

Supplementary Appendix

Supplement to:

Impact of Supplementary Nutrition Programme (SNP) on Minimum Dietary Diversity (MDD) among Children aged 6-23 months

Table A1: Odds Ratios for the econometric association of child anthropometric failures with ICDS services among children, India, NFHS, 2019-21

	Stunting		Wasting		Under-weight	
	OR	95% CI	OR	95% CI	OR	95% CI
ICDS services						
Frequency of receiving food (base category= never)						
almost daily	0.99	[0.90 1.08]	1.01	[0.91 1.12]	1.03	[0.94 1.13]
at least once a week	1.01	[0.92 1.11]	1.05	[0.94 1.17]	1.06	[0.96 1.17]
at least once a month	0.98	[0.89 1.07]	1.00	[0.90 1.11]	1.01	[0.92 1.11]
less often	0.97	[0.87 1.09]	0.95	[0.84 1.09]	0.96	[0.86 1.08]
received health check-up	1.02	[0.98 1.07]	1.04	[0.99 1.10]	1.01	[0.96 1.06]
received immunizations	1.00	[0.94 1.06]	1.12**	[1.04 1.20]	1.07*	[1.00 1.13]
received early child hood care	1.04	[0.99 1.08]	0.97	[0.92 1.03]	1.01	[0.97 1.06]
Child characteristics						
Female	0.79***	[0.76 0.82]	0.89***	[0.85 0.94]	0.76***	[0.73 0.79]
birth order (base category= birth order 1)						
birth_order2	1.07**	[1.02 1.12]	1.03	[0.98 1.09]	1.10***	[1.05 1.16]
birth_order3	1.07*	[1.01 1.14]	1.07	[0.99 1.14]	1.22***	[1.15 1.30]
birth_order4	1.16***	[1.08 1.24]	1.07	[0.99 1.16]	1.24***	[1.16 1.33]
Mother characteristics						
Mother's education (base category= No education)						
mother primary education	0.98	[0.91 1.05]	0.92*	[0.84 1.00]	0.93*	[0.87 1.00]
mother sec. education	0.83***	[0.79 0.88]	0.89***	[0.83 0.95]	0.80***	[0.76 0.85]
mother higher education	0.70***	[0.64 0.76]	0.77***	[0.70 0.85]	0.64***	[0.59 0.70]
mother diet diversity	0.98	[0.94 1.02]	0.96	[0.91 1.00]	0.95*	[0.91 0.99]
mother is anaemic	1.09***	[1.05 1.14]	1.04	[0.99 1.09]	1.09***	[1.04 1.14]
Other characteristics						
mass_media	0.89*	[0.81 0.99]	1.10	[0.97 1.23]	0.97	[0.87 1.08]
Wealth quantiles (base category= poorest)						
Poorer	0.88***	[0.83 0.93]	0.81***	[0.76 0.86]	0.73***	[0.69 0.78]
Middle	0.72***	[0.67 0.76]	0.77***	[0.71 0.83]	0.62***	[0.58 0.66]
Richer	0.62***	[0.57 0.66]	0.67***	[0.61 0.73]	0.49***	[0.45 0.53]
Richest	0.51***	[0.46 0.56]	0.58***	[0.52 0.65]	0.40***	[0.36 0.44]
Caste (base category= SC)						
ST	0.95	[0.89 1.02]	1.03	[0.95 1.10]	1.02	[0.95 1.09]
Obc	0.91***	[0.87 0.96]	0.95	[0.89 1.00]	0.90***	[0.85 0.94]
no_caste	0.79***	[0.74 0.84]	0.87***	[0.80 0.94]	0.75***	[0.69 0.80]
Religion (base category= hindu)						
Muslim	1.11**	[1.04 1.18]	1.15***	[1.07 1.24]	1.10**	[1.03 1.17]
Christian	0.95	[0.85 1.05]	0.86*	[0.75 0.97]	0.72***	[0.64 0.80]
others_noreligion	0.90	[0.80 1.01]	0.84*	[0.72 0.97]	0.91	[0.80 1.03]
Urban	1.03	[0.97 1.09]	1.12**	[1.04 1.20]	1.15***	[1.08 1.22]
Regions (base category= south region)						
north_region	0.84***	[0.78 0.91]	0.81***	[0.74 0.89]	0.77***	[0.71 0.84]
northeast_region	0.85***	[0.77 0.93]	0.77***	[0.69 0.87]	0.66***	[0.59 0.73]
west_region	1.15**	[1.05 1.25]	1.40***	[1.27 1.54]	1.32***	[1.21 1.44]
east_region	0.93*	[0.86 1.00]	1.11*	[1.02 1.21]	1.03	[0.96 1.12]
central_region	0.93*	[0.87 0.99]	0.93	[0.85 1.00]	0.89**	[0.83 0.96]
Observations	45636		45344		47057	

