The National School Meal Program in India: A Literature Review

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ABSTRACT

Objective: To describe the Indian school meal program (Mid-Day Meal: MDM) with the aim of improving the nutritional status of children.

Method: This study investigated the Indian central government's reports and articles about the school meal program.

Results: In India, the MDM has been institutionalized, along with compulsory education. In 2015~2016, MDM coverage was 81%, with a high proportion of MDM working days. However, the school attendance rate was low, with many absent children. Despite established nutritional standards for school meals and hygiene management guidelines, there were no data on school compliance rates. To evaluate processes, each school reported to the central government, as part of a national system of monitoring system operational situations (e.g., coverage). The expected improvement in children's nutritional status after the introduction of the MDM has never been confirmed because no national health survey has been carried out to evaluate outcomes. By introducing the MDM and promoting compulsory education, the central government has triggered a rise in school enrollment rates. A plan-do-check-act (PDCA) system is in place, with a Steering-cum-Monitoring Committee assuming a key role in this system.

Conclusions: When the MDM was institutionalized in India, along with compulsory education, it represented the world's largest school meal program. The Japanese experience of introducing a children's national health surveillance system could be useful in evaluating the success of the MDM program in improving children's nutrition.

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Key words: school meal program, coverage, nutrition management, program evaluation, India

I. Introduction

A school meal program can play an important role in increasing school attendance rates, providing an educational and social safety net, ensuring healthy child growth, and encouraging local agricultural production in low-income countries^{1, 2)}. Although previous reviews of school meal programs in low-income countries have evaluated program sustainability, they have focused on costs and budgets^{1, 2)}. The nutritional guidelines and menus adopted by school meal programs have been studied and evaluated³⁾. However, few studies have assessed school meal programs in low-income countries to discover whether (or to what extent) they have improved the nutritional status and healthy growth of children.

Although previous studies have presented an overview of the Indian school meals program, detailing its background, objectives, and components⁴⁾, few have assessed

its current status or the challenges associated with improving the nutritional status and healthy growth of children. The present study fills this gap by reviewing the program, with the aim of improving school meals, not only in India, but also in other countries. To achieve this, we have used three indicators: coverage, school meal quality, and evaluation and feedback, focusing on the following elements:

1. The coverage provided by school meals (the number of students served)
2. The quality of school meals (e.g., nutritional management, hygiene management, and nutrition education)
3. Evaluation and the plan-do-check-act (PDCA) cycle (in particular, whether assessment outcomes related to children's health or growth have been obtained)

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II. Method

The present study has focused on six key aspects of nutritional programs: the health and nutritional status of schoolchildren; school meal program objectives and the history of national policies, laws, and guidelines; implementation systems; coverage: the number of children served; the quality of school meals; and evaluation and feedback systems. Three areas: the quality of nutritional management; hygiene management; and nutritional education have been used as criteria to determine the quality of school meals. As these three areas are advanced fields in Japan, exploring Indian school meals from a Japanese perspective can highlight problems in the Indian program. The Indian process and outcomes have been evaluated to determine whether the school lunch program is being managed well.

Research materials have included relevant literature, including government reports, the school meal program website, and articles located through the Medline database.

III. Results

1. Basic information and the nutritional status of Indian children

In 2015, India's population numbered 1.309 billion; children between the ages of 0 and 14 made up 28.7%⁽⁵⁾ of the population. In primary schools, the gross enrollment ratio (number of pupils of any age enrolled in primary education, as a percentage of the total official school-age population) was 107.9%; in 2014, the net enrollment ratio (number of pupils of official primary school age enrolled in primary education as a percentage of the total number of children in the official school-age population) was 90%. In 2010, the agricultural employment ratio was 51.9%. As of 2015, India was regarded as a lower-middle-income country with a per capita GDP of US \$1,593.30.

In India, children under five have a stunted rate of growth (height for age) of 38.4% and an underweight rate (weight for age) of 35.7%⁽⁶⁾. Data from local investigations (Table 1) have shown the prevalence of undernutrition in children (weight for age) to be 63% for children aged 6~9, 78% for children aged 10~13, and 66% for children aged 14~17⁽⁷⁾.

