Micronutrient Action Policy Support (MAPS) tool: **MAPS India Supplement activities and findings**

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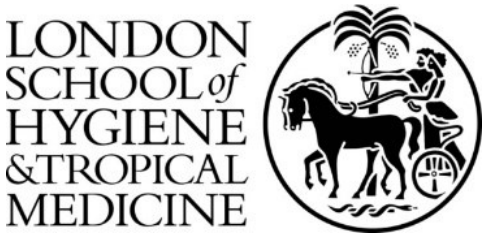
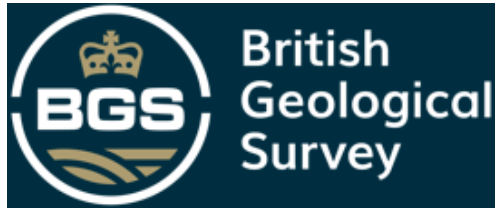
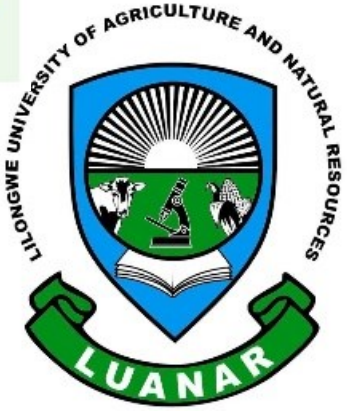
With funding from Gates Foundation

https://micronutrient.support/

MAPS Collaboration







The MAPS project is....

co-creating a web-hosted tool to estimate micronutrient deficiencies and explore pathways to improve nutrition.

Premise is to unlock, and make available, sub-national insights of relevance to nutritional assessments both currently, and under future scenarios.

Geographical focus

Full tool development in **sub-Saharan Africa**

Data landscaping and stakeholder consultation in three **India focus states**

Addressing **policy questions** by using existing micronutrient data

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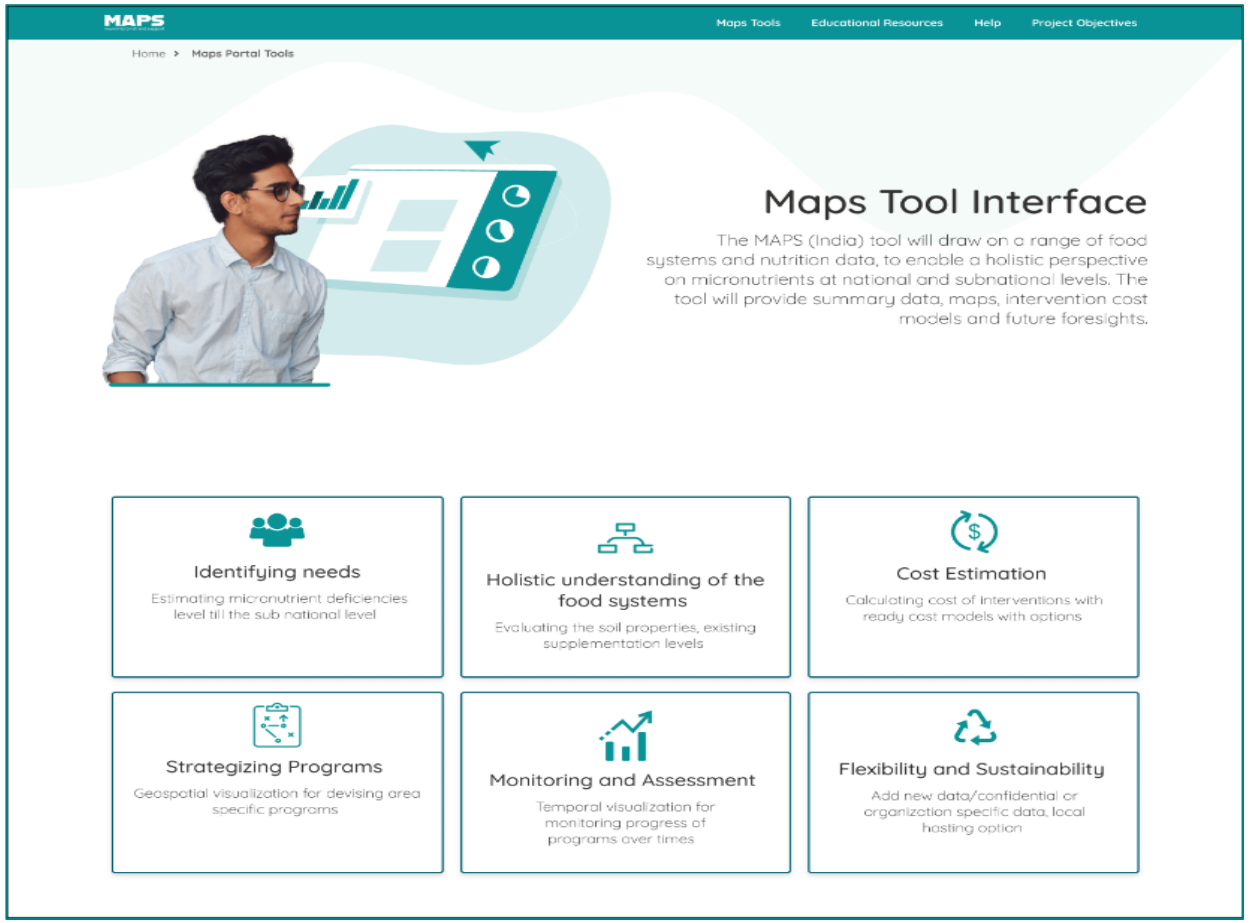
MAPS Tool is…..

co-creating a web-hosted tool to estimate micronutrient deficiencies and explore pathways to improve nutrition.



Data Informed decision making through….

1. Increasing quantity and quality of data
2. Enabling access and analysis
3. Ensuring datasets and methods are interoperable and transparent
4. Embedding a sustainability approach, e.g. development of learning materials
5. Equitable partnerships

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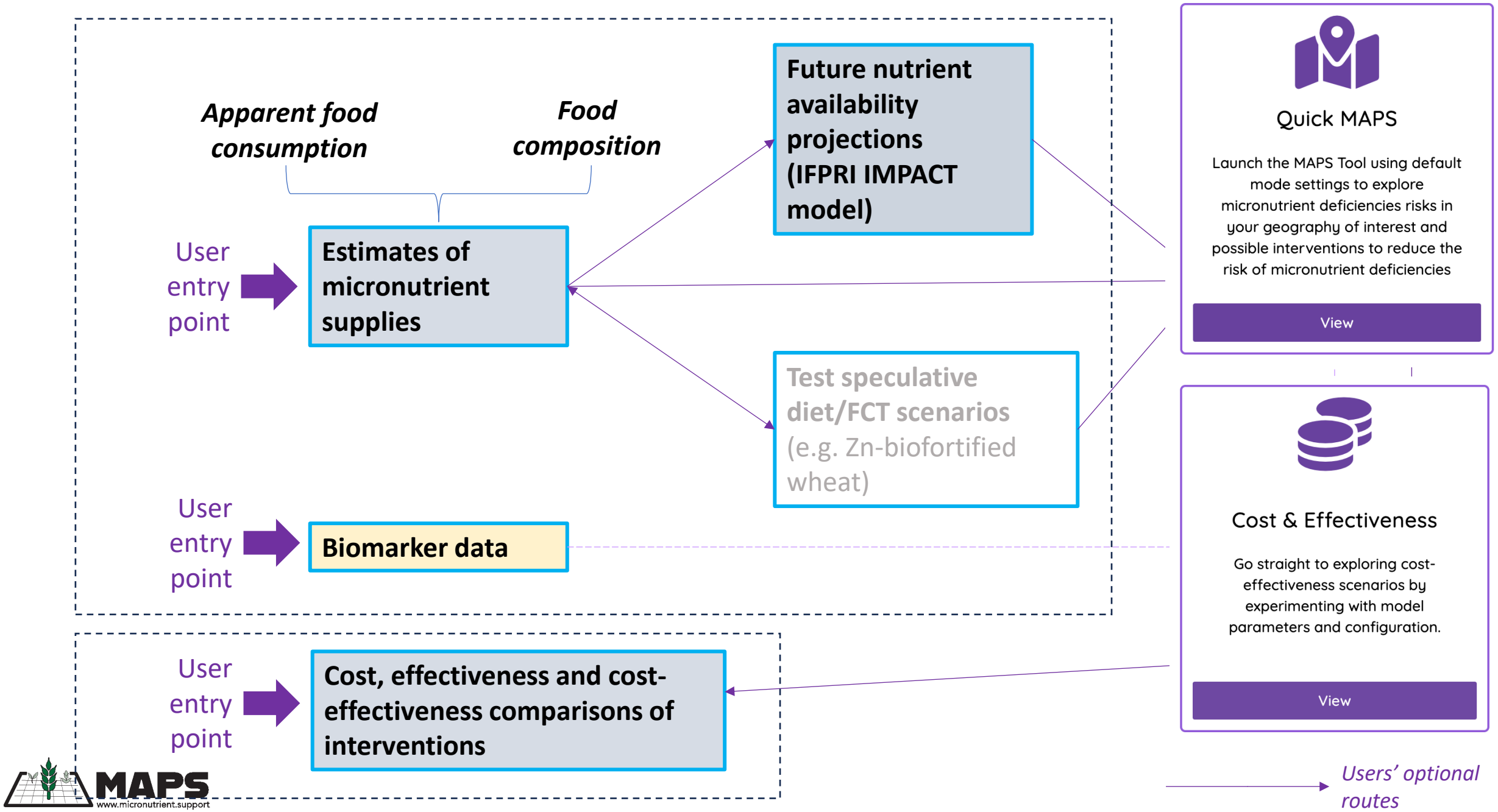
Simplified user journey in MAPS