Note: OR- Odds Ratios are based on logistic regression. 95% CI – 95% Confidence interval. ® refers to the reference category for the correlates. MDD- Minimum Dietary Diversity; * p < 0.05, ** p < 0.01, *** p < 0.001

Table A2: Odds Ratios for the econometric association of minimum dietary diversity with ICDS services among children, adjusted for district and state fixed effects, India, NFHS, 2019-21

Variables	MDD		MDD	
	State Fixed Effects		District Fixed Effects	
	OR	95% CI	OR	95% CI
ICDS Components & Frequency				
Never®				
Daily Food Supplementation	1.38***	[1.23 1.56]	1.39***	[1.23 1.57]
Weekly Food Supplementation	1.34***	[1.19 1.51]	1.33***	[1.18 1.50]
Monthly Food Supplementation	1.31***	[1.17 1.46]	1.31***	[1.16 1.47]
Less Often Food Supplementation	1.29***	[1.13 1.48]	1.29***	[1.12 1.49]
Health Checkup	1.17***	[1.10 1.23]	1.19***	[1.13 1.26]
Immunizations	1.02	[0.96 1.09]	1	[0.93 1.07]
Early Childhood Care	0.98	[0.93 1.03]	0.99	[0.94 1.05]
Child Sex				
Male®				
Female	0.99	[0.95 1.03]	0.99	[0.94 1.03]
Birth Order				
Birth Order-1®				
Birth Order-2	1.26***	[1.20 1.33]	1.27***	[1.20 1.34]
Birth Order-3	1.12***	[1.05 1.21]	1.14***	[1.06 1.22]
Birth Order-4	1.27***	[1.17 1.37]	1.30***	[1.20 1.42]
Mother's Education				
No Education®				
Primary	0.99	[0.91 1.07]	1.01	[0.92 1.10]
Secondary education	1.06	[0.99 1.13]	1.08*	[1.01 1.16]
Higher education	1.17***	[1.07 1.29]	1.18***	[1.07 1.30]
Mother's Dietary Diversity				
No®				
Yes	1.42***	[1.35 1.49]	1.38***	[1.31 1.44]
Mother's Anemia Status				
No				
Yes	0.99	[0.95 1.04]	1	[0.96 1.05]
Mass Media				
No®				
Yes	1.06	[0.95 1.18]	1.01	[0.90 1.13]
Wealth Quintile				
Poorest®				
Poorer	1.03	[0.96 1.10]	1.06	[0.99 1.14]
Middle	1.10*	[1.02 1.18]	1.15***	[1.06 1.25]
Richer	1.19***	[1.10 1.29]	1.26***	[1.15 1.37]
Richest	1.26***	[1.14 1.40]	1.34***	[1.20 1.50]
Social Category				
Schedule Castes®				
Schedule Tribes	1.06	[0.98 1.14]	1.02	[0.94 1.12]
Other Backward Class	0.95	[0.90 1.01]	0.94	[0.89 1.00]
Others	0.98	[0.90 1.05]	0.95	[0.88 1.03]

