IDENTIFYING INDICATOR NEEDS FOR FOOD SYSTEM TRANSFORMATION IN SOUTH AND SOUTHEAST ASIA

INSIGHTS FROM CONSULTATIONS WITH STAKEHOLDERS IN FOUR ASIAN COUNTRIES

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SUMMARY

Clear measures of progress on food system transformation can provide decision-makers with the visibility to course-correct to realise desired impacts and can help ensure accountability. To this end, there is a need to develop, test, and validate novel methods and metrics for assessing food systems transformation. To ensure that such work is grounded in local food system stakeholders' needs, GAIN consulted national stakeholders across four Asian countries (Bangladesh, India, Indonesia, and Pakistan) to identify priority indicator gaps for monitoring food systems transformation. These consultations drew from an analysis of each country's food system transformation pathway, existing indicators, and the results from similar stakeholder workshops in Africa. National stakeholder workshops were held with diverse participants in three of the countries, while stakeholder interviews were used in India.

Across all countries, some similar themes emerged, such as sustainable and climate-smart agriculture, small and medium-sized enterprises, food safety and quality, consumption behaviour, policy alignment, and food system governance. There was a strong focus on policy actions, sustainability, and resilience as crosscutting themes. Women and youth were mentioned as groups requiring particular attention in metrics development, including the wage disparities between men and women, inclusion of women and youth in decision-making process, and youth access to finance and agri-business. The results from the workshops will be used to inform GAIN's future work in developing metrics and methods to understand and help countries track their food systems transformation.

KEY MESSAGES

- Understanding and promoting food system transformation requires appropriate metrics and methods, some of which may not yet exist.
- To understand national stakeholder needs for food related methods and metrics, GAIN conducted stakeholder consultation workshops and high-level interviews in four countries in Asia in 2024, complementing similar work in five African countries in 2023.
- Consulted stakeholders identified priority themes for new metric development, which are summarised in this paper.
- Stakeholders in India described a markedly different approach to food systems transformation and measurement compared to the other three countries but identified similar priority areas for measurement, including unique agrarian economy and nutrition security needs.

BACKGROUND

The 2021 UN Food Systems Summit (UNFSS) culminated in the development of dozens of food systems transformation pathways—i.e., visions for how a country would like its food system to change to better achieve social, economic, and environmental goals (1). Following UNFSS, many countries have sought to translate these visions into realities. For example, Bangladesh, Pakistan, and Indonesia all organised multi-stakeholder dialogues to identify national priorities and formulate strategies for implementing National Pathways for food system transformation. Each country then made progress with different policy and priority focuses. Bangladesh has focused its National Pathway document on several priorities: promoting good agricultural practices, advancing a dynamic agricultural research system, supporting agroecological modernisation and resilient production, empowering women, adolescents, and youth as part of social capital, transforming agricultural and non-agricultural livelihoods, strengthening targeted social safety nets for vulnerable populations, and ensuring healthy diets for all to reduce malnutrition (2). It has shown its commitment to sustainable and resilient food systems through key policies such as the National Food and Nutrition Security Policy 2020 and its Plan of Action (2021–2030) as well as the Second National Plan of Action for Nutrition (2016-2025), focusing on food security, nutrition, rural livelihoods, and agricultural mechanisation (3,4). Pakistan's National Pathway document emphasises increasing agricultural productivity, strengthening resilience to climate shocks, and fostering sustainable food systems to support smallholder farmers and vulnerable populations (5). Indonesia has focused its National Pathway documents on five key priorities: promoting aquatic foods, environmental restoration, inclusive business, local food development, and inclusive governance (6).

In contrast, India took a different approach to food and agricultural policy by working outside the UNFSS Pathway process, focusing instead on domestic reforms tailored to its economic and nutritional needs. In recent years, the country has prioritised the National Food Security Act, with an objective to provide subsidised food to ~800 million people under the Public Distribution System (7). Another approach is the Promotion of Natural Farming (Bhartiya Prakritik Krishi Padhati), which encourages chemical-free farming (8). Overall, India prioritises direct welfare-based food security and indigenous agroecological practices to ensure sustainable nutrition security at central and state levels.

As countries take steps towards food system transformation, it is important to ensure adequate metrics and indicators to track and report on changes. The UNFSS +2 Stock-Taking Moment in 2023 further reinforced the importance of monitoring progress, ensuring that countries stay on track to meet their food system transformation goals and broader SDG commitments (9). Many metrics and indicators already exist and are available for doing so. For example, the Food Systems Dashboard (FSD) enables users to visualise over 300 indicators related to food systems at the global level, providing users with wide-ranging, data-driven insights (10). However, there remain gaps in methods and indicators for understanding food system transformation.

The Nourishing Food Pathways (NFP) programme, led by GAIN, is built on the work conducted during the UN Food Systems Summit. The programme seeks to support inclusive and coherent food systems transformation in ten countries. It also seeks to serve as inspiration and guidance for other countries and stakeholders seeking to advance food system transformation (11). As part of NFP, GAIN is working to strengthen efforts to

understand and measure progress on food system transformation. New metrics, measures and indicators can provide decision-makers with the visibility to course-correct as needed to realise the desired impact and help ensure accountability for action. To this end, part of NFP aims to develop, test, and validate new metrics for assessing food systems transformation, filling measurement gaps as opposed to data gaps – i.e., places where an accepted indicator does not yet exist, rather than places where an indicator exists but has not yet been widely collected. This work aims to complement other existing food system data and monitoring initiatives, such as the FSD and Food Systems Countdown Initiative (see Box 1).

To help inform this work, GAIN set out to understand stakeholder needs and preferences for new metrics and methods in the 10 countries targeted by NFP. This was begun through a series of consultations in five African countries in 2023 (12). The present paper reports on the second set of consultations, held in four Asian countries in 2024.

