

DELIVERING FOR NUTRITION IN SOUTH ASIA CONNECTING THE DOTS ACROSS SYSTEMS

December 5, 2024 • Colombo, Sri Lanka

Enhancing Nutritional Security Through Agri-Nutri Smart Villages: An Index-Based Approach in Telangana and Uttar Pradesh

Pagadala Sai Priyanka, Krishi Vigyan Kendra, Telangana



CONNECTING THE DOTS ACROSS SYSTEMS

Agri-Nutri

(A2N)

Smart

Village

Rationale

Gaps identified in measurement of the full pathway of change from agricultural inputs and practices to nutrition outcomes. To improve the evidence base, there is a **need to develop indicators of outcomes** that are not being fully measured (Herforth & Ballard, 2016).

 Empirical studies at village level to monitor and evaluate nutrition sensitive farming approaches and nutri-sensitive behavior of individuals were not carried out.

✓ A model A2N smart village is a rural area that uses technology to maximize agricultural productivity, improve nutrition, and promote economic development. It is a model village that has adopted sustainable farming practices and is actively promoting access to healthy foods and nutrition education, use of digital tools to improve agricultural production and access to markets. • Promotion of **biofortified crops nutri-rich varieties**, **traditional** and conservation of traditional crops rich in nutrients

- Fruits and vegetables cultivation
- Fodder crop cultivation

Nutri Farming System

• Food processing/value added products/food fortification

• Training and follow up on preparation of low cost nutritious foods for self and commercial purpose

Community Agri-Nutri Security Centres (CANSCs) Behavioural Change
Interventions

Agri-Nutri videos

 Nutri-quizzes for women, men and children

- · Nutri discussion forums
- · Farmer-scientist interface
- e-agri-nutricentres

Agri-NutriEducation

• Gram Panchayats, Anganwadis, Schools, SHGs, Banks, NGOS, Krishi Vigyan Kendras

> Participatory approach

Source: Sangeetha et al, 2018



Research Methodology



- Mixed method approach to identify the indicators adopting qualitative thematic analysis (6 thematic areas) of literature review (61) and quantitative Q-sorting (42) by experts with mean ≥ median. PCA reduced to 40 indicators under 12 dimensions.
- Indicators were validated in 3 model and 3 non-model villages (purposive) from two agro-climatic regions of Uttar Pradesh (IARI) and Telangana (DDS) on a total sample of 360 farmers (random) using an index developed through Alkire-foster method of counting.



Agri-Nutrition Knowledge Level



	(N = 90)	Mean	SD	t value
Telangana	Model villages	19.656	6.76	3.77**
	Non-model villages	16.089	5.88	(p < 0.01)
Uttar Pradesh	Model villages	19.72	7.31	5.14**
	Non-model villages	14.26	6.92	(p < 0.01)

Agri-Nutrition Attitude Level







DELIVERING FOR NUTRITION IN SOUTH ASIA



Tree map of codes

Market access & informati	Nutrition education	Panchayat se	Women's	Water n	na	Waste ma	Und	ernut	Renewa	bl	Nutrit	ion K
	Livestock											
nstitutional support	LIVESLOCK	Irrigation	Transport	Stora	age fa.	Status d	of So	oil health	Social	par	Nutr	ition
	BMI	ICTs	Inclusive	devel	Exter	nsi Ele	ctricity	Cultural	Cror	iac	Cro	o ma
Crop diversity												
	Women's access to pr	Hygiene & sanita.	Health la	anties								
					Capa	city buil	Staple	Soci	alsRo	oads	Nu	ıtriti
Drinking water		kitchen garden	Fodder so	urce								
	Production orientation	Ŭ			e-adv	visory se	Digita	marke				In
		Women's input in	Farm tech	nologi								
Consumption diversity					Yout	h in agric	Cookii	ng fuel	Hous	Co		Agri
	Production of nutrient	Production of nutrient		pment					11003	0		ды
		value addition			Veter	rnary cl	Agro-l	piodive	Digita	. Civ	ic	Acce