Table 1 Distribution (%) of school-age children and adolescents in some regions of India, according to nutritional status (weight for age)

Age group (years)	n	Nutritional status*			
		Normal [†]	Mild [‡]	Moderate [§]	Severe
6~9	5,453	5.4	31.9	54.0	8.6
10~13	4,526	3.9	18.2	47.8	30.1
14~17	2,420	4.5	29.5	47.1	18.9

* National Center for Health Statistics (NCHS) Standards

[†] >90% weight for age (NCHS)

[‡] 75~89.99% weight for age (NCHS)

[§] 60~74.99% weight for age (NCHS)

^{||} <60% weight for age (NCHS)

Source: National Nutrition Monitoring Bureau (2002)⁽⁷⁾

Table 2 Energy requirements for different groups in India

Group	Mean weight NNMB [†] (kg)	(a) Requirement for mean weight (kcal)	(b) Actual intake (kcal)	Gap (a)-(b) (kcal)
Adult man	51	2,346	2,000	-346
Adult woman	46	1,886	1,738	-148
Pregnant	-	2,336	1,726	-510
Lactating	-	2,386	1,878	-518
1~3 y	10.5	840	714	-126
4~6 y	14.6	1,095	978	-117
7~9 y	19.7	1,379	1,230	-149
Boys				
10~12 y	26.6	1,729	1,473	-256
13~15 y	36.8	2,208	1,645	-563
16~17 y	45.7	2,514	1,913	-601
Girls				
10~12 y	26.7	1,469	1,384	-85
13~15 y	36.9	2,030	1,566	-464
16~17 y	42.6	2,130	1,630	-500

[†] Mean weights derived from the results of a National Nutrition Monitoring Bureau study.

Source: Working Group Report on Elementary Education and Literacy in the 12th Five Year Plan (2012~2017)⁽⁸⁾.

The standard energy requirements for each age group are based on an average weight; Indian children's actual intake and the gap between the required nutrition and actual intake are shown in Table 2. The gap between the requirements and actual intake was widest among adolescents⁽⁸⁾. These results show that India urgently needs to improve the nutritional status of children.

2. Implementation of the school lunch program

The Indian school meals program is called the Mid-Day Meal (MDM) scheme. Launched in 1995, it became mandatory in 2001, with the following objectives: “to solve hunger in schools by serving a hot cooked meal, to improve the nutritional status of children, and to encourage poor children belonging to disadvantaged sections to attend school more regularly and to help them concentrate on classroom activities, thereby increasing the enrollment, retention and attendance rates”⁹⁾.

Table 3⁹⁻²⁵⁾ shows the MDM’s history. To enforce the program, roles exist all levels: country, state, district, block, Gram Panchayat (local self-government organization of the Panchayat raj system at the village or small-town level), local government, and school. Grains (rice or wheat) are procured by the Food Corporation India and donated gratis by the central government. The National Steering-cum-Monitoring Committee (SMC), which monitors the program, assesses its impact, coordinates departments and agencies, and provides policy advice to central and state governments. States and Union Territories (UTs) are required to establish SMCs at the state, district, and block levels to monitor program implementation. All state governments and UTs must authorize one department to assume overall responsibility for program implementation. In other words, nodal departments must establish implementation cells to monitor program implementation at the school level. The Gram Panchayat or municipality may assign program supervision at the school level to the Village Education Committee (VEC), School Management and Development Committee (SMDC), or Parent Teacher Association (PTA); these bodies are then accountable to the Gram Panchayat or municipality. Responsibility for cooking and supplying the meals is entrusted to local women’s self-help groups, local youth clubs affiliated with the Nehru Yuvak Kendras, voluntary organizations, or personnel engaged by the VEC, SMDC, PTA, Gram Panchayat, or individual municipalities. In urban areas, where a group of schools may share a centralized kitchen, hot cooked meals are transported to schools⁹⁾. In 2016, the cost of food preparation came to Rs. 4.13 (primary) and Rs. 6.18 (upper primary) per child per day. Central and state governments share this cost and the central government covers the costs of all UTs. Parents do not contribute. During the 2015–2016

school year, lunch operating costs totaled Rs. 915.155 million²⁶⁾; school meals accounted for 0.51%²⁷⁾ of the nation’s total expenditure, a drop from 2012–2013, when school meals made up 0.77% of the whole.

