Transforming Agrifood Systems in South Asia (TAFSSA)

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Proposal

September 28, 2021

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1. Summary table

Initiative name:	Transforming Agrifood Systems in South Asia (TAFSSA)
Primary Action Area:	Resilient Agrifood Systems
Geographic scope:	South Asia (Bangladesh, India, Nepal, Pakistan)
Budget:	US$ 40,000,000

Transforming Agrifood Systems in South Asia (TAFSSA): *A One CGIAR regional integrated Initiative to support actions that improve equitable access to sustainable healthy diets, improve farmers' livelihoods and resilience, and conserve land, air, and water resources in South Asia.*

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[a.] Core indicates membership in the core proposal design and writing team. Advisory indicates intellectual contribution to design and in some cases to projection of benefits.
[b.] SA = South Asia, BD = Bangladesh, IN = India, NP = India PK = Pakistan

Acronyms:

An Initiative-specific list of acronyms is available online here.

Online Annexes:

All additional online Annexes for TAFSSA are available in a Dropbox folder, linked here.

2. Context

2.1 Challenge statement

Home to one-quarter of humanity — one-fifth of whom are youth — South Asia has the world's largest concentration of poverty and malnutrition.[1] The Green Revolution positioned South Asia to produce one-quarter of the world's consumed food, but **the region's agrifood systems today face formidable poverty reduction, climate change adaptation and mitigation, environmental health and biodiversity challenges. Significant hurdles remain to securing an adequate and affordable supply of diverse foods necessary for sustainable healthy diets (SHDs)**.[2] Social, economic, and geographic inequalities create barriers from production to consumption, disproportionately affecting the poor.[3] Unhealthy food consumption is rising, with many nutritious foods too costly for the poor.[4]

South Asia's predominantly rice-based farming systems span the Indo-Gangetic Plains (IGP).[5] While crucial to food security and political and economic stability,[6] **parts of the IGP are threatened by unsustainable groundwater withdrawal** — the region extracts one-quarter of global groundwater — due to food and energy policy distortions.[7] **Natural resource degradation, low resource use efficiency, and agriculturally-based nonpoint source air pollution undermine sustainability and human health**.[8] South Asia's farmers are both contributors to and victims of **climate change and extreme weather.**[9] In association with off-farm employment opportunities, these issues contribute to **rural out-migration** — particularly of youth — resulting in rising labor scarcity and increased production costs. This in turn **disproportionately affects resource-poor and women farmers**.[10] Outside of the highly-productive 'breadbasket' of the western IGP, many farmers suffer from weak markets, poor access to extension, limited access to irrigation, and insufficient policy support.[11] These issues contribute to nearly **22 million hectares being fallowed** across South Asia following the harvest of the monsoon-season rice crop,[12] indicative of a significant missed opportunity sustainable intensification and diversified farm production.

Many of South Asia's agricultural policies and the research systems supporting them focus primarily on the production and related value chains of single crops in isolation, with less emphasis on developing an evidence base around the **multisectoral farm, market, and policy interventions** needed to sustainably intensify and diversify farming systems equitably without overstepping environmental boundaries.[13] Although agriculturally-focused nutrition interventions are frequently proposed to improve diets in rural communities, causal linkages between farm production and nutrition are not always direct, underscoring the **need for integrated approaches considering household food production alongside market purchase**.[14] In addition, **poor nutrition awareness** among rural households, low affordability of nutritious diets and **limitations to women's empowerment** interact to prevent progress.[15]

These obstacles must be overcome through **coordinated efforts to transform agrifood systems in ways that ensure that people can equitably access and consume healthy diets produced within environmental boundaries, while also securing livelihoods** and reducing poverty.[16] **Food systems are urgently needed that generate profits and incentivize farmers to produce nutritious foods, while also reducing prices for consumers purchasing healthy products by shortening and reducing inefficiencies within value chains**.[17] These objectives — which are also governmental and donor priorities in Bangladesh, Nepal, India, and Pakistan — require **coordinated research and action across the public and private sector**.[18] In response, TAFSSA will partner across sectors to generate **actionable evidence spanning the production-to-consumption continuum**. TAFSSA **will also amplify the effects of other CGIAR Initiatives** working in South Asia to **achieve productive, environmentally sound agrifood systems that support equitable**

access to SHDs. (*Additional references and supporting evidence can be found online in Annex 2.1*)