MAPS India supplement: priorities

- Establish stakeholder needs, and their landscape of interactions, **specific to India.**
- Data availability and accessibility to use in any future MAPS India realisation.
- Address policy questions by analysing and interpreting micronutrient data.

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MAPS India Team

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Focus Area: Assessment of needs & Co-design process

- Engaging with key agri-food-nutrition systems stakeholders in India through in-person meetings

- Scoping exercise to co-design the MAPS India tool – qualitative study

Aims of the co-design process in India

Better understanding of the value of a MAPS India tool, the information stakeholders would like to see represented in the tool, and the way they would engage with the tool.

Deep insight into user requirements and identification of priority needs of Indian food systems stakeholders.

Proposing an interface, priority set of functions, and underlying datasets that best fits the user requirements, and to plan aligned sustainability work.

Better uptake and anticipated ownership of the MAPS tool amongst the priority stakeholders in future.

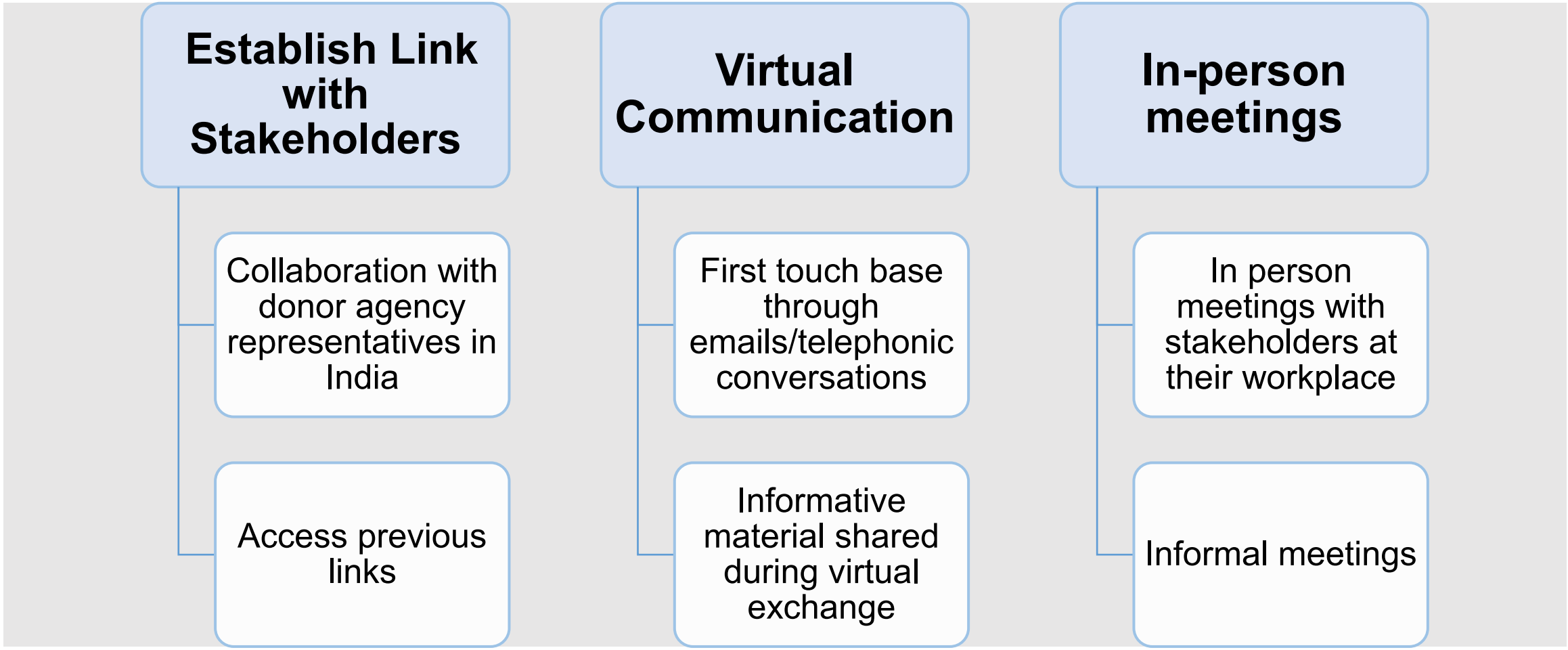
Identified stakeholders

Stakeholders who have decision making responsibilities in food systems in India or provide technical support to government and implement programs related to micronutrients in India.

- **Government Sector**
- **Research and Academia**
- **Development Partners**
- **Non-Government Organizations**
- **Donors-Gates Foundation**
- **Industries**

Representative mix from the different kind of stakeholders to ensure a robust understanding of priority needs and requirements for the MAPS tool.

Stakeholder engagement method

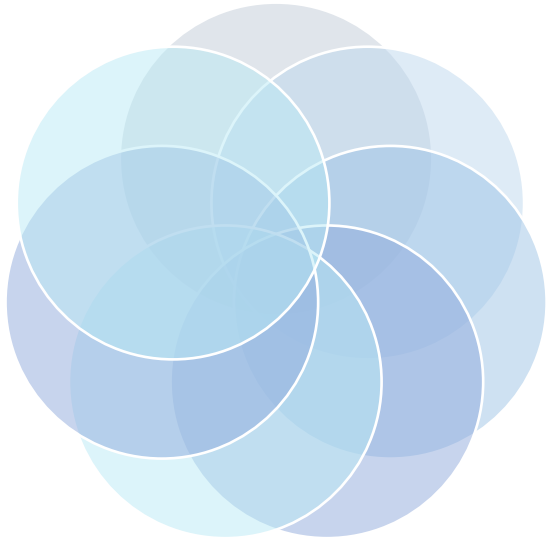


Stakeholder Engagement: Key Themes

Dynamics of food systems in India

Unmet needs and requirements

Specific role of the stakeholder



Challenges with respect to information use

Data sources and availability

Data use at various levels

Data quality

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Leaflet shared with participants by MAPS team

Micronutrient Action Policy Support (MAPS) Project

Developed by the University of Nottingham, London School of Hygiene & Tropical Medicine, University of California, Davis, British Geological Survey, International Food Policy Research Institute, Addis Ababa University and Lilongwe University of Agriculture and Natural Resources

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Summary

The MAPS project is building a web-hosted tool, to provide information on food system and population micronutrient status, support new analyses and enable evidence-informed decision making at national and sub-national scales.

Micronutrient deficiencies (MNDs) are a significant concern in India and globally, underlying a large burden of disease. With a growing population and anticipated changes in climate, MNDs are likely to remain important problems. The MAPS tool provides a framework to support evidence gathering, analysis and scenario modelling for informed policy interventions and program investments.

The MAPS team is exploring micronutrient agriculture-nutrition-food system data and stakeholder landscapes in three Indian states: Uttar Pradesh, Odisha, Bihar.

Priority states for MAPS-India project

Co-design

We employ a co-design process, comprising iterative stakeholder and user engagement to inform tool design and ensure the tool will meet user needs in a simplified way.