CONNECTING THE DOTS ACROSS SYSTEMS

Thematic Map of Indicators



	DELIVERING F	OR NUTRI	TION IN SOUT	H ASIA
SNo	Indicators	Mean	Category	0.
1	Production of nutrient-rich	8.73	Most	i
	food crop varieties		important	
2	Kitchen garden	8.47		
3	Agri-Nutrition Knowledge	8.07		• 1
4	Livestock or milch cattle	8.00	Highly	S
5	Drinking water	7.93	important	• т
6	Agro-biodiversity conservation	7.73		i ii
7	Agri-Nutrition practices	7.73		• N
8	Soil health	7.20	Very	• 4
9	Prevalence of undernutrition	7.20	important	4
10	Crop diversity	7.20		S. 1
11	Farm equipment	7.07		No
12	HDDS	7.07		25
13	Fodder source	6.87		20
14	Possession of a smart phone	6.87		28
15	Production orientation	6.87	Quite	29
16	Extension contact	6.27	important	30
17	Access to health facilities	6.20		31
18	Cooking fuel	6.20		32
19	Nutrition education	6.13		
20	Market access & information	6.00		34 1
21	Crop management	5.93		35 \
22	Farm technologies	5.93		
23	Local institutional support	5.87		36 37 9
24	e-agro advisory utilization	5.80		

Ω-sort distrib indicators ar mean sco	ution nd th pres	n of eir	F		
15 experts sort Scientists; KVK Total - 9 catego indicators Mean range = 8 42 selected wit 4.5	ed - SMS. ories; 8.73 - h mea	61 1.93 an ≥	3		
Indicators	Mea	Cat	eg	4	
	n	ory		4	
Women's access	5.73	S	i	1	
BMI	5.67	0	m		
Transportation	5.67	m	q		
Toilets	5.60	e		_	
Nutrition safety	5.53	\	r	!	
nets access		. P	+		
A2N attitude	5.53		Ľ		
Women's control	5.47	a	а		
Income	5.40	t	n	_	
Diversification			t		
F-F extension	5.33				
irrigation	5.33				
vvomen s	5.27				
	E 20			(
Storage facilities	5.20				
Social	5.07				
	2-sort distribution indicators are mean score 15 experts sort Scientists; KVK Total - 9 catego indicators Mean range = 8 42 selected wit 4.5 Indicators Women's access BMI Transportation Toilets Nutrition safety nets access A2N attitude Women's control Income Diversification F-F extension Irrigation Women's decision making Storage facilities	A-soort distributionindicators and theindicators and scientists; KVK SMS.Scientists; KVK SMS.Total - 9 categories;indicatorsMean range = 8.73 - 42 selected with meat42 selected with meat42 selected with meat4.5IndicatorsMean range = 8.73 - 42 selected with meat4.5IndicatorsMean range = 8.73 - 42 selected with meat4.5IndicatorsMean range = 8.73 - 42 selected with meat100men's access5.60Nutrition safety5.61Nutrition safety5.63Momen's control5.40Diversification5.41Income5.42Inrigation5.33Women's5.33Women's5.20Social5.071Social5.072	DescriptionSecond distributionSecond stateIndicators and solve-Scientists; KVKS/S/STotal - 9 cate-Scientists; KVK-Indicators8.73 - 1.93Mean range8.73 - 1.9342 selected with means-42 selected with means-4.5nIndicatorsMeaMeans5.73SBMI5.67Toilets5.60Nutrition safety5.53Nutrition safety5.53Nutrition safety5.40A2N attitude5.53Nomen's control5.40Diversification5.33Income5.33Irrigation5.33Women's5.20Social5.20Social5.20	D-soort distribution of stateIndicators and solve of scientists; KVK SMS.Total - 9 categories; 61indicatorsMean range = 8.73 - 1.93A2 selected with mean solve of scientists; KVKMean range = 8.73 - 1.93A2 selected with mean solve of scientists; KVKMean range = 8.73 - 1.93A2 selected with mean solve of scientists; KVKMean range = 8.73 - 1.93A2 selected with mean solve of scientists; KVKMean range = 8.73 - 1.93A2 selected with mean solve of scientists; KVKIndicatorsMeaColspan="2">Colspan="2"Mean range = 8.73 - 1.93Vomen's accessSocialSocialColspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"Mean range = S.73SocialColspan="2">Colspan="2"Mean CategoSocialColspan="2"Mean CategoColspan="2"Mean Catego <td col<="" td=""></td>	