BOX 1. CONNECTION TO THE FOOD SYSTEMS DASHBOARD AND FOOD SYSTEMS COUNTDOWN INITIATIVE

The work of NFP on identifying needs for novel metrics and methods for food system transformation and trying to fill them complements two existing initiatives with which GAIN is involved. **The Food Systems Dashboard (FSD)** is an online platform for displaying a comprehensive set of indicators related to food systems, spanning from drivers of food system change (like urbanisation rates) to outcomes of food systems, like greenhouse gas emissions and overweight/obesity rates. The **Food Systems Countdown Initiative (FSCI)** is an international scientific collaboration that seeks to identify and track a manageable number of indicators (currently 50) to inform progress on and spur accountability for food systems transformation.

Both initiatives rely on existing indicators and data—they do not collect novel data. In contrast, the work described here seeks to identify gaps and develop ***new*** metrics and methods, including through primary data collection where needed; it builds on the gaps identified by both the FSD and FSCI in doing so. The present work also focuses more on process-related indicators and others likely to demonstrate change in the short- to medium-term, while the FSCI has focused primarily on longer-term outcomes. The newly launched country Food System Dashboards in six countries, including Bangladesh, Pakistan, and Indonesia help governments track their implementation strategies and facilitate evidence-based policymaking.

CONSULTATION OBJECTIVES AND METHODS

The consultations were accomplished through a combination of workshops and key informant interviews.

WORKSHOPS

Three national-level stakeholder consultation workshops, in Bangladesh, Indonesia, and Pakistan, were held with the following objectives:

- Take stock of existing indicators and measures used for tracking food system transformation, focused on those relevant to UNFSS National Pathways
- Identify areas across the food system where indicators are currently missing
- Prioritise among those missing indicators, based on the areas reflected in the national pathway document.

GAIN used a food systems framework (13), which had also been adapted from the 2017 HLPE framework (14), to guide the consultations. In-person participatory workshops were held in collaboration with different ministries in Bangladesh, Pakistan, and Indonesia. We partnered with the Food Planning and Monitoring Unit (FPMU) of the Ministry of Food, Government of Bangladesh in Dhaka and the Pakistan Agricultural Research Council (PARC) under the Ministry of National Food Security and Research in Islamabad to organise half-day workshops on May 28 and May 7, 2024, respectively. In Indonesia, we conducted two workshops with two distinct groups of stakeholders in collaboration with BAPPENAS, the Ministry of National Development Planning of the Republic of Indonesia. A consultancy firm, WAIBI, supported us in conducting these two workshops in Jakarta. The first workshop engaged government representatives and researchers while the second engaged stakeholders from civil society organisations, development agencies, and community-based organisations. Workshop attendees ranged from 15 to 32 across different ministries, academia and research institutions, private sector, and international development partners collaborating under UNFSS country-level work.

To guide the workshops, GAIN prepared a list of existing indicators compiled from the global FSD and thematically categorised according to the Fanzo et al. food system framework (13) (see Figure 1). Based on these lists, we encouraged participants to focus their reflections around the following sub-components of food systems that were underrepresented in terms of indicators: under ***Drivers***, the sub-components 'politics and leadership', 'population growth and migration conflict', and 'land use and urbanisation'; under ***Food Supply Chain component,*** 'retail market' and 'food waste'; under F***ood Environments,*** 'food messaging'; under ***Individual Factors***, 'cognitive', 'situational' and 'aspirational'; under ***Outcomes***, 'economy' and 'social equity and inclusion'.

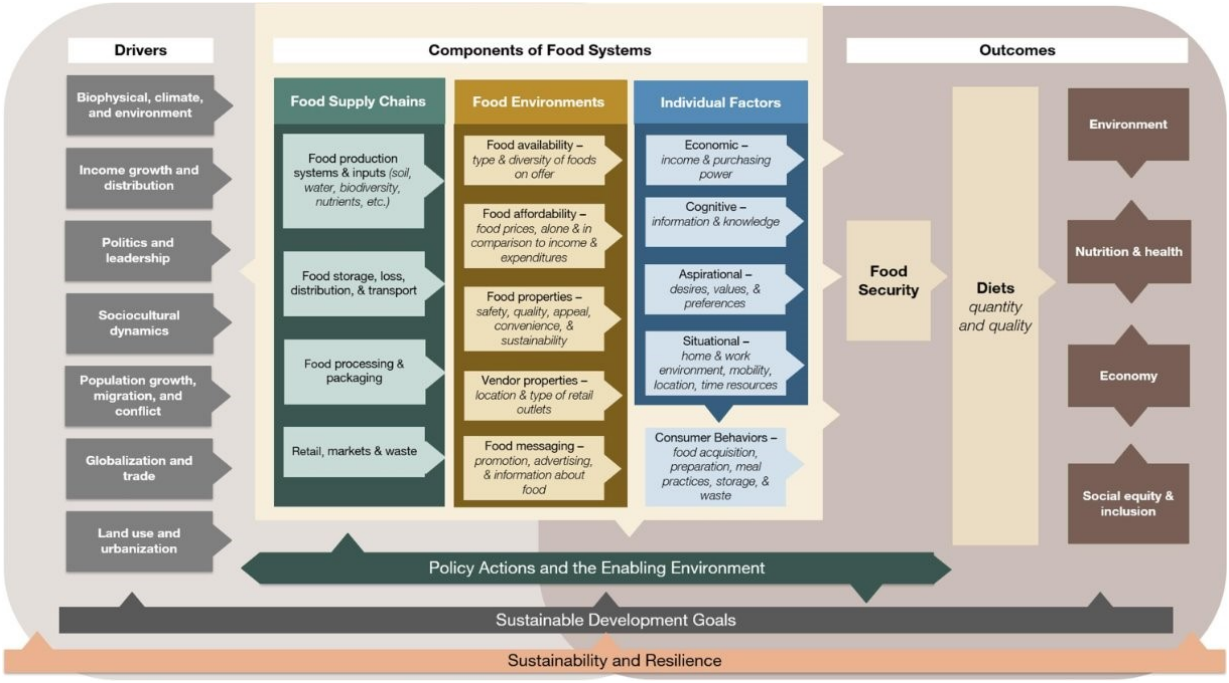

Figure 1: Food System Framework (13)