The co-design process is an opportunity to shape a MAPS-India version of the ~~tool, and~~ ensure this is optimised for a range of Indian stakeholders.

What are the data sources?

The tool will use existing data sets from health, agriculture and food processing domains. The tool will be pre-populated with data according to licence conditions, and there will also be "bring your own data" functionality.

Data sources and types in MAPS tool

Agriculture Data
- Soil fertility, crop production, crop nutrient composition, micronutrient fertilizers, crop varieties....

Health and Nutrition Data
- Diets, consumption and expenditure, nutrient biomarkers, nutritional status....

Intervention Data
- Biofortification, food fortification, intervention costs....

Features of the tool

The MAPS tool will draw on a range of food systems and nutrition data, to enable a holistic perspective on micronutrients at national and subnational levels. The tool will provide summary data and maps, foresight of future food systems, and comparison of intervention cost and effectiveness models. The tool will be developed in an open-source framework.

Potential users of the MAPS tool

The MAPS tool is anticipated to be useful to a plethora of stakeholders working on food systems in India.

Interface and uses of the MAPS tool in food systems decision making

The tool is envisioned to enable easy access to information on food system and population micronutrient status, and to support evidence-based decision making to mitigate micronutrient deficiencies.

Interface and uses of the MAPS tool

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Study Design and Data Collection Methods

Study Design:

- Qualitative study - Descriptive in nature with a deductive approach.

Data Collection Methods:

- In-depth interviews (IDIs): Face to face interviews - Open-ended semi structured interview schedule
- Focus Group discussions: In person FGD – FGD guide

Data Handling and Analysis

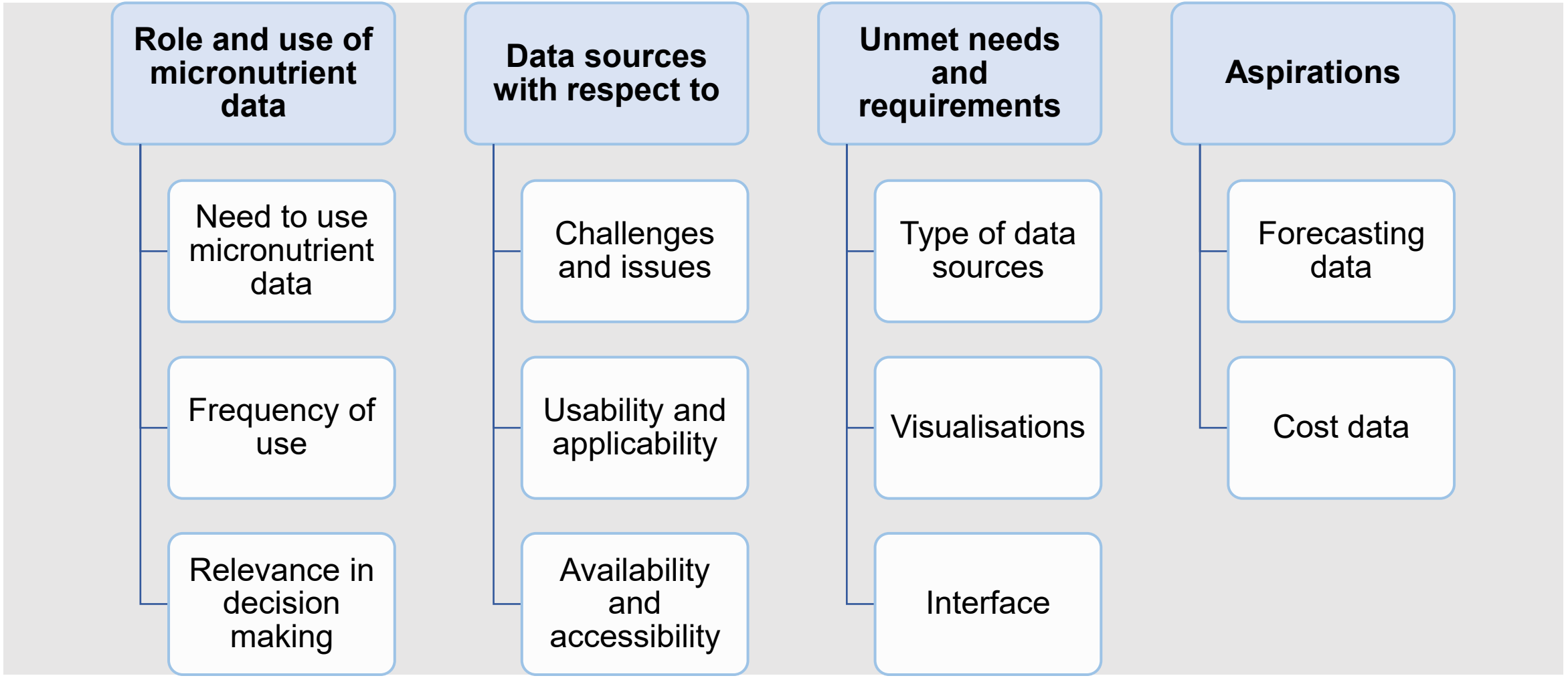
Data Handling:

After word-by-word transcription of IDIs and FGDs, familiarization with data and quality assurance was done by reading, re-reading the verbatim, and making notes.

Data Analysis:

- Deductive approach was followed for identification of emerging themes, concepts and issues which are exhaustive, sensitive to research objectives, reflecting the purpose of study and broadly based on the schedule.
- Framework Analysis was done with development of themes/sub themes.
- Quotes were used to support the findings.

Discussion domains – FGD and IDIs



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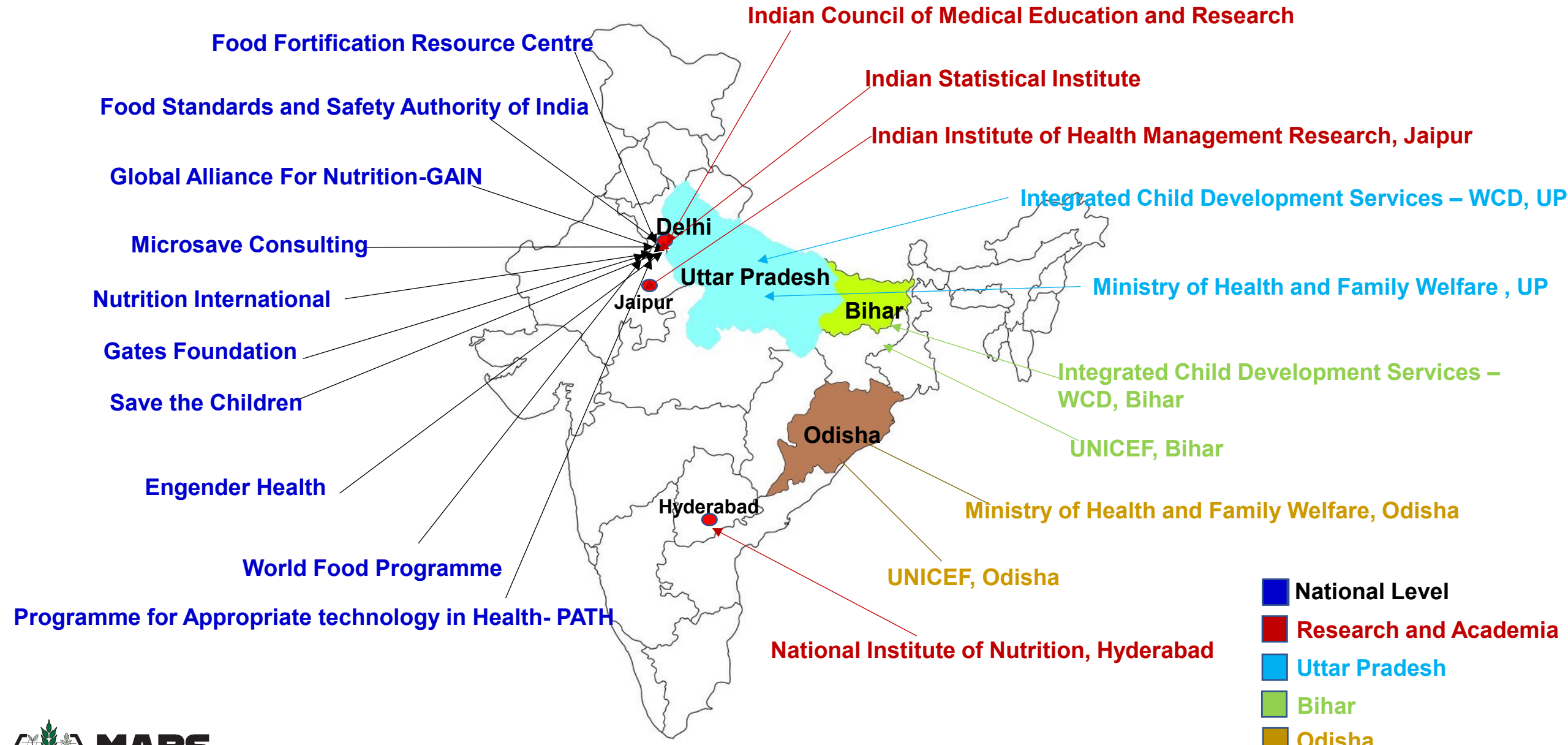
Stakeholder landscape – India and focus states