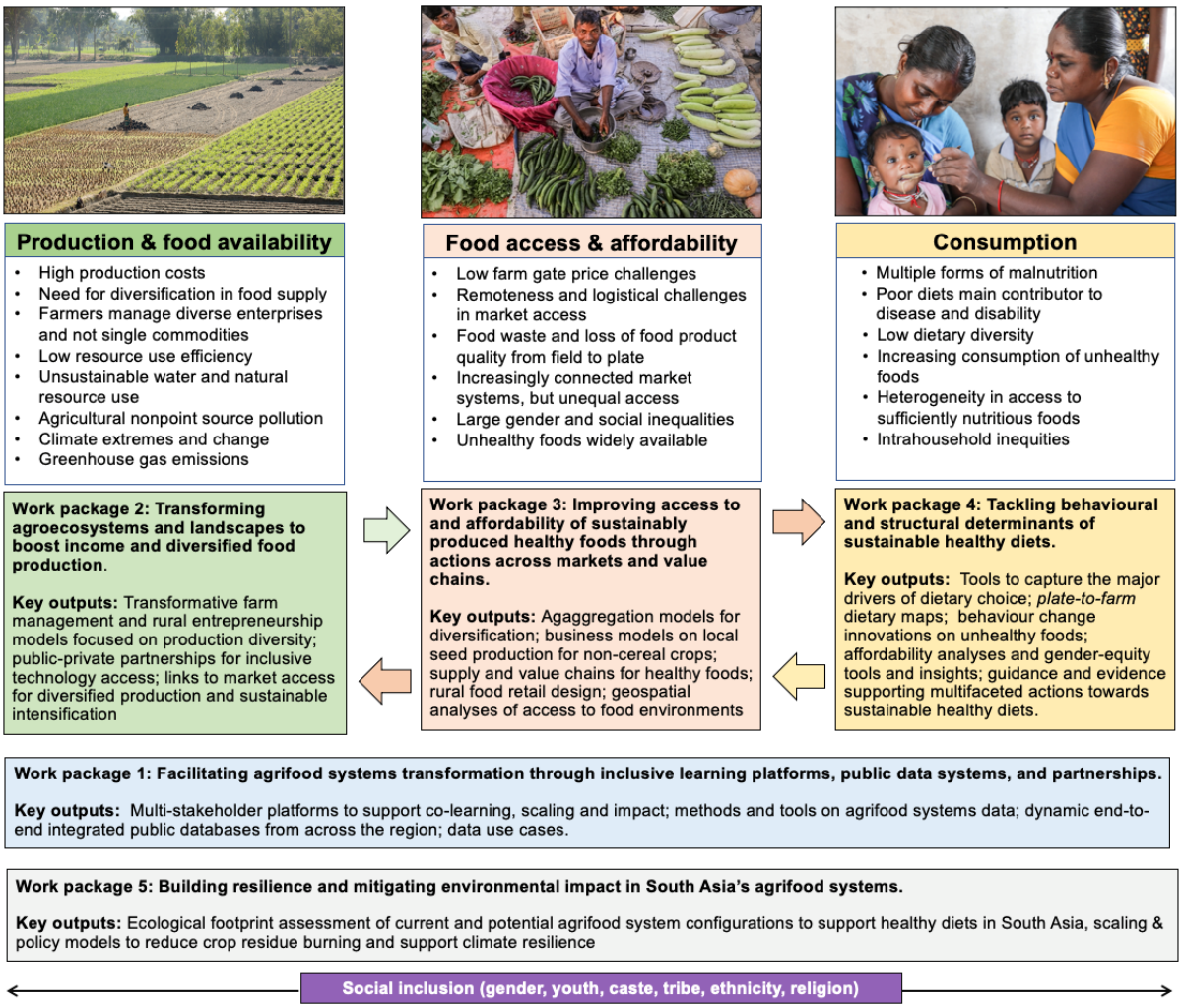


Figure 2.1. Overview of TAFSSA. Working across South Asia, TAFSSA will deliver a coordinated program of research and engagement across the food production-to-consumption continuum to improve equitable access to sustainable healthy diets, improve farmer livelihoods and resilience, and conserve land, air, and groundwater resources.

2.2 Measurable 3-year end-of-Initiative outcomes

Assuming full budget allocation for each year of the Imitative (Section 10), before the end of 2024 in Bangladesh, India, Nepal, and/or in Pakistan, we expect to achieve the following end of Initiative Outcomes (EoIOs):

1. Sub-national governments, donors, the private sector, and/or development partners co-develop knowledge systems and engage with networks reaching at least 1,000 stakeholders and decision-makers to inform at least four policies/programs and/or market interventions supporting agrifood systems transformation (EoIO 1).
2. Data informed actions supporting agrifood systems are implemented by sub-national governments, donors, the private sector, and/or development partners encouraging agrifood systems change in at least eight of TAFSSA's learning locations (EoIO 2).