All three workshops included two activities, followed by a plenary discussion and feedback session after each activity. For the first activity, the participants were asked to first individually review the list of existing indicators in the global FSD and reflect on the food system framework to identify the under-represented themes in the existing indicator list. Based on their reflections, in the second step, participants were asked to individually brainstorm new indicator ideas for the under-represented themes and write those in a blank copy food system framework. In the last step of activity one, participants were asked to share their identified new indicator ideas within their group and discuss the prioritisation of those indicators while filling out a prioritisation matrix. The prioritisation matrix depicted four distinct types of indicators based on their measurement complexity and alignment with national food system policies: those that are easily measurable but less aligned with policy, those that are easier to measure and highly aligned with policy, those that are harder to measure and less aligned with policy and lastly, those that are more challenging to measure but demonstrate strong alignment with policy.

The second workshop activity required participants to work in groups and select a priority indicator from their newly identified indicators list. They subsequently analysed their chosen indicator's reporting requirements and developed associated policy and action recommendations using a standardised template.

KEY INFORMANT INTERVIEWS

The objective of the key informant interviews with high-level stakeholders was to better understand their views on existing metrics, priorities for new relevant metrics, and the use of data for decision making and policy formulation across the food system. All key informant interviews followed a qualitative research approach, using a thematic content analysis framework to systematically analyse insights. This approach involved a stepwise process to extract, code, and organise data into meaningful themes, focusing on pre-identified gaps in food system measures.

Participants for this assessment were identified through a structured process that began with established GAIN partners and collaborators in the food and nutrition sector. The selection prioritised individuals in senior and technical, mid-level roles from academic institutions, international development agencies, government bodies, and civil society organisations. To ensure diverse perspectives, a snowball sampling approach was utilised, wherein initial contacts recommended additional participants to consider, broadening the scope of expertise and insights. Outreach efforts were conducted via email, facilitated by GAIN and in-country consultants. Before the interviews, participants were provided with relevant preparatory materials, including a brief concept note explaining the context and objectives of the interview and an outline of the interview structure, which highlighted the key areas of information being sought. This helped participants prepare for the discussions and ensured alignment with pre-identified focus areas.

A total of 11 key informant interviews were completed between Bangladesh, Pakistan, and Indonesia. Two interviews were conducted in Bangladesh, one with a Sustainable Development Goals expert and high-level policymaker and another with a nutritional sciences and food systems academic. In Pakistan, four interviews were conducted with experts in different fields including public health, agricultural economy, nutrition, and data generation and management. In Indonesia, five interviews were conducted with high-level stakeholders with expertise in metadata, national food and agriculture planning, food diversification and safety, public welfare statistics, and public health and nutrition.

In India, a different approach was taken. Several months after the other countries' workshops were conducted, eight key informant interviews were conducted. These were guided by the previous countries' workshops and interviews and focused on identifying perceived gaps in existing food and agricultural metrics that hinder progress toward national nutrition, sustainability, and equity goals, as well as evaluating the relevance of globally identified indicator themes to the Indian context. The eight participants included government officials, NGO representatives, technical UN and international agency stakeholders, and food system experts.

WORKSHOP AND INTERVIEW OUTCOMES: STAKEHOLDER INDICATOR IDEAS

Each country workshop identified unique gaps in existing metrics and priority areas where new metrics and indicators might be developed for use at the national level. Many of the same priority areas were identified by multiple countries. Annex 1 summarises these findings, organised by food system component and sub-sections. Additionally, workshop participants in Bangladesh and Indonesia also identified indicators that are easier and harder to measure but highly align with national policies linked to food system transformation using the prioritisation matrix (Annex 2). Below is a narrative summary of the priority areas and ideas identified by workshop participants that aligned with the ***underrepresented areas*** pre-identified by GAIN and were relevant for national policies linked to food system transformation.

BANGLADESH

Under ***Drivers***, stakeholders identified trade and globalisation as a priority area for new indicators, noting the need to measure import dependency of major food products

including agricultural commodities as well as processed food. Both interview and workshop participants also suggested tracking imported processed food, such as sugary drinks. Similarly, priority areas related to income growth and distribution and politics and leadership emerged, such as wage and employment disparities, financial access, and entrepreneurship (e.g., wage gaps between men, women and youth employed in agri-business.) It was also suggested to track youth access to finance for agri-food entrepreneurship as well as financial assistance schemes provided for food producers. Within the Bio-physical, Climate, and Environment sub-component, stakeholders prioritised measures related to Climate-Smart Agriculture (CSA), sustainable inputs, and resource management, investments in CSA, and land area coverage under CSA technology as well as use of chemical fertilisers versus organic alternatives. Moreover, the stakeholders identified the need for a Technology Adaptation Index tracking new technology use across production, research, food processing, and storage sectors, including the percentage of farmers adopting these technologies.

Within ***Food Supply Chains,*** several prioritised areas and indicator ideas emerged. This included sustainable and climate-informed production; food safety and processing; and information on incentives for local food production. Food loss and waste management (e.g., household-level food waste disposal, recycling) was also discussed as a national priority, though some measures exist globally. Indicator needs were also noted in relation to distribution and market access, such as tracking cold chain transport and storage capacity for perishable food, including in public versus private facilities. They also highlighted the need for indicators to include small- and medium-sized enterprises (SMEs).

Under ***Food Environments,*** the stakeholders raised the concept of local and traditional food systems, such as traditional food knowledge and regional food system resilience. More precise measures of food preparation at home versus use of ready-to-eat and processed foods were suggested. Priorities also included food safety and labelling, such as adulteration in food products, compliance with food safety standards, and safety labels' alignment with national dietary guidelines. Measuring food purchasing behaviour using data on online food purchases and digital food transactions was also raised.

