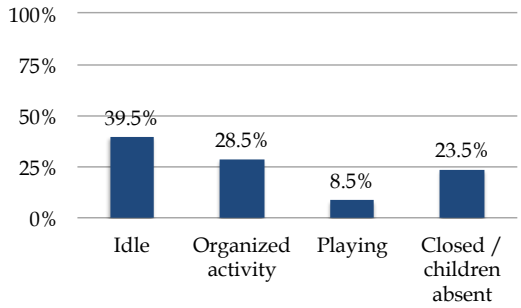
[15] This figure includes centres that did not serve meals, which had lower attendance on average. See graph 8.

If anganwadi centres functioned as they should: open 25 days per month with 40 children attending, surveyors would have observed 8,000 children. In fact, they only saw 3,041 children, or 38% of the number they should have seen.

Child activities

Not only do anganwadi centres do a poor job of providing meals for children, they offer few learning opportunities. Graph 10 shows that in only 28.5% of cases were children participating in an organized activity, and 8.5% of the time they were playing. 39.5% of the time the children were simply sitting idle, while 23.5% of the time no children were present, usually because the anganwadi centre was closed on that day.

Graph 10: Child activities



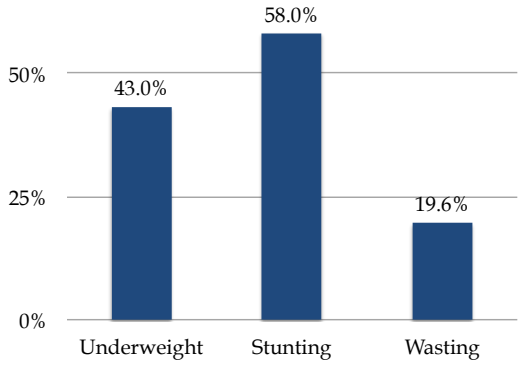
4. Beneficiary nutrition levels and nutrition at home

Nutrition levels

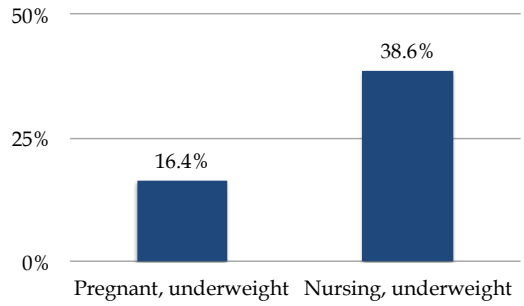
Children under age five

Overall, 43% of children under age 5 in the sample are underweight for their age,[16] as shown in Graph 11. This is lower than what the 2005 National Family Health Survey-3 survey indicates, but is almost identical to the data from a 2011 survey conducted by the Naandi foundation.[17] 58% of children suffer from stunting (low height-for-age) which is due to chronic malnourishment. Almost 20% of children suffer from wasting (low weight-for-height), which is often related to acute malnutrition.[18] These high levels are cause for concern: the World Health Organization deems a prevalence of low weight-for-height over 10% as "serious" and over 15% as "critical".

Graph 11: Child nutrition levels



Graph 12: Mother nutrition levels



Mothers

The pregnant and nursing mothers also suffer from high levels of malnutrition. 16.4% of pregnant mothers are below the underweight threshold for non-pregnant mothers (body mass index below 18.5 kg / m^2), despite the necessary weight gain due to pregnancy. Low maternal body mass index is associated with increased risk of intrauterine growth restriction,[19] which increases the risk of illness, disability and death.[20] In addition, nearly 2 in 5 (38.6%) of nursing mothers are underweight.

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[16] Technically, underweight is defined as "percentage of children under five years who have a weight-for-age below minus two standard deviations of the NCHS/ WHO reference median," stunted is the "percentage of children under five years who have a height-for-age below minus two standard deviations of the National Center for Health Statistics (NCHS)/WHO reference median," and wasted is the percentage of children under five yeas who have a weight for height below minus two standard deviations of the NCHS/ WHO reference median. Source: http://www.who.int/healthinfo/statistics/indchildrenstunted/

[17] HUNGaMA (2011), *Fighting Hunger and Malnutrition, The HUNGaMA Survey Report 2011.* In their survey in 112 districts in 9 states, 2 were in common with our survey. Our measures of the prevalence of underweight and stunted children were near identical in each of these districts.