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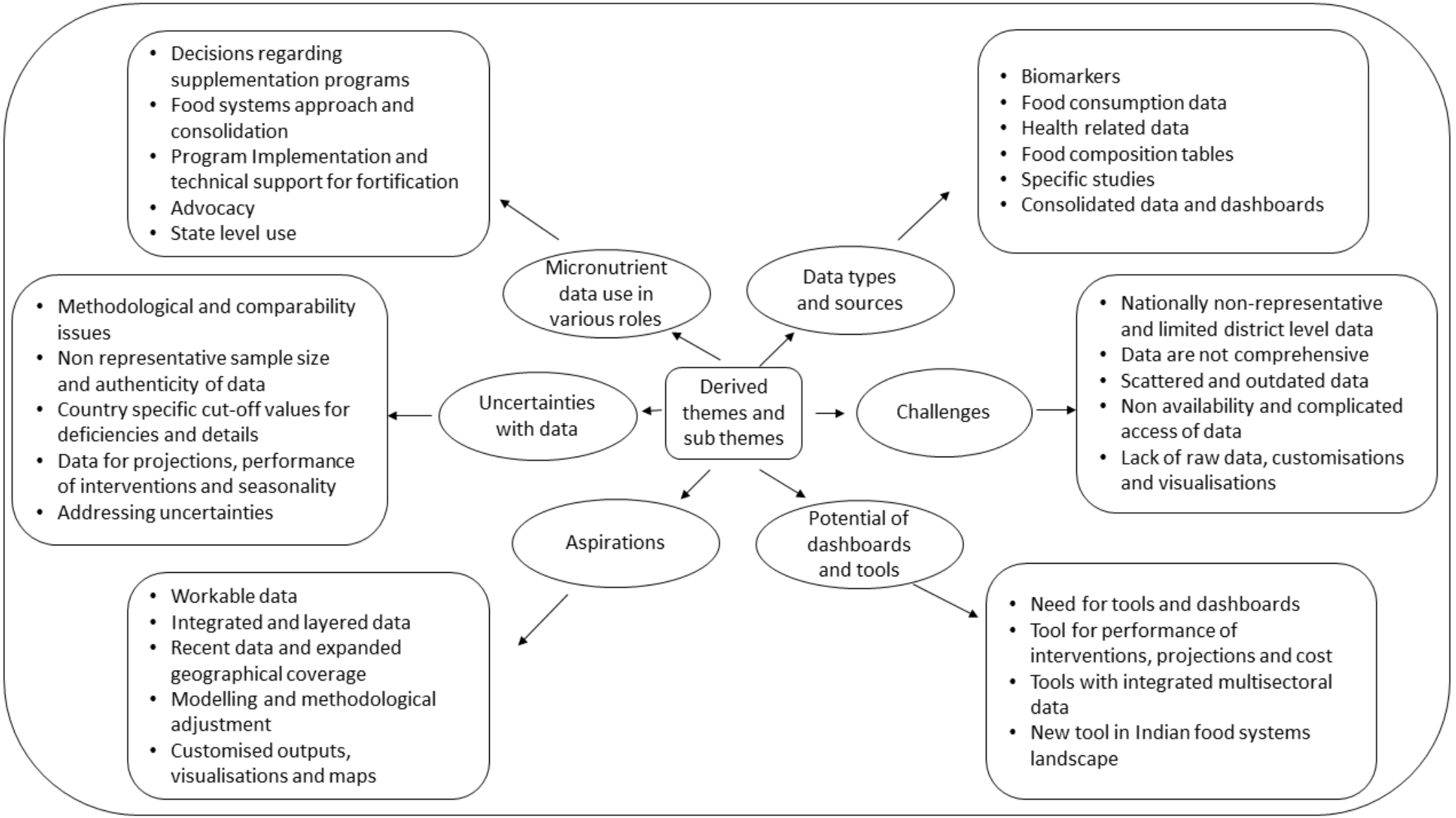
Results

Six themes and thirty subthemes



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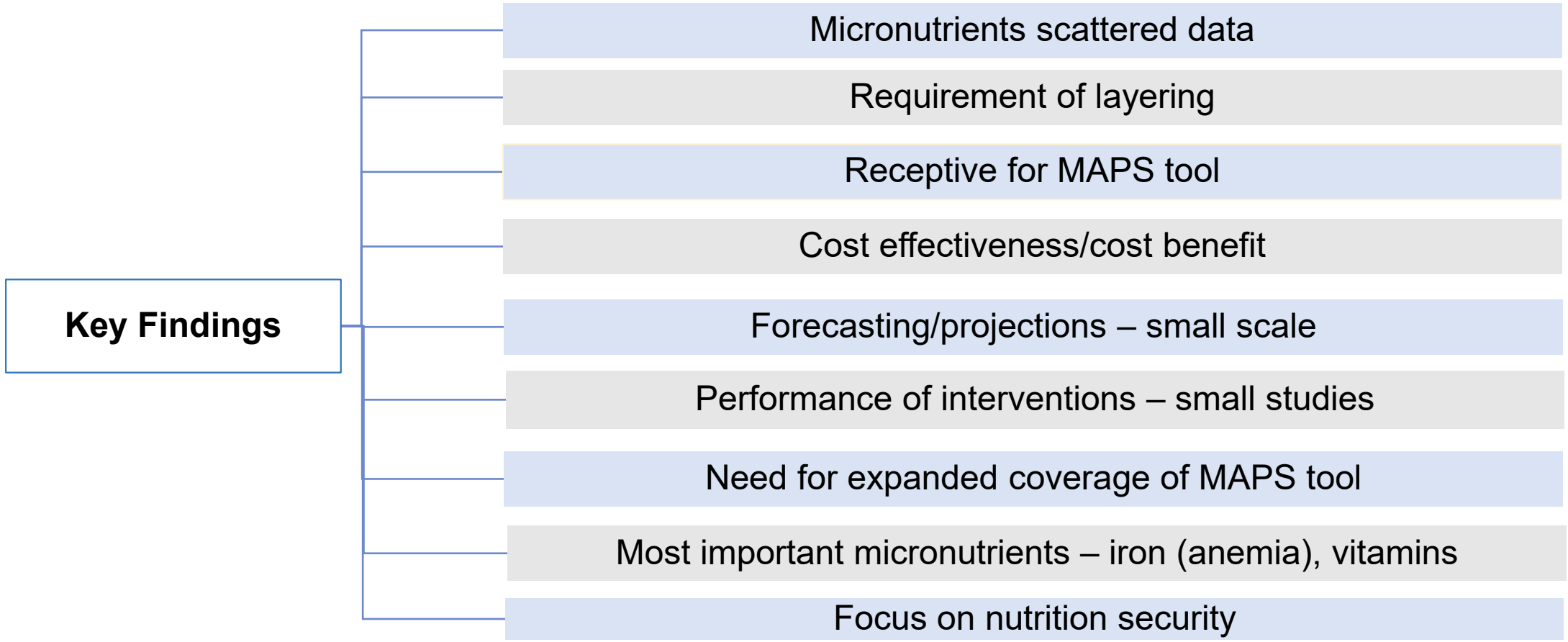
Key Findings – nutrition and biomarker data