Religion				
Hindu®				
Muslim	1.03	[0.95 1.10]	1	[0.92 1.09]
Christian	0.97	[0.84 1.11]	1	[0.85 1.17]
Others	0.96	[0.83 1.11]	0.93	[0.79 1.10]
Place of Residence				
Rural®				
Urban	0.94	[0.88 1.01]	0.93*	[0.87 1.00]
NFHS Regions				
South®				
North	2.49***	[2.03 3.06]	6.19***	[2.84 13.5]
North-East	1.1	[0.94 1.29]	2	[0.87 4.62]
West	2.53***	[1.68 3.81]	1.32	[0.43 4.11]
East	1.82*	[1.11 2.98]	9.76***	[4.65 20.5]
Central	0.85*	[0.74 0.98]	0.76	[0.33 1.75]

Note: OR- Odds Ratios are based on logistic regression. 95% CI – 95% Confidence interval. ® refers to the reference category for the correlates. MDD- Minimum Dietary Diversity. * p < 0.05, ** p < 0.01, *** p < 0.001

Table A3: Details of Covariates Balancing for Propensity Score Matching, before and after matching, India, NFHS 2019-21

Variables	Unmatched (U)/ Matched (M)	Treated (Mean)	Control (Mean)	t-test	p>t
female	U	0.49	0.48	2.63	0.01
	M	0.49	0.49	-0.08	0.94
birth_order1	U	0.40	0.39	0.65	0.52
	M	0.40	0.40	-1.27	0.21
birth_order2	U	0.34	0.33	3.60	0.00
	M	0.34	0.35	-1.78	0.08
birth_order3	U	0.15	0.16	-2.68	0.01
	M	0.15	0.14	2.62	0.01
birth_order4	U	0.11	0.12	-3.24	0.00
	M	0.11	0.11	1.72	0.09
mother_no_education	U	0.18	0.20	-5.29	0.00
	M	0.18	0.17	2.38	0.02
mother_primary_education	U	0.12	0.12	0.07	0.94
	M	0.12	0.11	2.02	0.04
mother_sec_education	U	0.57	0.53	7.64	0.00
	M	0.57	0.58	-2.21	0.03
mother_higher_education	U	0.13	0.15	-5.01	0.00
	M	0.13	0.14	-1.33	0.18
mother's diet diversity	U	0.54	0.48	13.00	0.00
	M	0.54	0.53	0.65	0.51
mother is anaemic	U	0.60	0.60	0.35	0.73
	M	0.60	0.60	-0.19	0.85
mass_media	U	0.05	0.04	4.41	0.00
	M	0.05	0.04	6.13	0.00
poorest	U	0.25	0.29	-10.49	0.00
	M	0.25	0.25	-1.62	0.11
poorer	U	0.24	0.23	1.81	0.07
	M	0.24	0.24	0.55	0.58
middle	U	0.22	0.19	9.00	0.00
	M	0.22	0.22	1.13	0.26
richer	U	0.18	0.16	5.44	0.00
	M	0.18	0.18	0.43	0.67
richest	U	0.11	0.13	-5.65	0.00
	M	0.11	0.11	-0.53	0.59
SC	U	0.22	0.21	1.82	0.07
	M	0.22	0.22	-1.48	0.14
ST	U	0.21	0.19	7.47	0.00
	M	0.21	0.21	-0.33	0.74
obc	U	0.38	0.41	-6.65	0.00
	M	0.38	0.39	-2.84	0.00
no_caste	U	0.15	0.16	-2.84	0.00
	M	0.15	0.14	3.27	0.00
hindu	U	0.78	0.77	2.07	0.04
	M	0.78	0.81	-7.95	0.00
muslim	U	0.12	0.12	-0.09	0.93
	M	0.12	0.10	7.45	0.00
christian	U	0.07	0.07	-2.36	0.02
	M	0.07	0.06	1.05	0.29
others_noreligion	U	0.03	0.03	-1.35	0.18