3. MDM coverage

The MDM program targets children in the primary (Classes I–V: 5–9 years old) and upper primary age groups (Classes VI–VIII: 10–12 years old), providing meals to government-run, locally supported, and government-aided schools, as well as to schools in the EGS (Education Guarantee Scheme: alternative schools in underserved locations without a formal school within a radius of 1 kilometer and at least 15–25 children ages 6–14 not attending school), AIE (Alternative and Innovative Education: alternative, temporary schools that accommodate child workers, immigrants, and slum and street children), and to Madrasas and Maqtabas (Islamic primary and upper primary schools). The total number of target schools and students comes to approximately 1.192 million and 104.6 million, respectively⁸⁾. In 2010–2011, there were approximately 1.196 million primary and upper primary schools and 197.4 million school children in Classes I–VIII²⁸⁾, making India’s school feeding program the world’s largest. Importantly, only 68.8%⁶⁾ of girls aged 6 or older have ever attended school; 31.2% of girls have never been to school. In fact, even if they are registered for a school place, many children do not attend school. Estimates (2011) place the population of children between 6 and 13 at about 208.2 million²⁹⁾; this figure shows that roughly 10.89 million children have never been to school.

During the 2015–2016 school year, state and UT reports indicated that MDM coverage was 81%³⁰⁾; this figure was calculated by totaling the average coverage in each state and then averaging the entire nation’s coverage. The 2006 MDM Guidelines required the MDM program to be implemented for more than 200 days per year; however, the number of MDM working days differs from state to state; as a result, coverage of the denominators for each stage is not unified. In the present study, we have used state reports to calculate the average number of working days³⁰⁾. Our findings show that, in 2015–2016, the percentage of working days was high, at 94%.

4. Quality of MDM

Table 4 presents the MDM food standards or norms. The MDM standard/recommended dietary allowance

Table 3 The history of the Mid-Day Meal in India

Year of enforcement	Action	Content
1925	The Mid-Day Meal Program (MDMP) was introduced by the Madras Municipal Corporation.	A program was introduced for disadvantaged children, using their own resources.
By 1990–1991	Twelve states had implemented the MDMP.	A program was introduced, using their own resources.
1995.8.15	The National Program for Nutrition Support to Primary Education (NP-NSPE) was launched ^{a)} .	<ul style="list-style-type: none"> • The program was launched in certain blocks. • Central assistance provided free food grain: 100 g/child/school day Subsidy for transporting food grain: maximum Rs.50/100 kg
By 1997–1998	The program was extended to all regions of the country ^{b)} .	
2001.11	The Supreme Court of India ordered the MDMP to begin ^{c)} .	<ul style="list-style-type: none"> • The MDMP provided all school children with 300 kcal of energy and 12 g of protein for 200 days. The children were in Classes I–V of all government-run, local organization-run, and government-aided primary schools.
2002.10	The scheme was extended ^{d)} .	The program was further extended to cover children studying in Education Guarantee Scheme (EGS) and Alternative and Innovative Education (AIE) centers.
2004.9	The NP-NSPE was revised ^{b)} .	<ul style="list-style-type: none"> • Central assistance: <ul style="list-style-type: none"> (a) Free supply of food grain: 100 g/child/school day. (b) Cooking costs: Rs.1/child/school day (c) Transport subsidy: special category states[†]: maximum of Rs.100/quintal. other states: maximum of Rs.75/quintal (d) Management, monitoring, and evaluation (MME) cost: 2% of the cost of food grains, transport subsidies, and cooking assistance (e) Provision of mid-day meals during the summer vacation in drought-affected areas • 450 kcal and 12 g of protein • Established a food standard (norm) • Central assistance: <ul style="list-style-type: none"> (a) Cooking cost: Rs.2/child/school day (b) Assistance to construct kitchen/store room: maximum of Rs.60,000/unit (c) Assistance for provisioning and replacing kitchen devices: an average cost of Rs.5,000/school (d) Management, monitoring, and evaluation (MME) cost: <ul style="list-style-type: none"> A rate of 1.8% applied to total assistance with free food grains, transport costs, and cooking costs. Another 0.2% of the above amount was used by Central Government for MME.
2006.7	The NP-NSPE was revised ^{b),d)} .	<p>The program covered children in upper primary (Classes VI to VIII) in Educationally Backwards Blocks (EBBs).</p> <p>The Mid-Day Meal was extended to cover all children in upper primary classes from 2008–09.</p> <p>(upper primary class)</p> <ul style="list-style-type: none"> • 700 kcal and 20 g of protein • Central assistance: <ul style="list-style-type: none"> (a) Free supply of food grain: 150 g/child/school day. (b) Cooking costs: Rs. 2.50/child/school day (c) Provision of mid-day meal during the summer vacation in drought-affected areas (d) Assistance to construct a kitchen/store room: maximum of Rs. 60,000/unit (e) Assistance with kitchen devices: an average cost of Rs.5,000/school (f) Transport subsidy: special category states: maximum of Rs.100/quintal→Rs.125/quintal
2007.10	The scheme was extended and the name changed from NP-NSPE to the National Program of Mid-Day Meals in Schools (NP-MDMS) ^{e)}	