Data Types and Sources – nutrition and biomarkers

Biomarker Data – Surveys	• Comprehensive National Nutrition Survey (CNNS) , National Family Health Survey (NFHS) rounds, National Nutrition Monitoring Bureau reports (NNMB), India Iodine Survey, Annual Health Survey (AHS), specific survey by state Govts.
Biomarker Data – Routine	• Health Management Information Systems (HMIS) data, Integrated Child Development Services (ICDS) data
Food Consumption Data	• NNMB rounds, National Sample Survey (NSS), NFHS, Annual Health Survey, Specific studies by technical agencies
Food Composition Data	• Food Composition Tables (FCTs) and Nutrient value of Indian foods (NIN)
Performance/Cost Data	• HMIS, NSS, Programmatic reporting, Rapid reporting system by Govts, Healthy diets survey, cost-effectiveness of supplementation program (NIN), OMNI tool, MMS cost benefit tool, published papers
Coverage and Evaluation data	• NFHS Rounds, HMIS, Specific studies (mostly conducted by NIN) and routine Govt. data, Studies by technical agencies, Evaluation studies by NIN and IIPS.
Nutrition Dashboards/Tools	• Nutrition India Info dashboard, IFPRI district profile, ProPan, Optifoods

Data use purposes

- Estimate the prevalence of micronutrient deficiencies (MNDs)
- Decisions regarding supplementation and fortification
- Scaling up programs and updating policies related to SSNPs
- Establishing food standards
- Evidence based advocacy and policy decisions
- Formulating food basket
- Fixing the level of fortificants
- Technical support to Govt
- Capacity building of frontline functionaries
- Community mobilisation and SBCC activities
- Making Programme Implementation Plans
- Monitoring/Evaluation of Programmes

Challenges with data sources

Limited sources – limited data elements	Sample size and biases	Reliability on routine data by Govt	Old data – recent surveys not available	More state level representation, limited district & sub district level data
Incomprehensive biomarker data – limited age groups	Data/Reports not easy to navigate or extract	Specific studies – expensive, academic rigour is required, ethical approvals	Confusion about exact source	Limited coverage of states – lacks national representation
Large gap between surveys	Consumption/Dietary data sources are limited	Accessibility issues – Some Govt. data sources and within Govt. departments	Repeating large scale surveys- costly affair	Comparison between surveys not possible

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Opportunities for the MAPS tool

- Readiness of stakeholders – Need for a platform which can provide customisation
- Need for consolidation of data at one place
- Receptibility of dashboards/tools – Easiest to use
- Most of the data is available in the public domain
- Relevance of soil composition data – mineral nutrient data, food consumption and composition data
- Need for comprehensive data covering all population groups
- Many Government data sources – Acceptability/Advocacy
- Data required for assessing performance of interventions
- Projection data not used much but receptive for such data
- Cost estimates, cost modelling not done much
- Equity in micronutrient programmes
- Shift toward disaggregated data geographically and temporally
- Tailored need – requirement of both raw data and consolidated/Analysed data
- Requirement of up to date data sources – Recent data
- Need for customised visualisations
- Requirement of district level data
- Harmonisation of data from different survey – statistical adjustment
- Ascertaining food consumption, composition and biomarker level together
- Workable data required – cleaned, adjusted, merged, corrected

In the words of stakeholders…….Public Sector

- *"If we don't have data, we can't do advocacy the policy makers will say why strengthen micronutrient status when it is not having any health effects."* Former MoHFW official.
- *"Basically, we need a ready tool which would save our time as at the state level we do not do extensive data analysis but look at ready analysis and interpretation."* Govt Agency at state level.
- *"Data should comprehensively assist in addressing issues, for example - for anaemia there should be provision of looking at blood biomarkers, food consumption habits and agriculture data simultaneously to get the real picture."* Govt Agency at state level.
- *"We don't have raw data, we rely on reports, readymade reports which have been tailored by different agencies."* Government agency working at national level.
- *"As a public stakeholder we want data in a processed and visual form so that we can take ready insights from it."* Government agency working at national level.

In the words of stakeholders…….Public Sector

- *"A comprehensive dashboard is required which should have both nutrition sensitive and specific data and should have centralised monitoring. Data should come from ICDS, education, agriculture, public health department, food supply department and rural development dept."* Govt Agency at state level.
- *"We need a methodology which can be used further and not going back to the old version again with one biomarker study, so that we can compare the data and arrive at a decision"* Government agency working at national level.
- *"One reason why more evidence is needed across micronutrient deficiencies is to assess the initiation/continuation/suspension of programs around IFA supplementation/Zn supplementation/Vit A supplementation/ Vit D supplementation and more specifically to ascertain geographical variations."* Former MoHFW official.

In the words of stakeholders……. Development agencies (DA) working at national level

- *"So there should be some forum where a request can be made- this level of data is required, in this format and in this visualisation and at the backend this can be provided"* DA working on fortification.
- *"All the data that makes sense from a micronutrient anaemia deficiency perspective could be at one place, so a map of India showing all the districts and then showing the data sets if available for that district."* DA working in policy advocacy role.
- *"India is a country where there is enough data which is available, there's really no dearth of data, also available in a timely manner and the fact that since it's generated by the government therefore when you show it to the government the acceptability is also high."* DA working in policy advocacy role.
- *"Irrespective of there are dashboards, multi data sources available, you can always innovate that space and you can make it more meaningful and helpful for the community"* DA working on child nutrition.

In the words of stakeholders……Agency supporting the Govt in implementation of programs

- *“If there is a tool which can do our robust cost effectiveness analysis or cost benefit analysis, I don't see cost utility analysis being carried out here but if we can get either of them I think they will be very useful for nutrition related interventions.”*
- *“We would be happy to have more holistic data, linking different data sets from different departments and from different ecosystems is very critical for us.”*
- *“While you were nudging senior government officials to work towards a particular public health goal, it needs data. So is the data authentic? What kind of data we have? What kind of data we are presenting? That plays a very critical role.”*
- *“Micronutrient data is very critical from both soil perspective from human health perspective and we have been at the interface of it and it's a very critical to have right kind of data at right point in time which is you know at healthy disposal of different stakeholders.”*

In the words of stakeholders…Development agencies working at state level

- *"To combat micronutrient deficiencies requires varied types of interventions, one of them is about agriculture interventions(multisectoral), look at behaviour change communication, look at fortification, supplementations."*
- *"Mostly all focus is on state level because we do not have the bandwith or the funding support to do district level programming, but our focus heavily depends on the working with state machinery, doing policy advocacy to have system in place."*
- *"I have still not really looked at projection data till now but it would be really interesting to have a look at projection data, then you can plan your programmes."*
- *"Ministry is very clear unless they have a strong evidence they will not implement anything and if they have a strong evidence, they will as a next step will go as an evidence in this country context."*

In the words of stakeholders……. Research and survey agencies

- *"In India micronutrient data for biomarkers very limited data is available in indicators except for iron."* Research institute.
- *"A holistic picture of the* *…ired….. MAPS can be the platform which can* *…rtunity to have a wholesome sort* *…ementation agency.*
- *"Huge resources* *…e.*
- *"MAPS can be a pla* *…oil data, whether it is micronutrient related data,* *… it is dietary data and then after that mapping we can see at* *…whether we require in visualised form?"* Representative who worked previc… in a survey implementation agency.