	M	0.03	0.03	3.58	0.00
urban	U	0.17	0.17	0.38	0.70
	M	0.17	0.16	4.52	0.00
north_region	U	0.15	0.14	5.57	0.00
	M	0.15	0.15	1.67	0.10
northeast_region	U	0.32	0.25	17.34	0.00
	M	0.32	0.34	-3.61	0.00
central_region	U	0.15	0.14	5.57	0.00
	M	0.15	0.15	1.67	0.10
northeast_region	U	0.10	0.14	-15.69	0.00
	M	0.10	0.10	-0.43	0.67
west_region	U	0.10	0.08	7.63	0.00
	M	0.10	0.11	-0.55	0.59
east_region	U	0.15	0.27	-32.19	0.00
	M	0.15	0.14	2.98	0.00
south_region	U	0.17	0.12	17.10	0.00
	M	0.17	0.17	0.93	0.35

Note: The treatment group consist of children who are getting food supplements regularly (i.e., almost daily or at least once a week) and control group consist of children who never received food supplements regularly

Table A4: Propensity Score-based Average Treatment Effect of ICDS supplementary nutrition on minimum dietary diversity (MDD) among children (6-23 months), adjusting for state fixed effects, India, NFHS 2011

	MDD	MDD	MDD	MDD	MDD	MDD
ICDS Food Frequency	ATET	ATET	ATET	ATET	ATET	ATET
Any Benefits ^a	0.039*** (0.007)					
Food Supplementation – Regularly ^b		0.056*** (0.005)				
Food Supplementation - Daily			0.059*** (0.008)			
Food Supplementation - Weekly				0.048*** (0.008)		
Food Supplementation – Monthly					0.048*** (0.009)	
Food Supplementation – Less Often						0.021** (0.0104)
Demographic & SES Controls ^c	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Treated observations ^d	48,763	24,430	13,988	10,442	17,647	3,530
Observations	62,371	41,083	30,641	27,095	34,300	20,183

a-Received any benefits from Anganwadi/ICDS centre in last 12 months (food supplements/health check-ups/immunization or early childhood education).

b-Treatment - Children received food supplements regularly (daily or weekly); Control- Children never received food supplements regularly; Control group is same for all the results

c-Demographic & SES (Socioeconomic) controls include children's sex, birth order, household wealth, mother's education, mother's employment status, mother's diet diversity, mass media, religion, caste, and regions.

d-Treated observations include observations in the treatment group which depends on how often children aged 6-23 months received food supplements from Anganwadi/ICDS centers.

Table A5. Sensitivity Analysis- Propensity Score-based Average Treatment Effect on Treated of ICDS supplementary nutrition on minimum dietary diversity (MDD) among children aged 6-23 months, India, NFHS-5

	MDD	MDD	MDD	MDD
	ATET	ATET	ATET	ATET
Food Supplementation – Frequently ^a	0.042*** (0.004)			
Food Supplementation - Daily ^b		0.040*** (0.004)		
Food Supplementation - Weekly ^c			0.032*** (0.006)	
Food Supplementation – Monthly ^d				0.051***

				(0.005)
Demographic & SES Controls ^e	Yes	Yes	Yes	Yes
Treated Observations (No.)	24,430	13,988	10,442	17,647
Observations (No.)	62,260	62,260	48,272	37,830

a- Treatment (Children received food supplements frequently (daily or weekly), Control (Children received food supplements once in a month, less often or never)

b- Treatment (Children received food supplements daily), Control (Children received food supplements once in a week, once in a month, less often or never).

c- Treatment (Children received food supplements atleast once in week), Control (Children received food supplements atleast once in a month, less often or never).

d- Treatment (Children received food supplements atleast once in month), Control (Children received food supplements, less often or never).

e- Demographic & SES (Socioeconomic) controls include children's sex, birth order, household wealth, mother's education, mother's employment status, mother's diet diversity, mass media, religion, caste, and regions.