2008.4	The scheme was extended ^{d)} .	Madrasas/Maqtabas [†] , supported under Sarva Shiksha Abhiyan (SSA), were covered.
2009	The Right of Children to Free and Compulsory Education Act was introduced, 2009	
2009.11	Food standards were revised, costs increased & kitchen helpers received honoraria ^{e)} .	<ul style="list-style-type: none"> • Set a standard for MDM nutrients and foods (Classes VI to VIII) • Central assistance: (a) Cooking costs: Rs.2.0→Rs.2.50 (Classes I-V) , Rs.2.50→Rs.3.75 (Classes VI to VIII) (b) Kitchen helpers received honoraria: Rs.1,000/month
2010.8	The state-level Steering-cum-Monitoring Committee (SSMC) took control ^{b)} .	
2010.9	Guidelines were published for engaging with voluntary organizations/NGOs, 2010 ^{b)}	Responsibility for cooking/providing the MDMs
2011.10	The scheme was extended ^{d)} .	Children covered under the National Child Labor Projects (NCLP) [§]
2012.7	The Ministry of Health and Family Welfare prescribed legal standards for using double fortified salt (iron and iodine) ^{k)}	
2013.7	There was an outbreak of food poisoning in the Bihar MDM.	23 children died after eating a MDM contaminated with agricultural chemicals.
2013.7	Guidelines were introduced to ensure safety and hygiene in the MDMS ^{b)}	<ul style="list-style-type: none"> • Setting up the management structure • Tasting the meal • Safe storage and the proper sourcing of ingredients • Capacity building • Cooking the MDMs • Awareness of MDMS • Convening the Monitoring Committee • Convening regular review meetings • Social Audit, etc.
2015.2	Guidelines on food safety and hygiene were introduced for school kitchens under the MDMS ^{m)}	<ul style="list-style-type: none"> • Food safety and hygiene • Hand washing for children • Infrastructural requirements for food safety and hygiene in the kitchen/store room
2015.9	The Mid-Day Meal Rules were introduced, 2015 ⁿ⁾	<ul style="list-style-type: none"> • Role of SMCs • Quality of food • Food security allowance, etc.
2017.4	The Model Memorandum of Understanding (MoU) set rules for engaging with Civil Society Organizations and non-govt. organizations (CSO/NGO) in MDMS ^{o)}	Standard format MoU to be signed by states/UTs with centralized kitchens.

[†] special category states: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim, Himachal Pradesh, Jammu and Kashmir, Uttarakhand.

[‡] Madrasas: Islamic educational institutions for preschool to graduate-school students. Maqtabas: Private schools for studying Islam[¶].

[§] National Child Labor Project (NCLP): The Scheme seeks to adopt a sequential approach with a focus on the rehabilitation of children working in hazardous occupations and processes^{¶ii}.

In the NCLP Special Training Centers, these children are provided with bridge education, vocational training, a mid-day meal, stipends, health care, and recreation etc.

^{¶i} Kusakabe,T., Madrasa of Bangladesh, Islamic journal (2009)¹⁰⁾.