"We need workable data"
– Chorus at FGD

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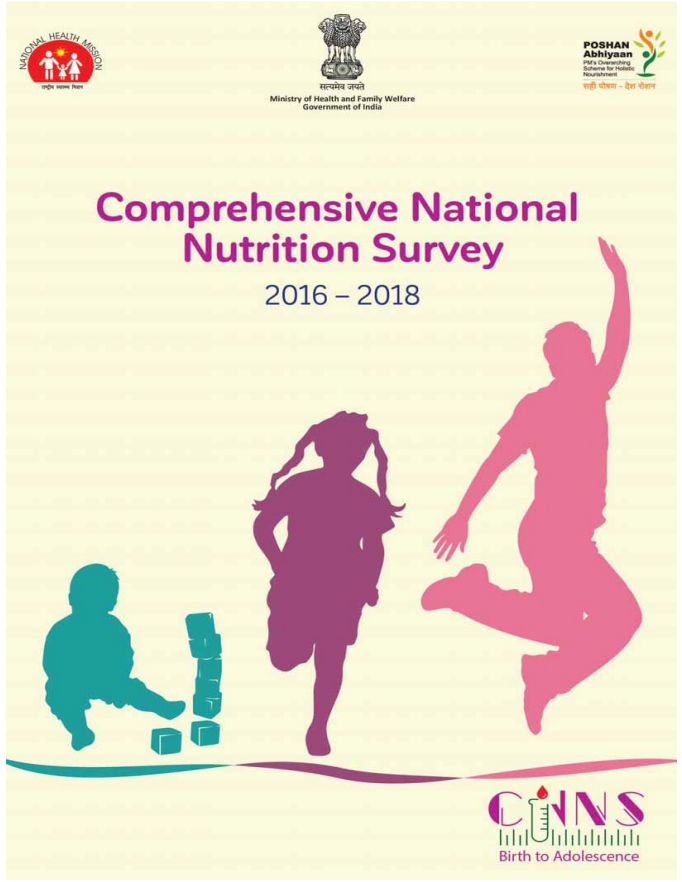
Focus area: Answering policy questions

Vitamin A deficiency in India and seasonality of vitamin A rich food consumption

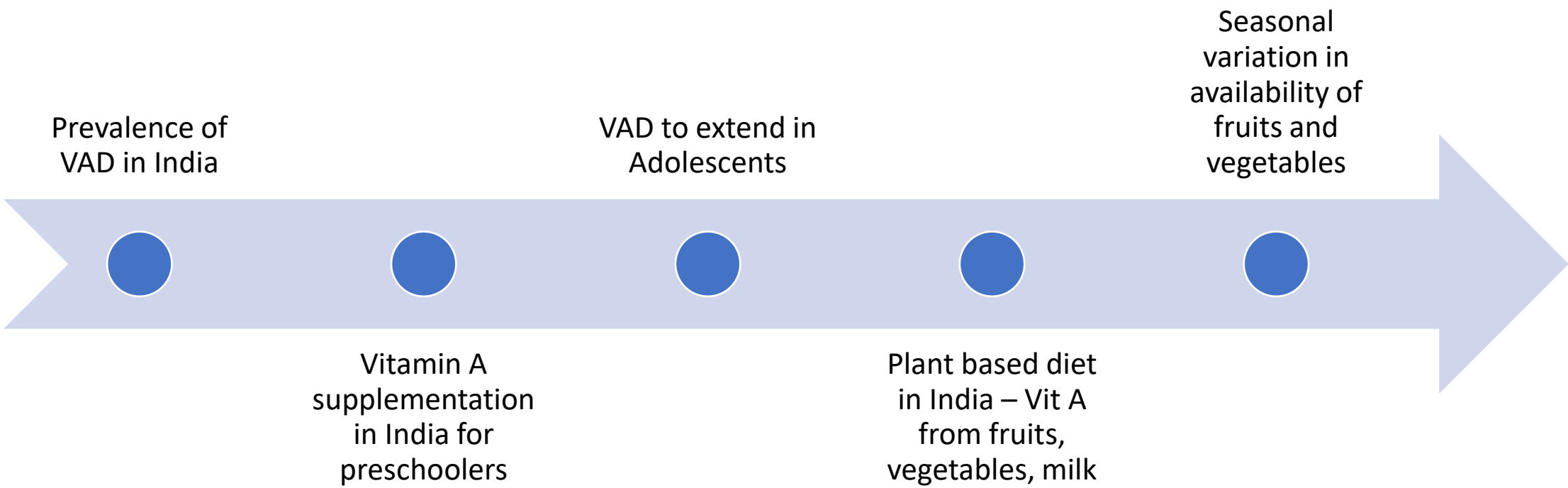
Vitamin A deficiency in three states in India and effect of spatial variances

Secondary Data Analysis

- Data derived from Comprehensive National Nutrition Survey (CNNS)
- Cross-sectional Survey at both the household and respondent levels from February 2016 to October 2018- spread over three years
- Multi-stage, stratified, probability proportion to size cluster sampling design.



Vit A and seasonality: Background and Rationale



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Research Questions

I. Is there evidence of temporal variation in serum retinol in adolescents?
II. Could this be driven by seasonal availability of vitamin A rich foods?
III. Is there a difference by wealth quintile?
IV. What are implications of the results for interpreting differences in deficiency between states in the CNNS, and the design of future surveillance?

How to isolate seasonal effect?

	2016												2017												2018											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
telengana			x	x	x	x	x																													
delhi			x	x	x	x	x	x	x																											
mizoram			x	x	x	x																													
uttar pradesh				x	x	x	x	x	x																										
goa							x	x	x																										
himashal pradesh							x	x	x	x																									
assam							x	x	x	x																									
bihar								x	x	x	x	x																							
andhra pradesh								x	x	x	x																								
madhya pradesh										x	x	x																							
rajasthan										x	x	x																							
maharashtra											x	x	x	x	x	x	x																		
nagaland													x	x	x	x	x																		
haryana															x	x	x	x																	
jharkhand															x	x	x	x																	
punjab																					x	x		x	x	x									
uttarakhand																					x	x	x	x	x	x									
chhattisgarh																					x	x	x	x	x	x	x	x							
kerala																									x	x	x	x							
manipur																									x	x									
tripura																							x	x	x	x	x	x							
gujarat																							x	x	x	x	x								
odisha																							x	x	x	x									
arunachal pradesh																											x	x	x	x	x	x	x		
tamil nadu																												x	x	x	x				
jammu and kashmir																												x	x	x	x				
west bengal																													x	x	x	x			
karnataka																													x	x	x	x			
meghalaya																													x	x	x	x	x		
sikkim																														x	x	x	x		

We selected states that have been sampled over multiple seasons:

Some data collection during ‘summer’ (May-August)
+ some data collection outside summer (October-March)

Comparability of states

Ex: In a state with high level of infection, the population is likely to have low serum retinol value irrespective of their vitamin A intake.

We chose states in the 25-35 U5MR category

- Biggest group
- Not extreme U5MR values
- States that represent regions of India

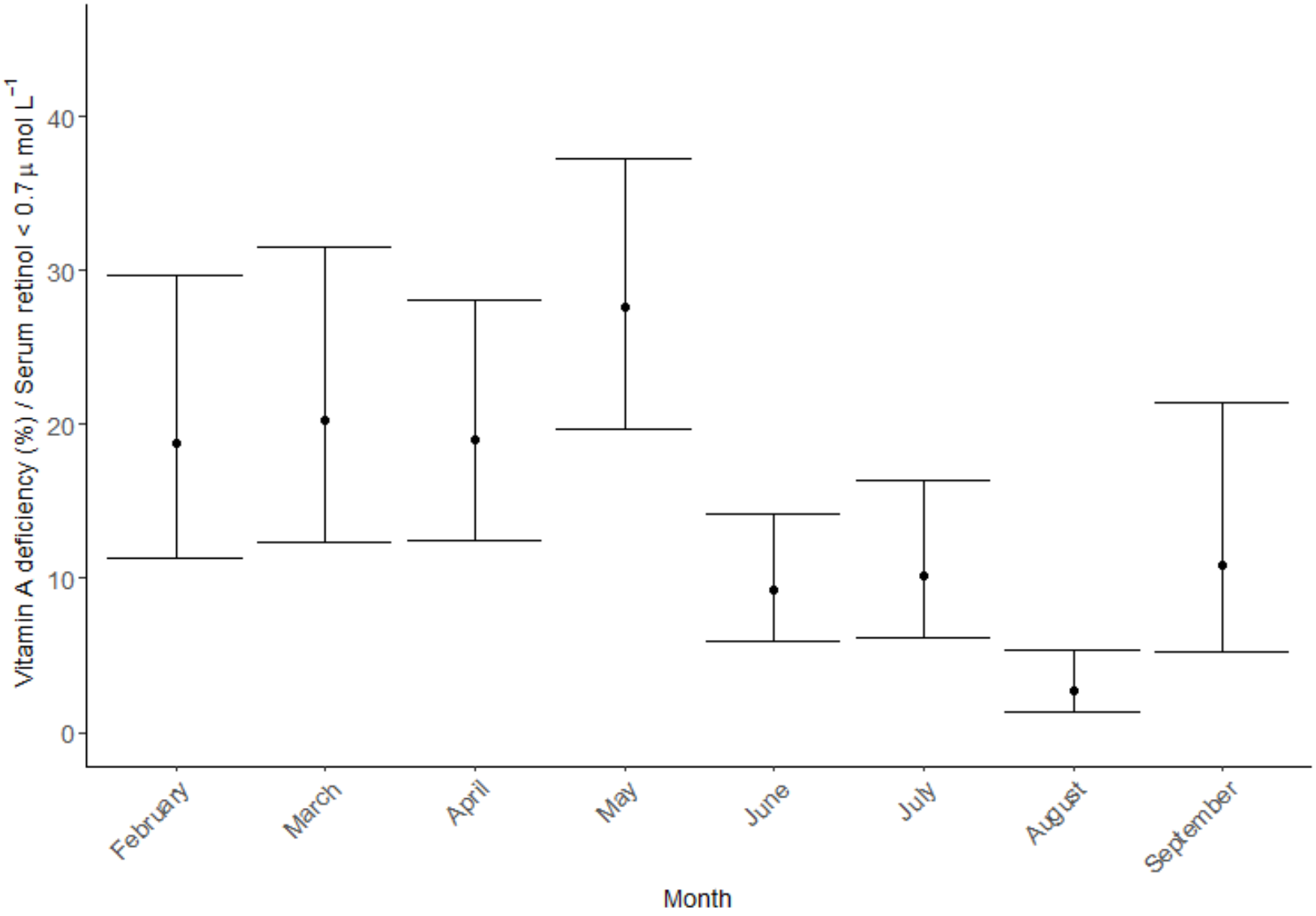
States	U5MR
kerala	5
goa	11
sikkim	11
arunachal pradesh	19
jammu and kashmir	19
tamil nadu	22
mizoram	24
west bengal	25
maharashtra	28
himashal pradesh	29
telengana	29
karnataka	30
manipur	30
delhi	31
nagaland	33
punjab	33
andhra pradesh	35
gujarat	38
rajasthan	38
assam	39
haryana	39
meghalaya	40
odisha	41
tripura	43
jharkhand	45
uttarakhand	46
madhya pradesh	49
chhattisgarh	50
bihar	56
uttar pradesh	60