DAN 20 24

S. No	Indicators	Mean	Category
38	Waste management	5.00	Slightly
39	Access to credit	5.00	important
40	Staple food stocks	5.00	
41	Water management	4.80	-
42	Type of house	4.53	
43	Youth in agriculture	4.40	
44	Participation in capacity	4.33	
	building activities		
45	Access to weather forecast	4.07	-
46	Veterinary facilities	4.00	
48	Agri-chemicals usage	3.40	Little
49	Renewable energy	3.07	importance
50	Cropping intensity	3.00	
51	Digital marketing	2.93	
52	Status of women	2.87	
53	Cultural activities	2.67	
54	Roads	2.67	-
55	Digital literacy	2.60	Very little
56	Community cohesion	2.60	importance
57	Nutrition budgeting	2.53	
58	Electricity	2.47	
59	Inclusive development	2.27	Least
60	Panchayat services	2.07	important
61	Civic infrastructure	1.93	

CONNECTING THE DOTS ACROSS SYSTEMS

	DELIVERI	NG FOR NUTRITION IN SOUTH ASIA D_{4} N_{24} C	CONNECTING THE DOTS ACROSS SYSTEMS	
Compon ent	Dimension	Description	Indicators	Factor Loadings
5	Production diversity	It quantifies the range and types of food produced, emphasizing the availability of diverse sources of nutrition	Production of nutrient rich food crop varieties	.742
		from both plant and animal origin.	Crop diversity	.703
			Livestock or milch cattle	.693
			Kitchen garden	.739
6	Agri-inputs	It gauges the effectiveness of resource allocation and	Production orientation	.894
	management	practices to enhance agricultural productivity and	Farm equipment	.907
		sustainability.	Fodder source	.644
11	Good farm	It evaluates the adoption of methods that promote	Crop management	.444
	practices	sustainable and efficient farming, leading to improved crop	Soil health	.772
		yields and soil quality while optimizing water resources.	Irrigation	.544
7	Health and	It measures the extent to which individuals have access to	Food access	.761
	Nutrition	adequate food, engage in healthy dietary behaviors, and	Agri-Nutrition practices	.733
	practices	can obtain essential healthcare services, all contributing to improved health and nutrition outcomes.	Access to health facilities	.761
1	Nutrition and	It measures the capacity of a community to enhance	Local institution support	.779
	learning	nutrition outcomes through a combination of institutional,	Agri-Nutri Knowledge	.814
		educational, and supportive factors, ultimately promoting	Agri-Nutrition attitude	.832
		learning and improved nutritional practices	Nutrition education	.846
			Access to nutrition safety nets	.720
8	Financial	It gauges the community's capacity to secure livelihoods,	Income diversification	.794
	resilience ensure food security, and manage financial risks in times of		Staple food stocks	.795
		adversity.	Access to credit	.777

	DELIVERIN	IG FOR NUTRITION IN SOUTH ASIA D_{4} 20 CC	ONNECTING THE DOTS ACROSS SYSTE	MS
Compone net	Dimension	Description	Indicators	Factor Loadings
4	Basic	It assesses the adequacy of these infrastructure	Type of house	.856
	Infrastructure	components, which are essential for ensuring the health,	Access to drinking water	.608
		safety, and well-being of community members.	Access to safe cooking	.758
			Access to sanitary facility	.697
12	Smart	It measures the community's readiness and capacity to	Possession of smart phone	.518
	technologies	leverage digital tools for enhanced agricultural productivity	Farm technologies	.561
		and access to information.	E-agro advisory service utilisation	.694
10	Market and	It evaluates the community's ability to efficiently connect	Market access & information	.649
	logistics	agricultural products to markets and manage logistical	Transportation	.758
		aspects of agricultural supply chains, which is essential for economic viability and sustainability.	Storage facilities	.771
2	Social	It evaluates how well knowledge and practices are	Extension contact	.926
	networking	disseminated and adopted within the community through	Farmer to farmer extension	.893
		social interactions and outreach, fostering agricultural development and innovation	Social participation	.926
3	Gender	It measures the extent to which gender equity and	Women's inputs in decision making	.895
	empowerment	women's empowerment are integrated into the allocation	Women's access to productive	979
		and management of agricultural resources.	resources	.525
			Women's control over income	.916
9	Sustainability	It assesses the community's commitment to minimizing	Waste management	.607
		environmental impact and preserving resources for future	Water management	.771
		generations.	Agro-biodiversity conservation	.854