^{¶ii} REVISED NCLP Guidelines: Ministry of Labor and Employment Child Labor Division (2016)¹¹⁾.

Source:

^{a)} Guidelines of the National Program of Nutritional Support to Primary Education (2004)¹²⁾

^{b)} Guidelines of the National Program of Nutritional Support to Primary Education (2006)¹³⁾

^{c)} Supreme court orders on the right to food, (August 2008)¹⁴⁾

^{d)} Program Evaluation Organization Planning Commission Government of India: Performance Evaluation of COOKED MID-DAY MEAL (2010)⁹⁾

^{e)} Govt. of India MHRD Department of School Education & Literacy MDM Division, Extension of MDM Program to upper primary in EBBs (September 27, 2007)¹⁵⁾

^{f)} Govt. of India MHRD Department of School Education & Literacy MDM Division, Extension of the MDM Program to eligible Madrasas/Maqtabas (April 21, 2008)¹⁶⁾

^{g)} Govt. of India MHRD Department of School Education & Literacy MDM Division, Revision of food grain standards, cooking costs, honoraria for kitchen helpers (December 31, 2009)¹⁷⁾

^{h)} Govt. of India MHRD Department of School Education & Literacy MDM Division, State-level Steering-cum-Monitoring Committee (August 30, 2010)¹⁸⁾

ⁱ⁾ Govt. of India MHRD Department of School Education & Literacy MDM Division, Guidelines for engaging with voluntary organizations/NGOs 2010 (September 8, 2010)¹⁹⁾

^{j)} Govt. of India MHRD Department of School Education & Literacy MDM Division, Guidelines for providing MDM to children through the National Child Labor Project (October 27, 2011)²⁰⁾

^{k)} Govt. of India MHRD Department of School Education & Literacy MDM Division, Use of double fortified salt for MDMS (vide D.O.No.5-5/2011-MDM-1-1) (July 1, 2012)²¹⁾

^{l)} Govt. of India MHRD Department of School Education & Literacy MDM Division, Guidelines to ensure quality, safety, and hygiene under the MDM scheme (July 22, 2013)²²⁾

^{m)} Govt. of India MHRD Department of School Education & Literacy MDM Division, Guidelines on food safety and hygiene for school-level kitchens under the MDM scheme (February 13, 2015)²³⁾

ⁿ⁾ Govt. of India MHRD Department of School Education & Literacy MDM Division, MDM rules-2015 with JS DO Letter (October 8, 2015)²⁴⁾

^{o)} Govt. of India MHRD Department of School Education & Literacy MDM Division, Model memorandum of understanding for engagement with civil society organizations/NGOs in the MDM scheme (April 26, 2017)²⁵⁾

Table 4 The Mid-Day Meal food standards in India

		2006 [†] Primary (Classes I–V)	2009 [‡] Upper Primary (Classes VI–VIII)
Energy (kcal)		450	700
Protein (g)		minimum 12	minimum 20
Micronutrients		Adequate quantities of micronutrients including iron, folic acid, vitamin A, etc.	
Items (g)	Food grains	100	150
	Pulses	20	30
	Vegetables (including leafy vegetables)	50	75
	Oil & fat	5	7.5
	Salt & condiments	As per need	As per need

Source:

[†] Guidelines of the National Program of Nutritional Support to Primary Education (2006)¹³⁾

[‡] Govt. of India MHRD, Department of School Education & Literacy MDM Division: Revision of food standards, cooking costs, and honoraria for kitchen helpers under the National Program for Mid-Day Meals in Schools¹⁷⁾

Table 5 Recommended dietary allowances (RDA) and balanced diets for infants, children, and adolescents

		RDA2010		Balanced diets for infants, children, and adolescents number of portions (g)			
Years		Energy (kcal)	Protein (g)	Food grains	Pulses	Vegetables	Oil & fat
					portions (g)		
4–6		1,350	20.1	4 (120)	1 (30)	2.5 (250)	5 (25)
7–9		1,690	29.5	6 (180)	2 (60)	3 (300)	6 (30)
10–12	Boy	2,190	39.9	10 (300)	2 (60)	4 (400)	7 (35)
	Girl	2,010	40.4	8 (240)	2 (60)	4 (400)	7 (35)
13–15	Boy	2,750	54.3	14 (420)	2.5 (75)	4.5 (450)	9 (45)
	Girl	2,330	51.9	11 (330)	2 (60)	4 (400)	8 (40)