Several indicator ideas fell under the ***individual factors*** component, relating to consumers' food purchasing behaviours, nutrition awareness/ food literacy (particularly on unhealthy / sugary foods), and access to affordable food. It was also mentioned that it is important to understand food consumption patterns in workplaces.

While there were no new ***Outcomes*** indicators suggested by the stakeholders in Bangladesh, the ***Policy Actions and Enabling Environment***, and ***Sustainability and Resilience*** components were briefly touched on. Stakeholders discussed policy and political will as cross-cutting themes and noted a need for greater measurement of food and nutrition related issues in parliamentary discussions, high-level dialogues, and national policy alignment.

In terms of degree of complexity, participants emphasised basic outcome focused indicators as easy to measure and highly aligned with national policies (existing examples include food expenditures or the number of hygienic slaughterhouses). In contrast, indicators related to multi-sectoral coordination and infrastructure were more challenging to measure but highly aligned with national policies; examples included value chain management, food labelling, food waste disposal, and recycling.

INDONESIA

Under ***Drivers,*** measuring trade and globalisation aspects was prioritised by the stakeholders in Indonesia as in Bangladesh, including monitoring of marketing and distribution certification processes, comprehensive farm and livestock product data (including derivative products), and metrics for assessing the added value of fishery products. Other sub-components of income growth and distribution as well as sociocultural dynamics was identified, including indicators for the relative importance of farmers, fisherfolk, and fish farmers and metrics for evaluating the inclusion of youth and women in decision-making processes within food system jobs. It was noted there are inadequate indicators for monitoring income stability and changes among small-scale food producers and assessing fiscal capacity at regional and village levels. Other suggestions include indicators for measuring the effect of governance decentralisation on food policy implementation, tracking of important national frameworks, and implementation of blue economy policies.

Within the land use and urbanisation sub-component, suggested improved or new indicators include community urbanisation and accessibility factors, use of cooking equipment (e.g., stoves, gas cylinders), changes in land use for food production and processing, the proportion of land available for food production or processing, and carbon production from land use, fertilisers, and livestock. Stakeholders identified the need for more comprehensive indicators to measure investment in CSA, climate-informed seed security repositories/availability, and the effectiveness of incentives for environmentally sustainable farming practices. Key informants also identified energy sources (particularly firewood) at household level, agrobiodiversity, and climate-integrated food system data as essential indicators.

Regarding ***Food Supply Chains***, areas for new measurement included incentives for local food production, measures discouraging harmful farming practices, CSA certification for sustainable palm oil, regional food loss across the supply chain, equity in food distribution across hard-to-reach places, cold chain logistics, climate-smart storage and distribution, food vendor licensing, SME inclusion, and traceability. Several gaps were noted related to food processing, such as adherence to processing standards, volume of processed products, source of processed food composition, and innovation in urban food processing. In addition, interviewed stakeholders prioritised food availability indicators, specifically the availability of rice, animal and vegetable protein, and vegetables. They also emphasised data on the potential of local food utilisation, reflecting concerns about local food system resilience.

Under ***Food Environments***, indicator gaps noted included measures for indigenous food knowledge, preservation of forgotten foods, availability of local food species, and balancing local production with imports. Stakeholders noted insufficient metrics for accuracy of food labels, alignment with dietary guidelines, safety and hygiene standards for food storage, and contamination prevention. Indicator gaps related to food industry SMEs and the economic impact of food loss and waste were also raised. Moreover, in the food messaging domain, interview participants prioritised data on public knowledge about food, promotion, education, and food literacy. Additionally, they identified water needs for households (comparing food consumption versus other uses) as an important indicator.

Several ***Individual Factors***-related indicator ideas also emerged, including behaviour change for shopping and diverse food consumption, percentage of households who prepare their own food versus buy ready-to-eat meals, consumer preference for local versus Western foods, and consumption of food at workplaces. Measuring public understanding of balanced diets and nutrition (including cultural contradictions) and reach and effectiveness of awareness campaigns were also raised. Under ***Outcomes***, significant gaps in measurement were discussed, such as measuring consumption of adequate protein and micronutrients and household contributions to food waste and emissions.

Under ***Policy Action*** and ***Sustainability and Resilience***, suggestions included measuring political will and legislative alignment with food security policies, long-term governance for aquatic food production and water security, and policies and incentives for household and market food loss and waste reduction. The interviewed stakeholders also identified data on fiscal capacity and institutional and regional leadership as important indicators of political will. Participants identified numerous easy-to-measure and policy-aligned indicators, such as related to local food production, consumption patterns, and inclusion of women and youth. They noted indicators that relate to deep, system-level transformation (e.g., linked to climate change, infrastructure, cultural behaviour) as harder to measure but aligned with national priorities.

PAKISTAN

In terms of ***Drivers*** of food systems, environment-related indicators were identified as missing; hence, stakeholders suggested new indicator ideas such as a CSA index and an indicator for Compliance with Environment, and Social, and Governance (ESG) Standards. Interview respondents highlighted population growth and migration indicators, stressing the importance of tracking population-land shifts and changes in land use patterns.

Under ***Food Supply Chains***, four themes were highlighted: production and processing, tracking food loss, storage capacity, and SME and vendor engagement. These include compatibility and quality of food testing laboratories, best farming practices, seed production/conservation, tracking food loss at all levels from farm to market (including cold chains), percentage of private and public sector storage facilities, number of food SMEs, registered suppliers of specific food commodities, and food fraud traceability.

Regarding ***Food Environments***, stakeholders highlighted the importance of tracing the coverage of food fortification to address micronutrient deficiencies. Therefore, they suggested indicators on the supply of fortified commodities, coverage of fortified oil and flour, and the percentage of SMEs capable of food fortification. Besides, monitoring gaps on food safety and quality including food processing standards were discussed. Metrics on the number of street food vendors and training for food handlers on food safety and quality were suggested for proper monitoring. In addition, food messaging was considered an important theme to measure awareness on nutrition and healthy diets as per the country specific guidelines. The interview respondents also emphasised adapting international toolkits like Hazard Analysis and Critical Control Point (HACCP) to local agricultural conditions and implementing an Integrated Hazard Surveillance and Response System.