Selection of states

- Delhi
- Karnataka
- Maharastra
- Telengana
- West Bengal

States	U5MR category	Sample collection time for the states in the 25-35 category	selection
andhra pradesh	35-45		
arunachal pradesh	<20		
assam	35-45		
bihar	>50		
chhattisgarh	>50		
delhi	25-35	March-September	x
goa	<20		
gujarat	35-45		
haryana	35-45		
himashal pradesh	25-35	July-October	
jammu and kashmir	<20		
jharkhand	40-50		
karnataka	25-35	June-September	x
kerala	<20		
madhya pradesh	40-50		
maharashtra	25-35	November-May	x
manipur	25-35	January-April	
meghalaya	35-45		
mizoram	15-25		
nagaland	25-35	January-May	
odisha	40-50		
punjab	25-35	September-February	
rajasthan	35-45		
sikkim	<20		
tamil nadu	15-25		
telengana	25-35	March-July	x
tripura	40-50		
uttar pradesh	>50		
uttarakhand	40-50		
west bengal	25-35	June-September	x

Results



Vitamin A deficiency (VAD) across all states among adolescents (n =2,297). Points are average per month, and error bars are the 95% confidence interval.

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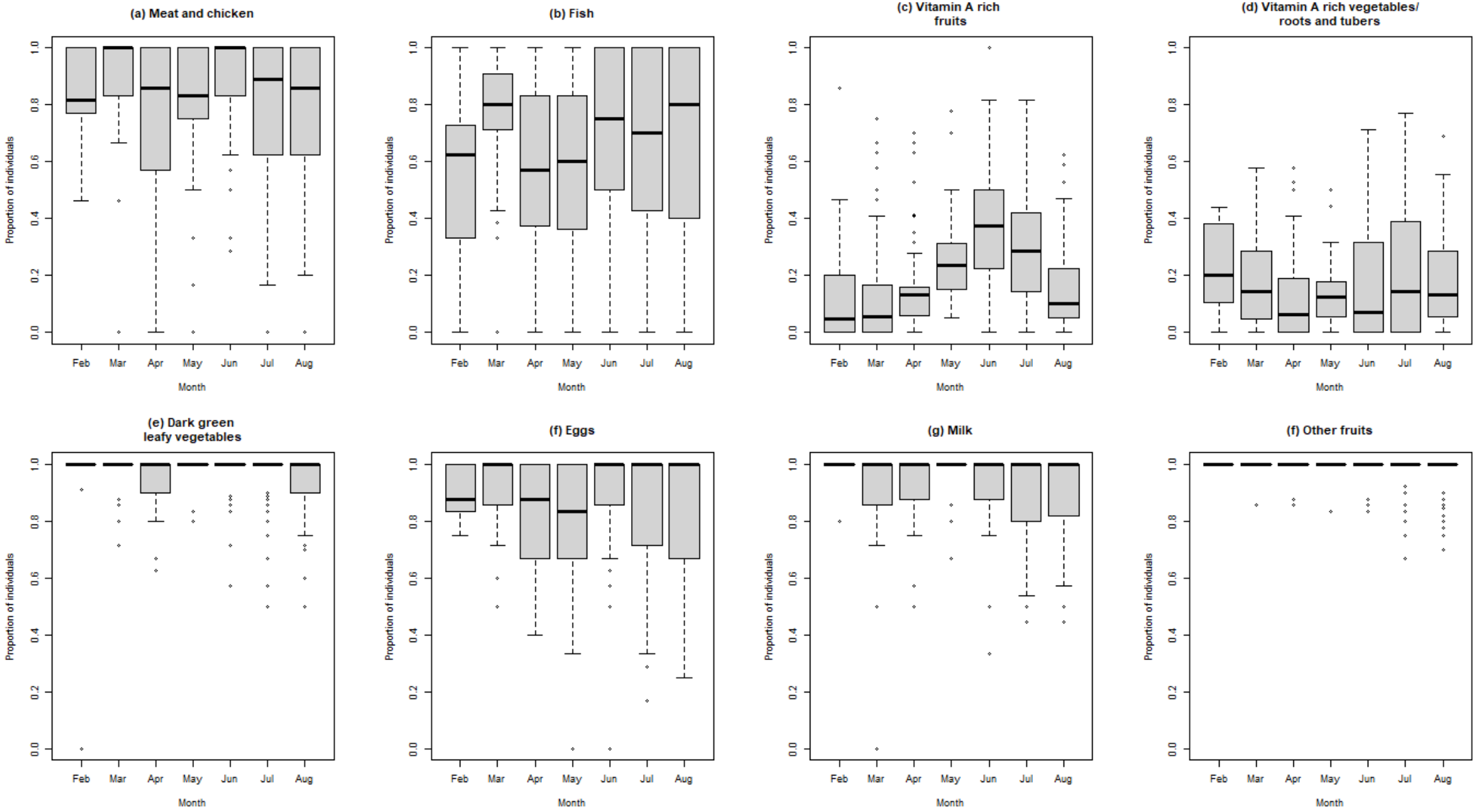

Consumption pattens of vitamin A rich foods among children 0-4 years, as a proxy of food group consumption among adults, in the CNNS