Based on the Nutrient Requirements and Recommended Dietary Allowances for Indians (2009)³¹⁾,
Dietary Guidelines for Indians (2011)³²⁾

(RDA) in India³¹⁾ (Table 5) has been calculated to build Table 6. Although the amount of energy provided to children was generally less than 30% of their recommended daily allowance, protein mass came to more than 30%. Next, we calculated the MDM standard/recommended amount of each food item (Table 5)³²⁾, as shown in Table 6. Although the MDM standards provide one-third of meals in the form of food grains and pulses, as required, it is likely that lower-class children receive a higher proportion of food grains. For these children, the lunches include a very small amount of oil, fat, and vegetables.

An assessment of the food provided in the region surrounding the national capital, Delhi, revealed that 90% of

lunches did not meet MDM^{33, 34)} standards. In India, schools are not required to hire dietitians. State governments, local governments, school teachers, NGOs, and other bodies are therefore obliged to create their own MDM menu plans¹³⁾. The MDM scheme thus lacks dietetic experts to take responsibility for administering schools lunches nationwide.

After a food poisoning case caused a child's death in 2013, hygiene management was emphasized. In 2015, the *Guidelines on Food Safety and Hygiene for School Level Kitchens under MDM Scheme*²³⁾ was published to regulate the details of hygiene management. However, government evaluation reports have noted that schools lack kitchen

Table 6 Proportion (%) of Mid-Day Meal food allowances (Table 4) in comparison to the RDA for Indians (Table 5)

Years		Energy (%)	Protein (%)	Food grains (%)	Pulses (%)	Vegetables (%)	Oil & fat (%)
4~6		33	60	83	67	20	20
7~9		27	41	56	33	17	17
10~12	Boy	21	30	33	33	13	14
	Girl	22	30	42	33	13	14
13~15	Boy	25	37	36	40	17	17
	Girl	30	39	45	50	19	19

Based on Nutrient Requirements and Recommended Dietary Allowances for Indians (2009)³¹⁾

infrastructure and utensils^{9, 33)}.

When it comes to dietary education, official sources mention the need for information, education, and communication connected with the MDM program¹³⁾. No report on dietary education has been issued. Instead, the public has been encouraged to wash hands before and after meals and after working in the kitchen garden.

5. MDM evaluations, the PDCA, and outcomes

1) Process evaluation

In India, a process evaluation of the MDM scheme is enforced, with the operational situation (e.g., lunch coverage) reported by each school to the state and by the state to central government. Central government reports on nutritional and hygiene management, but does not report on nutrition education.

This study has found that MDM process evaluations target coverage and the quality of school meals, including quality control, hygiene management, and children's dietary education. Both coverage and the working day ratio are high, although these figures include absent children and many children who do not attend school at all. The Indian central government has attempted to solve these problems by introducing "Aadhaar" (Individual Number System of India), a system imported into the MDM scheme to capture the actual number of children and achieve 100% coverage³⁵⁾.

In relation to the quality of school meals, the agreed nutritional standards do not supply one-third of the children's RDA. A full process evaluation could be carried out by recording the children's preferences and rates of left-over food and conducting satisfaction research regularly.

The official hygiene management guidelines are not adequate for preparing kitchen infrastructure, and many

school kitchens do not comply with the guidelines. Hygiene management records should be reported to the state through ICT (Information and Communication Technology)²⁶⁾; in the present study, these data could not be gathered. If such data were available, a more detailed process evaluation could be carried out.

2) Outcome evaluation

Concepts of "hunger" and "education" were examined in relation to the MDM program goals. First, it is impossible to measure the program's effectiveness in alleviating hunger. We could not find national data on the physical and nutritional status of children (in Classes I–VIII) because some schools perform physical checkups and some do not. Others do checkups, but do not keep any records³³⁾. It is therefore impossible to evaluate the extent to which children's nutritional status has improved nationally, following the introduction of the school meal program.