A number of indicator ideas regarding ***individual factors*** emerged, particularly those related to consumption behaviour and food literacy. These include sugar-sweetened beverage consumption rates, sugar intakes, food consumption knowledge and practices across ages, and supplement usage. Consumer education on sugar and health outcomes and the percentage of school children having access to healthy food information were also discussed as new metrics to measure for food literacy. Moreover, household-level decision making on food and individual relationships with food were also suggested as important indicators. Regarding consumer behaviours, stakeholders emphasised economic indicators such as food price indices. Environment impacts and health and nutrition were discussed under ***Outcomes*** of food systems, particularly around compliance with ESG standards, water quality and its impact on health, and commercialisation's impact on health.

Lastly, *policy and food system governance* were discussed as a cross-cutting theme. Stakeholders suggested new metrics on policy alignment with food system pathways, existence of development of pre-processing, processing and post-processing frameworks, implementation of HACCP activities, technology adaptation index (in production, research, food processing and storage), public access to food systems related data, and the presence of adaptation and mitigation plan. Stakeholders emphasised centralised data management for decentralised use to inform policy and stressed the integration of data collection and utilisation across sectors. In addition, they also highlighted the need to strengthen laboratory technicians' capacity to link raw data to meaningful indicators for policy and regulation purposes.

INDIA

As India's food system conceptualisation and food/ agricultural policy process differ from the other three countries, we conducted a larger number of key informant interviews in India, focusing on five themes pre-identified following the prior country consultations: globalisation and trade, processed foods, environmental sustainability, livelihoods and gender, and food storage, loss, and distribution.

Stakeholders in India validated two pre-identified indicators under globalisation and trade theme, import dependency and export-import balance, highlighting India's dependency on imports for critical food products like edible oils and pulses causing vulnerabilities in price volatility and food security. They also suggested two new indicators under this them nutritional quality differences between imported and domestic food products and reserve stock availability for key food products during crises. Under the theme of processed food, stakeholders validated indicators related to accessibility of processed food and nutritional labelling compliance, highlighting the increasing impact of processed food on dietary habits and nutrition. They also suggested two new indicators, compliance with food safety regulations in the informal food sector and impact of processed foods on traditional diets.

Regarding environmental sustainability, key informants validated two indicators, ESG compliance for agriculture and fisheries and tracking climate adaptation and mitigation efforts, reflecting environmental challenges resulting in crop productivity reductions and fish migration due to climate change. They also suggested two new indicator ideas, related to rising carbon dioxide levels and their impact on crop nutritional quality and fish migration trends linked to temperature changes and their effects on local livelihoods (as fish migration disrupts the livelihoods of fisherfolk and decreases their access to key

sources of nutritious food). Under the theme of ***Food storage, loss and distribution***, stakeholders validated pre-identified indicators, 'cold chain utilization rates' and 'food loss at producer and logistics levels' and suggested new indicators focused on regional disparities in cold-chain access and indigenous storage techniques. Lastly, stakeholders validated two pre-identified indicators under the cross-cutting theme, ***Livelihoods and Gender***, focused on employment and wage tracking across the food system, gender-specific participation in agri-business and agriculture, gender specific barriers in agricultural markets and inputs, and the role of women's self-help groups in achieving rural financial independence. Through these indicators, they aimed to highlight the systemic barriers faced by women in food systems, including limited access to credit, inequitable wages, and the burden of unpaid care work.

Overall insights from India referenced the need for agricultural production data to align with market realities, to better assess food availability and respond to fluctuations in demand. It also highlighted disparities and bottlenecks in India's food distribution systems and the need to measure and mitigate these for rural populations. Compliance with food regulations regarding labelling was flagged as a priority, particularly for high fat, sugar, and salt products.

SYNTHESIS & DISCUSSION

A list of ideas and prioritised themes identified by stakeholders across all four countries are presented in Annex 1, coded into themes.

Across the three national workshops in Bangladesh, Pakistan, and Indonesia, similar themes emerged. Income growth and distribution, land use and urbanisation, distribution and market access, food safety compliance and consumers' consumption behaviour were identified by each country. ***Food Supply Chains*** was the component with the largest number of identified themes and indicator ideas, indicating stakeholders saw a particular need to fill measurement gaps for this part of the food system. Policy actions and governance also emerged as a common area for identifying indicator gaps, including understanding policy and incentives for food waste and loss reduction. Many new indicator ideas were also suggested for ***Individual Factors***, such as food safety awareness and interactions with the local food system.

Besides, many stakeholders also focused their considerations on the food system component '***Food Environments',*** which encompassed the sub-components of food affordability, availability, properties, messaging, and vendor properties. This was not anticipated, as the pre-identified sub-components that stakeholders were prompted to reflect on and suggest new indicators for spanned equally the food system components (a slight majority falling in 'Individual factors'). Within the ***Food Environments*** component, the sub-component 'food messaging' was pre-identified, and each country identified new indicator ideas on this theme, such as food literacy and awareness campaigns. Stakeholders identified priority themes and indicator ideas across many of the pre-identified sub-components but excluding 'population growth and migration conflict' under ***Drivers***; 'economy' and 'social equity and inclusion' under ***Outcomes;*** and 'aspirational' under ***Individual Factors***.

Stakeholder interviews in India used more specific pre-identified categories than in the other countries, including globalisation and trade, processed foods, livelihoods and gender, environmental sustainability, and food storage, loss and distribution. Within these

categories, several priorities were noted, such as import dependency, accessibility of processed food, gender disparities in agri-business participation, food loss and cold chain utilisation rates. Others fell beyond these pre-identified categories, including nutritional quality differences between imported and domestic food products, impact of processed foods on traditional diets, financial independence of women, gender-specific barriers in agricultural markets and inputs, and indigenous storage techniques.