3. Farmers implement improved farming practices and/or diversify production systems on at least 1.42 million hectares (EoIO 3) averting GHG emissions by 16.24 million tons CO_2 equivalent (EoIO 10).
4. Innovations in entrepreneurial rural service provision markets and public and private extension systems are supported to accelerate uptake of improved farm management practices and production diversification by at least 1.16 million farmers including 0.40 million women (EoIO 4).
5. Business models supporting farm product aggregation, better pricing for farmers at the farmgate, and/or shortened value chains benefit at least 190,000 farmers (95,000 of whom will be women) (EoIO 5).
6. At least three food product supply chains are targeted to reduce food waste and/or financial losses for food distributers, processors, and/or retailers (EoIO 6).
7. At least 10 local governments engage in efforts to reshape rural food environments to support access to affordable and nutritious food (EoIO 7).
8. At least two nutrition behavior change programs operated by governments and/or NGOs provide evidence-based guidance to consumers on SHDs, benefiting 0.48 million people (all women) (EoIO 8).
9. Gender and equity focused nutrition approaches are included in at least two agrifood systems linkage and/or social protection programs operated by governments and/or NGOs (EoIO 9).

2.3 Learning from prior evaluations and impact assessments

TAFSSA's objectives are ambitious, but achievable as they build on 11 highly successful, large-scale CGIAR-managed bilateral projects in South Asia, five research programs (CRPs), four global integrating programs, and a CGIAR Platform, many of which have been **externally evaluated** (online in Annex 2.3). **Internal lessons** from prior Initiatives show that alignment with *both* governments' and donor priorities is required for research relevance, scientific quality, and transitioning research into impact. **Multiyear, multiphase Initiatives** delivered by **well-respected, regionally/nationally posted long-term senior research staff** are necessary to maintain crucial day-to-day partner relationships enabling research quality and scaling. High-impact initiatives also require **well-structured cross-CGIAR collaboration, transparent governance, and flexible adaptive management plans**.

Evaluations also highlight the value of well-developed theories of change, **setting research within countries' priorities**, strategically selecting national innovation and scaling partners — in both the **public and private sectors** — and investing in participatory **multistakeholder learning platforms** and **effective communications.** Impactful Initiatives assure a strong sense of research ownership by national partners, and must more specifically consider **gender in production- and market-focused research**. Finally, evaluations underscore the importance of investing in building **more systematic evidence of uptake and impact** from research.

TAFSSA's design employs insights from both internal learning and external evaluation. In addition, our Initiative benefits from **(i)** structured and thorough participatory priority setting with more than 500 stakeholders complemented by in-depth focus group meetings (online in Annex 2.6), **(ii)** clear articulation of demand-driven research agendas based on intensive partner consultation (partner support statements are available online in Annex 2.6.1), **(iii)** a cross-cutting social-inclusion agenda developed in response to prior evaluations, and **(iv)** development of scaling strategies as part of the research process. Finally, **(v)** prior evaluations have also informed our Monitoring, Evaluation, Learning, and Impact Assessment (MELIA) strategy, which guides adaptive management and assures high-quality scientific outputs.

2.4 Priority setting

Countries: TAFSSA's priority setting follows a three-tier analytical approach identifying target countries, farming systems, and subnational research 'learning locations. Supporting data, methods, and results are described in detail online in Annex 2.4 and summarized below. Chosen locations are inhabited by millions of smallholders facing poverty, malnutrition, environmental degradation, and climate change challenges, as well as millions of poor consumers needing enhanced access to affordable healthy diets. Our focus countries will be Bangladesh, India, Nepal, and Pakistan, where one-quarter of children under 5 years of age are undernourished, where poverty remains high, and where women's access to economic and educational resources are poor.[19] These countries also score poorly in food affordability, with consumers spending 30–54% of their income on food with low dietary diversity.[20]

Farming Systems: Cereals are grown on most cultivated lands (98% of land in Bangladesh, 51% in India, 83% in Nepal, and 37% in Pakistan), with cereal-based farming systems covering the IGP, Himalayan foothills, India's central plateau and coast, and hilly, riverine areas in northeastern India. Livestock and fish play important roles in income generation and nutrition.[21] Limited crop and animal diversity in rice-based farming systems correlate with poverty, because of limited income generation potential of rice farming alone.[22]