[18] See this source for further explanation and interpretation of the nutrition metrics: http://www.who.int/nutgrowthdb/about/introduction/en/index2.html

[19] Fishman SM, Caulfield L, de Onis M, et al. Childhood and maternal underweight. In: Ezzati M, Lopez AD, Rodgers A, Murray CLJ, eds. Comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors. Geneva: World Health Organization, 2004: 39–161.

[20] Black RE, Allen LH, Bhutta ZA, et al, for the Maternal and Child Undernutrition Study Group. Maternal and child undernutrition: global and regional exposures and health consequences. Lancet 2008; 371: 243–60.

Association between nutrition levels and anganwadi centre performance

The following table shows how anganwadi centre performance variables are correlated with beneficiary nutrition. However, most are not statistically significant, and no causal relationships can be claimed. It is possible that better performing anganwadi centres increase beneficiary outcomes, however it is also possible that areas with better nutrition levels are more developed in general, and also have better functioning anganwadi centres. The coefficients in the table are the average difference between z-scores[21] for beneficiaries belonging to an anganwadi centre found to be of a certain status (indicated by the column heading, such as Sevika being present or absent) on the survey day. Observations at the anganwadi centre are positively correlated with nutritional outcomes of children eligible for meals (ages 3–6) in 9 out of 12 cases.

Table 3: Association between nutrition levels and anganwadi centre performance

	AWC open	Sevika present	Sahayika present	Both present	Meal served
Weight-for-age (3-6)	-	0.46	0.01	0.27	0.16
Height-for-age (3-6)	-	0.19	0.29	0.35	0.42
Weight-for-height (3-6)	-	0.51	-0.25	0.08	-0.17
Weight-for-age (6m-3y)	-0.13	-0.02	0.04	0.06	0.07
Height-for-age (6m-3y)	-0.32	-0.09	0.05	0.14	-0.02
Weight-for-height (6m-3y)	0.07	0.05	-0.02	-0.06	0.13
Body mass index (mothers)	0.73*	0.59*	0.46	0.44	0.16

* indicates statistically significant with p<0.10. Values shown are z-scores.

Home nutrition

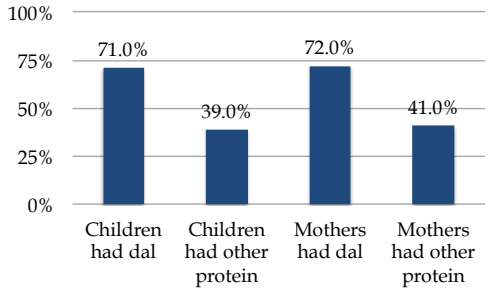
Meals at home

Children who attend the anganwadi centres eat meals and snacks 3.3 times a day at home. They usually eat once in the morning before attending the anganwadi centre, then 2 or 3 times after returning home. Households do not seem to respond to whether or not the AWC served a meal: children have 3.3 meals on days when the AWC served a meal and 3.1 on days when they did not.[22],[23]

Children and mothers usually have dal once per day, and that is their main source of protein. Graph 13 below shows that 71% of children and 72% of mothers had eaten dal on the day before the survey, and 39% and 41% had eaten other protein sources. Only 23% of children and 17% of mothers had not eaten any protein sources on the previous day of the survey.

[21] A z-score is the standard deviation above or below the NCHS/ WHO reference median for a given age and gender.
[22] The difference is not statistically significant.
[23] We are unable to comment on whether the quantity of food received at home lessens in response to food received at the anganwadi centre.

Graph 13: Protein sources at home on the day before the survey



Conclusion

There are no easy solutions guaranteed to reduce leakage and increase the provision of nutritious food to Bihar's millions of malnourished children and mothers. This quantitative assessment was a first step that provides evidence of what the sources of leakage and areas of concern are overall. This report provides the foundation for the design of interventions by ICDS to improve the Supplementary Nutrition Program. Ideally, each intervention should be piloted, refined, and rigorously evaluated for impact before scaling across the state. The Government of Bihar and ICDS' eagerness to innovate and to improve the performance of SNP provides hope that the status quo can improve, ultimately benefiting millions.

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