In terms of particular population groups, women and youth were mentioned as key to consider for developing new indicators across all four countries, spanning topics such as wage gaps, access to finance, and inclusion in decision-making processes.

Some limitations to this analysis should be noted. Workshops' time limits did not allow for in-depth discussion or review of existing indicators, which limited stakeholders' ability to grapple with the task of envisioning new indicators. Unsurprisingly given the highly technical topic, participants often struggled with understanding what was an actual indicator gap (i.e., a need for conceptualisation of a new indicator / method) as opposed to a data gap (i.e., collecting data on an established or easily calculated indicator), and a number of the suggestions made fell into the 'data gap' category. Similarly, some indicators suggested under one component of the food system might be better classified under another component. The specific way in which the discussions were framed (focusing on certain parts of the food system, using the Fanzo et al. framework, and on certain pre-identified indicator areas) also will have affected the outcomes of the discussions; there may still be opportunities in areas where indicators already exist (but are not adequately utilised, or generating sufficient, reliable data). Discussions were also largely shaped by the participants' professional and cultural perspectives; there are other perspectives in each country that could yield other priorities. Stakeholder input is also biased to what was most prominent in their country's pathway documents, and the specific wording used therein. This is of particularly importance when analysing the results from India, where agri-food systems and a focus on agricultural production is paramount.

Moving forward, GAIN will consider the results of the consultations and those in Africa as one input into identifying priority topics for new metrics and methods development (while also considering other criteria, such as existing metrics, feasibility, generalisability, and sensitivity). By helping to identify and fill gaps in metrics and methods for measuring food system transformation, we hope to contribute to accelerating that transformation as well as documenting progress and processes to inform future efforts.

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ANNEX 1. INDICATOR LIST

List of Indicators/ Indicator Ideas suggested in Metrix and Methods workshops and Key Informant Interviews in Bangladesh, India, Indonesia and Pakistan

Section	Sub-section	Coded themes	Illustrative indicator ideas from national workshop and stakeholder interviews	Country
Drivers	Globalisation and Trade	Trade	Supply stability: import dependency of major food products with respect to total demand/requirements; food aid reliance relative to domestic production; Total import and export of agricultural commodities (% of total export and import vs. Agro-Export and Import)	BD, ID
			Reserve stock availability	India*
		Processed Food	Imported processed foods; proportion of total imported foods that are processed; Sugary drinks imported per capita	BD, ID
	Income growth and distribution	Livelihood	Wage differentials (between men and women)	BD
			Agricultural productivity per worker, per sector	PK*
			% of farmers, fisherfolk, fish farmers vs total food system workers	ID
		Livelihood; Inclusive	Number of youth employed (including women) in agri-buisness/agro-storage/ago-processing	BD
		Capital; Place-based	Fiscal capacity (region wise/village-level)	ID
		Capital; Access to Finance	% of youth having access to finance for agri-food entrepreneurship	BD
	Socio-cultural dynamics	Inclusive	Participation, inclusion, involvement of youth and women in decision-making particularly in FS livelihood	ID
		Capital	Access to capital / Debt incurred by family members for celebrations	ID
	Politics & Leadership	Local FS/ Equitable Distribution & Access	Regional planning for food production, distribution, fiscal planning	ID
		Political Will	Decentralisation and the limits of policy being implemented the same way across diverse administrative areas	ID
	Population Growth & Migration Conflict			
	Land use and urbanisation	Accessibility	Urbanisation/ accessibility measures; % of villages that can be access by 4-wheeled vehicles; % of HH with access to a market <5km; % of HH with electricity; % of HH with MCK/ lavatory	ID
		People - land shifts	Changes in land use for food [production, processing]; Population shifts linked to land use change; Proportion of land available for food production/ processing in each sub-national region	ID
			Population shifts and changes in land use	PK*

	Biophysical, climate, and env.	CSA (climate smart Agriculture)	Climate Smart Agricultural Index; Percentage of farmers who has access to early warning information; Compliance to Environment, and Social, and Governance (ESG) Standards	PK
			Proportion of Climate and Environment-Friendly Crops produced; chemical fertiliser vs. green manure/ composting; % Coverage of the total land cultivated? % Coverage (in hectares or % of total cultivated land) under CSA technology	BD
			% of Investment in CSA out of total National agricultural budget	BD
		Environmental Sustainability; Blue food	Rising CO2 levels reducing crop nutritional quality	India*
			Fish migration trends impacting livelihoods	India*
			Energy sources (firewood) at household level	ID*
			Agrobiodiversity	ID*
			Climate integrated food system data	ID*
Food supply chains	Food production systems and inputs	Capital	Subsidies, assistance scheme for food producers	BD
		Blue food	Water quality (safety and accessibility, stability over time) and its impact on health	PK
			Total 'blue food' production (disaggregated by marine and freshwater)	ID
		Affordability	Accountability in price of food; Food price indices (SPI, CPI, Wholesale price index)	PK
			Tracking/ predicting costs using inputs (corn) related to ASF (eggs)	ID
		Training/ Practices	% of farmers/producers with access or utilising early warning information systems	BD
			% of trained youth (gender disaggregated) engaged with food and nutrition related activities	BD
			% of farms (or farmers, producers) trained on or adopting Good Ag Practices (GAP), Good Manufacturing Practices (GMPs), Good Hygiene Practices (GHPs)	BD
		CSA	Climate-informed seed production/ conservation/ security repository/ availability	PK, ID
			Incentivising production practices and inputs for environmental improvement	ID
		Local FS	Development, incentivisation for local food production to strengthen food system	ID
			Local food potential / types of food that can be produced locally vs relying on international or cross-national imports	ID
	Food storage, loss, distribution, transport	Food Loss	Media highlighting food loss and waste per year, disaggregated across 3 sectors: farm/food producer, distribution/cold-chain, and retailer/market/vendor	BD, PK