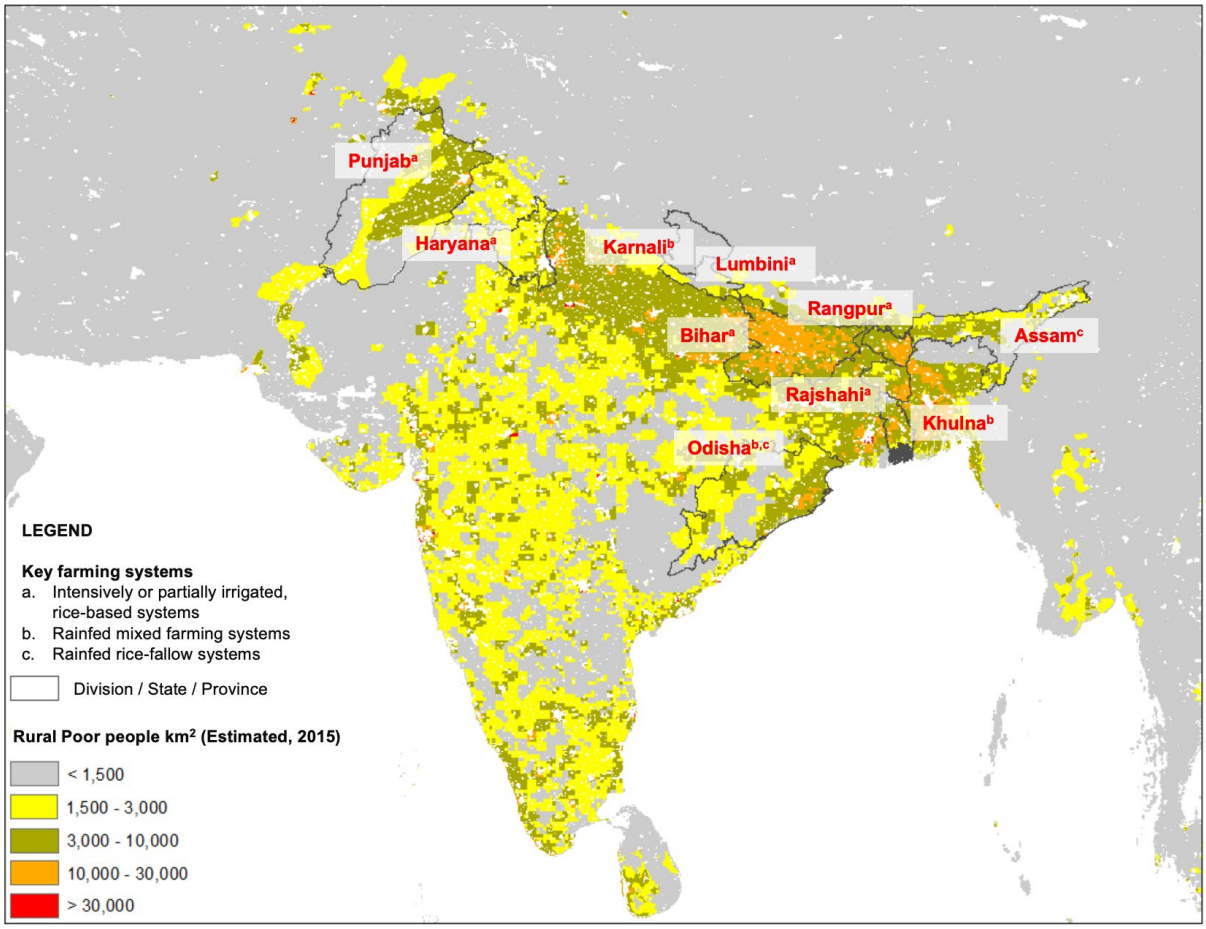


Figure 2.4. Density of rural poverty (people km^2) in South Asia, and farming systems in TAFSSA's learning locations.[23] Data source: CIESIN, Columbia University, FAO, and CIAT. 2015. Gridded Population of the World, Version 3 (GPWv3): Population Count Grid. Palisades, NY: NASA Socioeconomic Data and Applications Center. https://sedac.ciesin.columbia.edu/data/set/gpw-v3-population-count-future-estimates/

TAFSSA specifically targets these farming and associated market systems to support actions across the agrifood system to help Improve livelihoods, reduce inequities, improve diets and protect the environment by 2030. Our priority-setting analyses

underscore the need to reorient research toward supporting a diversity of crop and animal species that create nutritious food products for consumption and support income generation. Similarly, effort is needed to enhance the market availability and affordability of foods that contribute to healthy diets for poor consumers. TAFSSA adopts an integrated agrifood systems approach that focuses on diversifying cereal-based farming systems with the integration of horticultural, legume, and tuber crops in addition to animals (livestock and/or fish, depending on geographic, cultural, and market appropriateness). Once food has left the farm, our research focuses on the value chains and knowledge gaps in food environments that deliver food to consumers,[24] with an emphasis on addressing retailer and consumer dietary behaviors, drivers of food choices, and the policies affecting these systems.