CONNECTING THE DOTS ACROSS SYSTEMS



F % Pastapur 13 43.3 0.815 I Bidakanne 17 56.6 0.773 II Arjun Nayak Thanda 21 70.0 0.728 IV Jharsangam 23 76.7 0.687 V Shamshallapur 23 76.7 0.678 VI Jamgarbodi Thanda 24 80.0 0.637 X Lachoda 18 60.0 0.773 II Bassi 19 63.3 0.742 III Sunehra 25 83.3 0.642 IX Kata 23 76.7 0.673 VII Mawikala 25 83.3 0.642 IX	Village	Ina	ANSVI	Rank	
Pastapur 13 43.3 0.815 I Bidakanne 17 56.6 0.773 II Arjun Nayak Thanda 21 70.0 0.728 IV Jharsangam 23 76.7 0.687 V Shamshallapur 23 76.7 0.678 VI Jamgarbodi Thanda 24 80.0 0.637 X Lachoda 18 60.0 0.773 II Bassi 19 63.3 0.742 III Sunehra 25 83.3 0.642 IX Kata 23 76.7 0.673 VI Mawikala 25 83.3 0.642 IX		F	%		
Bidakanne 17 56.6 0.773 II Arjun Nayak Thanda 21 70.0 0.728 IV Jharsangam 23 76.7 0.687 V Shamshallapur 23 76.7 0.678 VI Jamgarbodi Thanda 24 80.0 0.637 X Lachoda 18 60.0 0.773 II Bassi 19 63.3 0.742 III Sunehra 25 83.3 0.642 IX Kata 23 76.7 0.673 VI Sankroth 27 90.0 0.620 XI	Pastapur	13	43.3	0.815	I
Arjun Nayak Thanda2170.00.728IVJharsangam2376.70.687VShamshallapur2376.70.678VIJamgarbodi Thanda2480.00.637XLachoda1860.00.773IIBassi1963.30.742IIISunehra2583.30.642IXKata2376.70.673VIISankroth2790.00.620XIMawikala2583.30.653VIII	Bidakanne	17	56.6	0.773	II
Jharsangam 23 76.7 0.687 V Shamshallapur 23 76.7 0.678 VI Jamgarbodi Thanda 24 80.0 0.637 X Lachoda 18 60.0 0.773 II Bassi 19 63.3 0.742 III Sunehra 25 83.3 0.642 IX Kata 23 76.7 0.673 VI Sankroth 27 90.0 0.620 XI Mawikala 25 83.3 0.653 VIII	Arjun Nayak Thanda	21	70.0	0.728	IV
Shamshallapur 23 76.7 0.678 VI Jamgarbodi Thanda 24 80.0 0.637 X Lachoda 18 60.0 0.773 II Bassi 19 63.3 0.742 III Sunehra 25 83.3 0.642 IX Kata 23 76.7 0.673 VII Sankroth 27 90.0 0.620 XI Mawikala 25 83.3 0.653 VIII	Jharsangam	23	76.7	0.687	V
Jamgarbodi Thanda2480.00.637XLachoda1860.00.773IIBassi1963.30.742IIISunehra2583.30.642IXKata2376.70.673VIISankroth2790.00.620XIMawikala2583.30.653VIII	Shamshallapur	23	76.7	0.678	VI
Lachoda1860.00.773IIBassi1963.30.742IIISunehra2583.30.642IXKata2376.70.673VIISankroth2790.00.620XIMawikala2583.30.653VIII	Jamgarbodi Thanda	24	80.0	0.637	X
Bassi1963.30.742IIISunehra2583.30.642IXKata2376.70.673VIISankroth2790.00.620XIMawikala2583.30.653VIII	Lachoda	18	60.0	0.773	11
Sunehra2583.30.642IXKata2376.70.673VIISankroth2790.00.620XIMawikala2583.30.653VIII	Bassi	19	63.3	0.742	III
Kata2376.70.673VIISankroth2790.00.620XIMawikala2583.30.653VIII	Sunehra	25	83.3	0.642	IX
Sankroth2790.00.620XIMawikala2583.30.653VIII	Kata	23	76.7	0.673	VII
Mawikala 25 83.3 0.653 VIII	Sankroth	27	90.0	0.620	XI
	Mawikala	25	83.3	0.653	VIII