			New ways of utilising food loss/waste	ID
		Cold chain	% of stored space, capacity comprised of fresh, perishable produce	PK, BD
			Regional Disparities in Cold chain Access	India
		Blue food	National fish logistics system utilised	ID
		Equitable distribution & access	Equitable distribution across islands/ hard to reach places	ID**
			Storage and distribution is climate-smart; private vs. public storage reported	ID, PK
		Food Storage	Indigenous food storage techniques	India*
	Food processing and packaging	Tech	Technology Adaptation Index (production, research, food processing & storage) which can track new tech use in food sector; coverage of a technology % farmers	BD**, PK
		Training/ Practices	Frameworks developed to support processing practices towards health and sustainability (including pre and post-processing)	PK
		CSA	Certification for sustainable palm oil	ID
	Retail, markets & waste			
Food Enviroments	Food Affordability	Affordability	Distribution of affordable food, accessibility to low-income consumers	PK, ID
			Food expenditure in smaller units; food purchase profile of the population up to the individual and HH level	BD, ID
			Expenditure on food consumption	ID
			Food prices: measuring the prices of dominant commodities and their impact on food security	ID
	Food Availability	Food Availability	availability of rice, animal and vegetables protein and vegetables	ID*
		Local FS; Data (availability)	Data on the potential of local food utilisation	ID*
			% of food acquired locally vs. imported for local vendors	ID
		Local FS; CSA (avail)	Diversity of local food species	ID
			Regional food vulnerability, types of food grown regionally being available for consumption, stable for production, for population	ID, PK
	Food Properties	Processed Food (Properties)	Use of adulteration in food products for commercial/profit making purpose.	BD
			Safety regulation compliance in the informal food sector	India*
			Impact of processed foods on traditional diets	India*
		Processed; Blue food	Added value of fishery products	ID
		Training/ Practices (Pro)	Training (medical, food safety) of food handlers	PK

			Capacity building of lab technicians, food production, safety, quality QA/QC	BD, PK
		Training/ Practices; Cooking Method (Pro)	% of people trained to use stoves and LPG gas cylinders and utilising those vs % of people not utilising those despite receiving the training (out of fear of exploding)	ID
		Safety; Blue food (pro)	Label includes accurate safety information & aligned with dietary guidelines	BD, ID
			% of safe and accurate (quality) food / water samples from public spaces	PK
	Vendor Properties	Tech	Food composition of online food purchases; digitised transaction	BD, ID
			Adapting international toolkits like HACCP to local agricultural conditions	PK*
			Implementation of an Integrated Hazard Surveillance and Response System	PK*
		SMEs	% of wholesale vendors that procure food from SMEs	PK
			Engagement of SMEs	PK**
		Place-based	Proportion, change in street food vendors vs formal vendors	PK
		Training/ Practices; SMEs	Strength of engagement, level of nutrition sensitivity training for SMEs	BD, PK
		Capital; Blue food	Accessible food vendor license for vendors/ suppliers; specific idea for aquatic food vendor; % of vendors under traceability (registered vs non-registered), disaggregated	BD, PK, ID
		Data	Production data at provincial and district level	PK*
			Producer price data in a agriculture at farm level	PK*
	Food Messaging	Awareness	Awareness development about a healthy diet; linking national FSD & national food messaging campaigns (SBCC)	BD, PK
			Breastfeeding subsistence food program, policy and messaging support	ID
		Food utilisation	Data on public knowledge about food and changes in consumption patterns	ID*
		Training/ Practices	Promotion, Education, and Food Literacy	ID*
Individual Factors	Consumer Behaviours	Waste	Food waste at consumer-level, food waste disposal, possibly measuring recycling	BD, PK
		Diet diversity	Behaviour change in consuming more diverse diet, socialisation approach	BD, ID
		Diet; Food Prejudice	Existence of food prejudice; % of people practicing food prejudice	BD
		Nutrient Intake	Individual macro and micronutrient consumption data	ID*
		Training/ Practices; Local FS	Water need for HH (for food consumption vs other uses)	ID*

	Cognitive	Safety; Awareness; Diet diversity	Knowledge about balanced diet, 'food literacy', food-composition teachings; when it contradicts norms or customs of eating/ cooking (% of people or HH having knowledge of balanced diet)	BD, ID
		Awareness	Awareness of sugar consumption & health effects, measured in specific groups	PK
		Training/ Practices; people-land shifts	Urban food crop processing; knowledge/ training; Innovative food crop processing, provision of land for processing	ID
		Local FS; CSA	Traditional knowledge of folklore regarding local foods; "Forgotten food" / indigenous foods?	ID
	Economic		Food price indices, composite (SPI, CPI, Wholesale Price Index)	PK*
	Aspirational			
	Situational	Workforce Nutrition; Local FS	Food at Work; % of people taking food at work; % of people eating outside of HH;	BD
		Safety; Local FS	Local food prep, loss & waste; reducing contamination and waste during food preservation and preparation; % of HH/establishment having knowledge or maintaining protocols; training about local foods (loss and waste)	BD, ID, PK*
		Local FS; food relationship	Taste preferences for local foods (vs. western, non-traditional)	ID
			Psychological effects of individual's relationship with food (adults)	PK
Outcomes	Food Security (HH)	Processed; food relationship	% of households who prepare their own food (vs. ready-to-eat, vs. outside HH) a certain number of times per day	ID
		Gender; food relationship	HH food-related decision-making that examines who makes food-decisions vs. who is 'head of household' across different contexts	PK
			Intra-household food allocation; quantity distribution of food per household member	PK
		Food relationship; Political will	Social assistance linked to HH food security; food aid policies guiding social assistance impact on food security	ID*
		Blue food	HH access to water	ID
	Economy			
	Environment			
	Social Equity and Inclusion			
	Nutrition & Health			
	Diets (quality & quantity)	Processed	% consuming sugar above a set threshold, gender and age disaggregated;	PK
			Processed food consumption (HH level)	BD*