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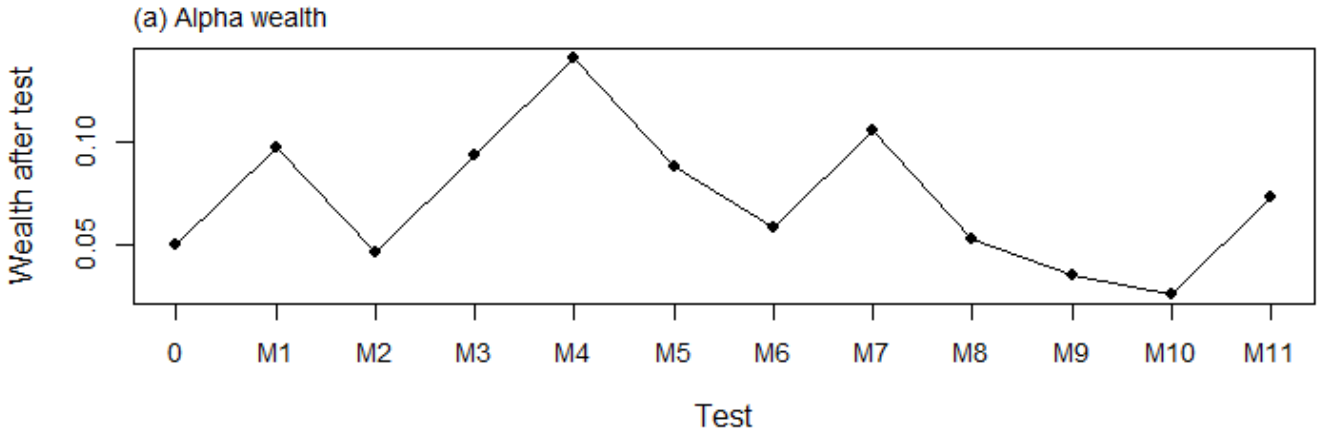
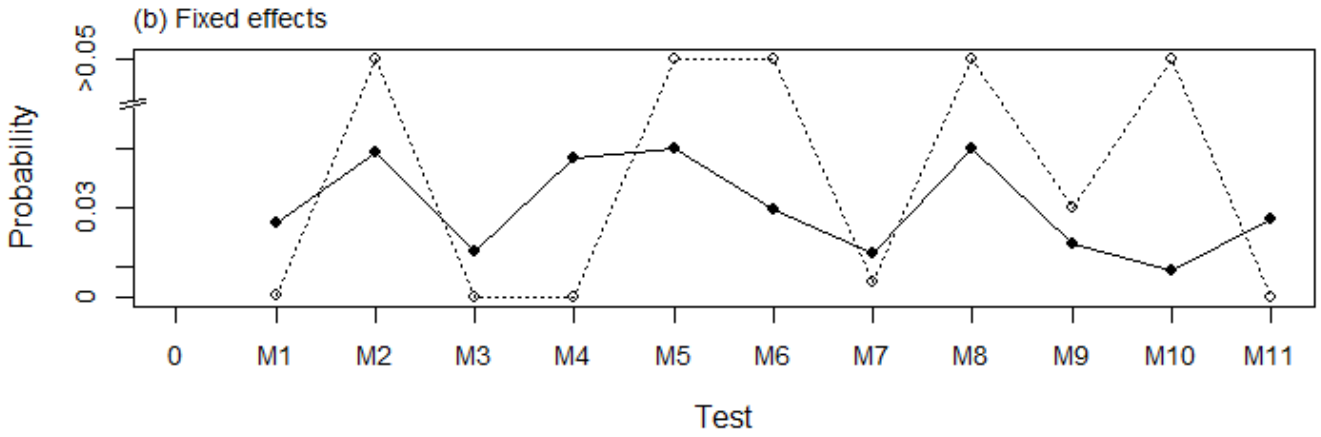




Sequence for predictors

Order	Fixed effect
1	Month when child was sampled
2	Meat and chicken
3	Vitamin A rich vegetables/roots and tubers (e.g. carrots, pumpkin, sweet potatoes, squash)
4	Vitamin A rich fruits (e.g. ripe mangoes, papaya, jackfruit)
5	Vitamin A rich dark green leafy vegetables
6	Eggs
7	Fish
8	Milk
9	Other fruits
10	Wealth quintile of child.
11	Age of child

Discussion

- The consumption of VA rich foods appears to drive seasonal variation in serum retinol status, so that the prevalence of VAD may vary in the same population depending on when sampling occurs.

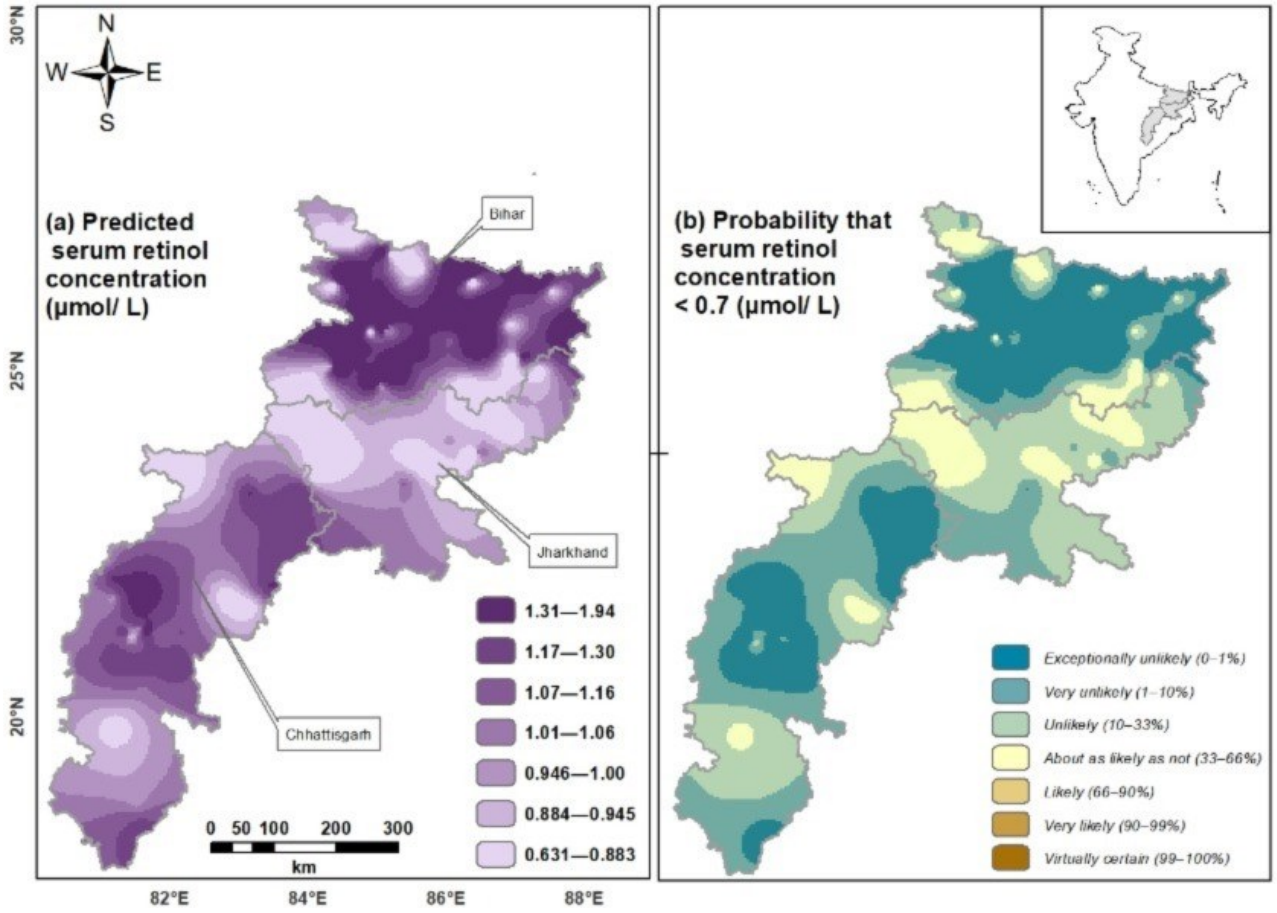
- Future programmes and policies to address VAD, as well as surveys or monitoring, need to take into account the large component of seasonal variation in status

- The analysis demonstrates the value of combining a food systems and biomarker perspective to understand population micronutrient status

Ongoing work:
Vitamin A deficiency and spatial variances

- How geospatial predictions can be made useful for a public health policy?
- Can intra-state variation be modelled using CNNS data, and how can the information be presented in ways that can support public health understanding and decision making?
- What uncertainties must be considered? How uncertainties can be reduced?
- How to present/ communicate areas with large uncertainties/areas with low sample size- what are the implications for design of future surveys.

Preliminary results



(a) Spatial prediction of concentration of serum retinol in adolescents in Bihar, Jharkhand and Chhattisgarh (b) probability that retinol concentration does not exceed 0.7 µmol/L in adolescents of the study area

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Synthesis of findings

MAPS India

- Established stakeholder needs, and their landscape of interactions, **specific to India.**
  - ✓ There is a willingness among multiple stakeholders
  - ✓ There is an unmet need for the modelling and visualisation capabilities of MAPS, and enthusiasm for the tool.

MAPS India

- Data availability and accessibility to use in any future MAPS India realisation.

  - ✓ There are data available and the ability to locate and use data (e.g. cost models).
  - ✓ Data age and access to some microdata may be challenges: we now understand how to mitigate some of these.

MAPS India

- Exploring existing data to answer key policy questions.
  - ✓ Vitamin A deficiency and seasonality
  - ✓ Vitamin A deficiency and spatial variations

Thank you!

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