Learning locations: We focus on ten "learning locations' for focused research and engagement and from which scaling-out to similar environments is possible. Six of ten sites span an east-to-west gradient of poverty, climate, and groundwater resources availability in the irrigated or semi-irrigated rice-based farming systems of the IGP and Indus Basin (Punjab Province in Pakistan, India's Haryana and Bihar States, Rangpur and Rajshahi Divisions in Bangladesh, and Nepal's Lumbini province). Two sites are in rainfed mixed farming systems (Nepal's Karnali province and India's Odisha State), and two sites are located where rainfed rice-fallows are common (India's Assam and Bangladesh's Khulna Division). These locations are prioritized by governments and donors as hot spots for challenges related to poverty, climate, malnutrition, environment, and social inclusion (Annex 2.6), meaning that they experience disproportionate impacts from climate change, groundwater depletion, rural out-migration, and crop residue burning air pollution. Nine of ten learning sites have established CGIAR staff, offices, and partnerships stemming from bilateral projects, ensuring rapid start-up and enhanced development impacts within and beyond the Initiative timeline.

2.5 Comparative advantage

TAFSSA leverages a **10+ year history of significant bilateral and CRP investments in well-known cross-CGIAR projects that nurtured strong relationships with demand, innovation, and scaling partners** (these projects are detailed online in Annex 2.3)**. This history provides a well-developed foundation for TAFSSA to build upon**. The partnership and research impact-orientation TAFSSA's design team has enabled TAFSSA's consultative and demand-driven design process with over 520 stakeholders. Proof of the potential impact of TAFSSA is evidenced by the Initiative's science team, many of whom have been involved in bilaterally supported initiatives such as the Sustainable and Resilient Farming System Intensification (SRFSI) project and the Cereal Systems Initiative for South Asia (CSISA), which has resulted over 5 million farmers applying resource-conserving and climate-resilient technologies and practices in Bangladesh, India, and Nepal.[25] TAFSSA also harnesses the scientific credibility, local and global engagement of CGIAR scientists involved in large-scale nutrition initiatives such as Alive & Thrive, Transform Nutrition, POSHAN, WINGS and A4NH. These programs of work exemplify how CGIAR scientists in South Asia have brought together **portfolios of thematically unified research agendas** generating purpose-driven solutions. They reflect the Eschborn principles and have facilitated the effective management of **outcome-oriented and applied research for development innovation system**.

By harnessing **synergies with other Initiatives aiming to work** in South Asia, **TAFSSA will amplify CGIAR's impact in the world's most impoverished and malnourished region**. High-caliber **scientists with strong, established relationships with partners in government, development, and the private sector will facilitate cross-Initiative coordination to strengthen research relevance and development impact.** Building on this experience base, TAFSSA goes beyond a commodity focus, to truly embody an agrifood systems approach. **TAFSSA embraces interdisciplinarity** to provide evidence and facilitate action tackling pressing regional challenges while contributing to all five CGIAR Impact Areas.

2.6 Participatory design process

Process: TAFSSA's participatory design process involved 535 people (35% researchers, 33% government, 15% NGOs, 7% private sector, and 5% academia; a detailed accounting of this process can be found online in Annex 2.6). Our process began with **(i)** a workshop to gather design inputs from all 30 CGIAR Regional and Country Representatives in Bangladesh, India, Nepal, and Pakistan (June 8) and (**ii)** an internal CGIAR town hall soliciting collaboration from all Initiatives (July 12). We conducted **(iii)** bilateral meetings with all Initiatives working in South Asia (July 15–Sept. 20) and **(iv)** hosted interactive stakeholder workshops with a range of public and private sector partners in Nepal (June 29, 65 participants), Bangladesh (August 4, 235 participants), and Pakistan (Aug. 16, 53 participants). In India, TAFSSA supported a high-level Indian Council for Agricultural Research (ICAR)-CGIAR consultation (Sept. 9, 39 participants) which highlighted key Indian priorities for One CGIAR research collaboration. This was followed by a multistakeholder workshop with government, NGO, and private sector stakeholders in India (Sept. 13, 100 participants). Finally, **(v)** TAFSSA solicited feedback from 13 donor representatives from the World Bank, USAID, Australian Centre for International Agricultural Research (ACIAR), and the Bill and Melinda Gates Foundation (BMGF) during two round-table discussions on Sept. 24.