		Diet, Infant	Breastfeeding (immediate initiation, exclusive breastfeeding at 1, 3, 6 months)	PK**
		Blue food	consumption of adequate protein; adequate fish or aquatic food	ID
		Diet diversity; Local FS; Blue food	Re-emphasised alternative local crops/ specified carbohydrate consumption (tubers); Acknowledge and optimise 'ikan' fish and other aquatic foods	ID, PK**
	Health & Nutrition	Local FS, Inclusive; Political will	Anaemia rates across urbanicity gradients & income levels	PK, ID
		Diet; Health outcome	Health outcomes of low-and high income households	PK*
		Variance in nutritional quality	Nutritional quality differences between imported and domestic food products	India*
Cross-cutting	Policy actions & enabling env.	Local FS	Decentralisation and the limits of policy being implemented the same way across diverse administrative areas	ID
		Data; Blue food	Centralised data management for decentralised use/ need (inform policy); Food data availability, continuity, link to local governance and implementation	ID**, PK
		Policy and Leadership; Data	Integration of data (collection, utilisation) across sectors	PK*, BD*
			Strengthen the capacity of laboratory technicians to link raw data to meaningful indicators for policy and regulation purposes	PK*
		Political will	Data on Fiscal capacity, institutional and regional leadership	ID*
		Political will	# of questions asked at National Parliament; level of alignment in legislation on food and nutrition security with Pathway priorities; # of high level dialogues around food system transformation organised in a year in the country; # of coordination meeting held	BD, PK
		Political will; Blue food	Blue Economy policy; long term water management governance system ('water ministry)	ID
		Livelihood and Gender	Role of self-help Groups in rural financial independences	India*
			Agricultural productivity per worker (gender disaggregated)	PK*
			Gender specific barriers in agricultural markets	India*

Note: * signifies indicator suggested in the interviews, ** signifies indicator suggested both in workshop and interviews

ANNEX 2. PRIORITISATION MATRIX OF INDICATORS

	Bangladesh	Indonesia
Highly Aligned with National Policy Linked to Food System		
Easier to Measure	• Prevalence of household hunger using the Household Hunger Scale (HHS), which is internationally available every year. • Household food expenditure data, obtainable from the Bangladesh Bureau of Statistics Household Income and Expenditure Survey (BBS HIES). • Charging fines for food wastage • Involvement of mass media for awareness • Maintaining hygienic slaughterhouses • Awareness raising about healthy diet and knowledge on balanced diet	• Addition of indicators and measurement of carbohydrate consumption • Regeneration of farmers, fishermen, and fish farmers • Addition of indicators of local food consumption and forgotten food • Volume of processed products • Protein Consumption • Pulses consumption • Catch and Farm Fish • Fish/Aquatic Consumption Index • national standards on food safety • Good manufacturing practices • Food Loss • Optimal Utilisation food loss and waste • Indicators on RPJM (national development midplan) • Program Inline Indicators • Development of local food production • Public knowledge about FLW • People's preference for local food • Percentage of households with access to market < 5 km • Percentage of villages that can be passed by four-wheeled vehicles • Food storage techniques • Food availability • Provision of local food and blue food (aquatic) • Involvement of young people and women • Local food diversity: species diversity, nutritional quality • Climate resistance • Access to capital • Access to information and technology • Small and medium industry data • Access to traditional markets selling fresh ingredients • Land availability • Food loss in distribution or storage for all commodities and retail • Understanding the importance of local food for diversity and the environment • Substitute carbohydrate sources other than rice • The role of households in food waste

		• Sustainable oil certified dan sugar meter for food • Carbon production from land use, fertilisers, and livestock • Cultural stickiness • Jobs • Availability of farmer data and livestock products including derivative products • Local food yield and food loss • Production of food seed repositories • Local food information system (local food balance) • Food information awareness and education • Standard availability of land for food production in each region • Appropriate incentive and disincentive system optimisation of local food production and utilisation • Local fertiliser production from household waste • System of incentives and disincentives in household waste and fresh food • Data on food distribution facilities and infrastructure • Utilisation of food production and processing waste • Data on food availability and consumption needs • Provision of land for food crops in urban areas • Increase in income of small-scale food producers • Availability of regenerative production and processing standard rules • Availability of information on local food sources in each region • Micronutrient deficiency • Distance, time, cost of food distribution from producer to consumer

Harder to Measure	• Minimum Dietary Diversity for Women, representing a shift from diet to social inclusion. • Value chain management • Active involvement of Convergence Action Blueprint (CAB) • The introduction of cooling system/chain • Food labelling (ingredient, source, expiry date), • Waste disposal and recycling • Food-specific nutritional information • Food preparation and processing • Consumption behaviour and food diversity.	• Socialisation of diverse, nutritionally balanced and safe food consumption • Household Indicators • Emissions in food distribution • Reduction in carbon footprint of food production • National Fish Logistics System • Public knowledge about B2SA food • People's knowledge about local food • Public awareness of B2SA food • Public awareness to prevent and reduce FLW • Knowledge of local food and its benefits • Policy on breastfeeding for women and babies • Diabetes rates in children and toddlers • Food Messaging • Policy on breastmilk substitutes • Seed type standards according to climate • Facilities and infrastructure of the process of food access availability • Appropriate incentive and disincentive system (for local governments or individuals/producers) for optimisation of local food production and utilisation using local food seeds and environmentally friendly fertilisers or pesticides • Source of processed food composition • Application of appropriate post-harvest technology • Knowledge of food processing application and storage technology • Informative consumer food labels • Application of disincentives for non-local food consumption • Number of identified versus forgotten food sources • Utilisation of local plants by businesspeople • Innovation of food crop processing in urban areas

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ABOUT GAIN

The Global Alliance for Improved Nutrition (GAIN) is a Swiss-based foundation launched at the UN in 2002 to tackle the human suffering caused by malnutrition. Working with governments, businesses and civil society, we aim to transform food systems so that they deliver more nutritious food for all people, especially the most vulnerable.

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