It is also difficult to assess the impact of the MDM program on education. UNESCO statistics show that gross and net enrollment ratios have been rising and stabilizing, with the number of out-of-school children falling conspicuously since 2002³⁶⁾. According to teachers cited in the report, *Performance Evaluation of Cooked Mid-day Meal (2010)*⁷⁾, the introduction of the MDM program is not the only cause of increased enrollment; other factors, including the results of Sarva Shiksha Abhiyan (SSA), may also have increased attendance. SSA is the Indian government's flagship program for achieving "universal elementary education;" it was launched in 2000. SSA was inspired by a surge of interest in public education and it introduced a scholarship system. These findings demonstrate that the MDM, in conjunction with other government initiatives to

promote compulsory education, has led to increased enrollment rates. Finally, the report argues that the MDM program alone is not enough to keep children in public school because a growing section of society wants better quality education. As a result, the rates of enrolment in private schools have been rising, while the number of children targeted by the MDM program has been falling³³⁾.

3) The extent to which the PDCA is enforced

SMCs must evaluate MDM programs regularly, at the national, state, district, and block levels. With using each SMC-held ratio, this study has examined the extent to which the PDCA is being enforced. An SMC must convene twice a year at the national and state levels, and once a month at the district and block levels. The report, *Details of NSMC and SMC meetings during 2009~10 to 2013~14*³³⁾, states that the average enforcement ratios for national, state, district, and block level SMCs were 60%, 52%, 21%, and 17%, respectively. At the national and state levels, the SMCs-held ratios were low, despite being calculated only twice a year. The block-level SMC-held ratio was the lowest, in spite of closing schools. In fact, the MDM PDCA system could not be implemented adequately.

IV. Discussion

Initiating SSA and institutionalizing the MDM scheme has created the world's largest school meal program in India. The program includes high coverage, monitoring systems, and standards for food and hygiene. Developing countries seldom have such systems. India's MDM program can therefore serve as a reference for other countries initiating school meal programs. Previous Japanese experiments suggest that the next steps for the MDM program might include the following. A meal that satisfies hunger is not enough; children could receive their nutritional RDA if MDM food norms and standards were reviewed. To achieve higher levels, improving the quality of school meals would be preferable and the program should make the best possible use of the MDM scheme's Management and Monitoring Evaluation system. To evaluate outcomes, data on children's health checks should be recorded in all states and UTs. Since the central government introduced "Aadhaar" to achieve 100% coverage, this program could be used to manage data relating to chil-

dren's health checks.

Finally, children need a dietary education in order to have a healthy future. When children grow up with food literacy, they can provide their own children with better nutrition. In Japan, every school has a dietitian who takes part in managing the school lunch program. His or her responsibilities include creating menus, hygiene management, and many related areas, including food education. If dietitians played an active role in the Indian school meal program, it would be easier to take the next steps.

This study has some limitations. Researchers consulted reports and articles published in English, without carrying out a field study. The analysis was conducted without a thorough understanding of the working practices of dietitians in India. In addition, the authors may have viewed the school meal standards negatively because they did not fully understand the decision-making process that created the norms and standards. In addition, schools had no hygiene-related records, making it impossible to analyze and evaluate the process; it was therefore necessary to rely only on governmental reports.

V. Conclusions

India's MDM program has been institutionalized, along with compulsory education. The levels of coverage and working days are high in the MDM program. However, school attendance rates are relatively low. The MDM standard meal did not provide one-third of the RDA; furthermore, 90% of the meal samples failed to satisfy the agreed standards. Although guidelines for hygiene management were published, they were difficult to observe because schools lacked well-equipped kitchens and utensils.

India's gross and net school enrollment ratios have been rising and stabilizing; with the introduction of the MDM, the number of out-of-school children has conspicuously fallen. However, it is difficult to evaluate the extent to which nourishment has improved, because there has not been a national investigation of the MDM program. The PDCA system has been in place, and SMCs have assumed a key role in implementing it.

The world's largest-scale school meal program has been realized, first, through the introduction of the nationwide MDM program, alongside compulsory education. The Japanese experience suggests that introducing a chil-

dren's national health surveillance system would be useful in evaluating improvements in children's nutrition due to the MDM program.

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Conflict of Interest

The authors confirm that they have no conflicts of interest.

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