DELIVERING FOR NUTRITION IN SOUTH ASIA

CONNECTING THE DOTS ACROSS SYSTEMS

SI. No	Indicators (TELANGANA)	Uncen headco ratio (°	sored ount %)	Cens head ratio	ored count (%)	Propor contrik to Non A2NS	rtional oution	SI. No	Indicators (UTTAR PRADESH)	Unce head ratio	nsored count	Cens head ratio	ored count	Propo contril to Nor A2NS	rtional bution n
		MV	NMV	MV	NMV	MV	NMV			MV	NMV	MV	NMV	MV	NMV
1	Production diversity	08.9	11.1	06.7	11.1	0.95	1.38	1	Production diversity	13.3	10.0	11.1	08.8	1.53	1.27
2	Agri inputs management	15.6	50.0	14.4	45.6	1.67	6.21	2	Agri inputs management	33.3	42.2	17.8	36.7	3.82	5.36
3	Good farm practices	48.9	36.7	18.9	31.1	5.25	4.55	3	Good farm practices	45.6	42.2	36.7	35.6	5.23	5.36
4	Health and nutrition practices	11.1	16.7	10.0	15.6	1.19	2.07	4	Health and nutrition practices	12.2	13.3	12.2	13.3	1.40	1.69
5	Nutrition and learning	83.3	81.1	54.4	68.9	8.95	10.1	5	Nutrition and	81.1	82.2	58.9	74.4	9.31	10.4
6	Financial resilience	08.9	10.0	07.8	10.0	0.95	1.24	6	learning Financial resilience	10.0	10.0	08.9	10.0	1.14	1.27
7	Basic infrastructure	25.6	28.9	18.9	26.7	2.74	3.59	7	Basic infrastructure	27.8	35.6	26.7	34.4	3.19	4.52
8	Smart technologies	81.1	78.9	51.1	65.6	8.71	9.80	8	Smart technologies	74.4	73.3	57.8	66.7	8.54	9.32
9	Market and logistics	28.9	21.1	22.2	18.9	3.10	2.62	9	Market and logistics	26.7	21.1	22.2	21.1	3.06	2.68
10	Social networking	08.9	21.1	08.9	21.1	0.95	2.62	10	Social networking	11.1	20.0	10.0	18.9	1.27	2.54
11	Gender empowerment	53.3	84.4	40.0	64.4	5.73	10.4 9	11	Gender empowerment	45.6	82.2	35.6	68.9	7.23	10.4
12	Sustainability	04.4	15.6	04.4	15.6	0.47	1.93	12	Sustainability	30.0	31.1	22.2	27.8	3.44	3.95

DAN 20 24 DAN 20 24





Distribution of respondents based on their ANSVI levels

St	udy area	High	Medium	Low
Telangana	Model villages $(n-90)$	25 (27.8)	54(60)	11(12.2)
	Non-model villages (n=90)	6 (06.7)	60(66.6)	24(26.6)
	Total (n=180)	31 (17.2)	114(63.3)	35(19.4)
Uttar Pradesh	Model villages (n=90)	23 (25.6)	56(62.2)	11(12.2)
	Non-model villages (n=90)	7 (07.8)	62(68.8)	21(23.3)
	Total (n=180)	30 (16.7)	118(65.5)	32(17.7)
	Overall (n= 360)	61 (16.94)	232(64.4)	67(18.6)

	ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Telangana	Between Groups	.182	1	.182	13.79	.000
Villages	Within Groups	2.351	178	.013	8	
	Total	2.533	179			
Uttar	Between Groups	.085	1	.085	7.097	.008
Pradesh	Within Groups	2.120	178	.012		
Villages	Total	2.205	179			
Model	Between Groups	.032	1	.032	2.433	.121
Villages	Within Groups	2.355	178	.013		
	Total	2.387	179			
Non-	Between Groups	.002	1	.002	.158	.692
Model	Within Groups	2.116	178	.012		
Villages	Total	2.118	179			

Sensitivity Analysis of Indicators

		A-F	PCA	
	Pearson Correlation	1	.103*	Correlation signifies
∖-F	Sig. (2-tailed)		.050	that indictors do
	N	360	360	not effect much to
	Pearson Correlation	.103*	1	different weightage
PCA	Sig. (2-tailed)	.050		procedures.
	Ν	360	360	

*. Correlation is significant at the 0.05 level (2-tailed)

DELIVERING FOR NUTRITION IN SOUTH ASIA

D4N 20 24

CONNECTING THE DOTS ACROSS SYSTEMS

Implications of study

Need for tailored training programs and knowledge transfer from model villages to non-model villages.

The study identifies various indicators of model Agri-Nutri Smart Villages. These indicators can serve as benchmarks for evaluating and ranking villages in terms of their development in nutrition through agriculture. This is important for tracking progress and targeting interventions where they are needed the most.

The study highlights the importance of providing resources and incentives for adopting nutri farming practices.