Table A6: *Descriptive statistics of outcome and covariates for diversified and non-diversified states, India, NFHS 2019-21*

Variable	Received food supplements regularly ^a						Never received food supplements					
	Less Diversified States ^b			Diversified States ^c			Less Diversified States			Diversified States		
	N	Mean	Std. dev.	N	Mean	Std. dev.	N	Mean	Std. dev.	N	Mean	Std. dev.
MDD	4,910	0.21	0.41	3,651	0.24	0.43	5,098	0.15	0.36	1,166	0.23	0.42
minimum meal frequency	4,910	0.35	0.48	3,651	0.29	0.45	5,098	0.34	0.47	1,166	0.26	0.44
Mother's education												
Primary level	4,910	0.13	0.34	3,651	0.10	0.30	5,098	0.12	0.33	1,166	0.06	0.24
Secondary level	4,910	0.49	0.50	3,651	0.59	0.49	5,098	0.41	0.49	1,166	0.49	0.50
Higher level	4,910	0.11	0.31	3,651	0.16	0.37	5,098	0.14	0.35	1,166	0.36	0.48
mother's diet diversity	4,910	0.43	0.50	3,651	0.58	0.49	5,098	0.44	0.50	1,166	0.59	0.49
mother anaemic	4,777	0.65	0.48	3,535	0.60	0.49	4,910	0.66	0.47	1,099	0.53	0.50
mass_media	4,910	0.03	0.18	3,651	0.03	0.17	5,098	0.03	0.17	1,166	0.06	0.24
poorer	4,910	0.24	0.43	3,651	0.18	0.39	5,098	0.23	0.42	1,166	0.08	0.27
middle	4,910	0.19	0.39	3,651	0.26	0.44	5,098	0.15	0.36	1,166	0.14	0.35
richer	4,910	0.17	0.37	3,651	0.25	0.43	5,098	0.14	0.34	1,166	0.25	0.43
richest	4,910	0.12	0.33	3,651	0.15	0.36	5,098	0.13	0.33	1,166	0.48	0.50

a-Child has received food supplements regularly from anganwadi/ICDS centre in last 12 months implies that child has received food supplements almost daily or atleast once a week

b-Less diversified states are states that covers less than four food groups under supplementary nutrition program. These states are Bihar, Rajasthan, Chhattisgarh and Haryana.

c-Diversified states are states that covers atleast four food groups under supplementary nutrition program. These states are Kerala, Telangana, Odisha, and Gujarat.

Table A7. Propensity Score-based Average Treatment Effect on Treated of ICDS supplementary nutrition on minimum dietary diversity (MDD) among children aged 6-23 months) in poor and rich households for less diversified and diversified states, India, NFHS-5

	MDD-Child	MDD-Child	MDD-Child	MDD-Child
	Diversified states		Less diversified states	
	Poorest household	Middle and Rich Households	Poorest Households	Middle and Rich Households
ICDS Food Frequency	ATET	ATET	ATET	ATET
Food Supplementation – Regularly ^a	0.03*** (0.008)	-0.001 (0.007)	0.04*** (0.007)	-0.010 (0.007)
Demographic & SES Controls ^b	Yes	Yes	Yes	Yes
Treated Observations (No.)	6,778	10,239	7,113	7,957
Observations (No.)	13,611	18,156	14,197	14,553

a-Treatment (Children received food supplements regularly (daily or weekly), Control (Children received food supplements once in a month, less often or never)

b-Demographic & SES (Socioeconomic) controls include children's sex, birth order, mother's education, mother's employment status, mother's diet diversity, mass media, religion, caste. Poor households include 40% of the sample including poorest and poor categories. Rich household include 60% of the sample including middle, richer and richest categories.