Analysis: During national workshops, polls were used to score the relevance TAFSSA's Work Package (WP), followed by WP-specific breakout discussions. A subset of participants (*n* = 286) also completed a postworkshop questionnaire. Workshop events were complemented by small-group and one-on-one consultations with key public and private sector partners to further improve Initiative design. We also reviewed governmental and donor development priorities in relation to TAFSSA's objectives (Annex 2.6); support statements from 40+ partners affirming TAFSSA's alignment with development goals of key organizations can be found in Annex 2.6.1.

Results: Governmental partners participating in all of the stakeholder workshops confirmed their interest in having TAFSSA aid decisionmakers in the development of agriculture-nutrition action plans. Interest from private sector partners, particularly in the agricultural machinery sector, was also strong. Poll results from the 520 participants in country-level meetings underscored the importance of TAFSSA's planned WPs. When averaged across countries and WPs, 54% of workshop participants indicated that TAFSSA's planned research agenda was highly relevant, while 31% and 9%, respectively, ranked TAFSSA's research plans as relevant or somewhat relevant to national needs. Only 3% considered TAFSSA to not be relevant.

Participants valued the interdependence of the WPs and noted that strong agrifood systems and integrated approaches to research are valuable to their countries. Postworkshop questionnaire results (found online in Annex 2.6) provide a more detailed picture of stakeholder demand for TAFSSA's work. Lastly, TAFSSA's design generally reflects key priorities for agricultural, economic, and social development as articulated by the range of governmental policies reviewed and described online in Annex 2.6. TAFSSA's learning locations (Section 2.4) and research topics (covering each of the CGIAR Impact Areas) also reflect the geographic and development priorities of key donors working in the region, including USAID, BMGF, ACIAR, the Foreign Commonwealth Development Office (FDCO), Swiss Agency for Development and Cooperation (SDC), *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) Gmb, and a range of other international and national funders and foundations.

2.7 Projection of benefits

The projections below transparently estimate reasonable orders of magnitude for impacts which could arise as a result of the impact pathways set out in the Initiative's theories of

change. Initiatives contribute to these impact pathways, along with other partners and stakeholders.

For each Impact Area, projections consider breadth (numbers reached), depth (expected intensity of effect per unit) and probability (a qualitative judgement reflecting the overall degree of certainty or uncertainty that the impact pathway will lead to the projected order of magnitude of impact).

Projections will be updated during delivery to help inform iterative, evidence-driven, dynamic management by Initiatives as they maximize their potential contribution to impact. Projected benefits are not delivery targets, as impact lies beyond CGIAR's sphere of control or influence.

TAFSSA's goal of reaching the CGIAR Impact Area targets will be achieved through two pathways: **(i) direct reach of TAFSSA innovations to farming communities** in our sub-geographies and **(ii) indirect reach to broader communities**, both yielding a range of benefits through the **uptake of evidence, tools, and innovations by next-user policy and practice communities.** Our estimates of projected benefits (Table 2.7) are based on the greatest relevance of these pathways for each chosen impact indicator. As a Regional Integrated Initiative, **TAFSSA is designed to harness synergies with other initiatives** as per our TOC, though we have not yet included these synergies in the below estimates remain conservative and avoid double counting risks. These points will be addressed during inception.

Table 2.7. Projected benefits of TAFSSA's impacts by 2030

Impact Area and indicators	Breadth	Depth	Probability
Nutrition, health & food security: # people benefiting by CGIAR innovations	49.90 million people	Substantial [a]	High certainty (50%-80% expectation of achieving these impacts by 2030)
Poverty reduction, livelihoods & jobs: # people benefiting from CGIAR innovations	3.26 million people [b]	Significant [c]	High certainty (50%-80% expectation of achieving these impacts by 2030)
Gender equality, youth and social inclusion: # women benefiting from relevant CGIAR innovations	49.90 million people [b,d]	Substantial [e]	High certainty (50%-80% expectation of achieving these impacts by 2030)
Climate adaptation and mitigation: # tons CO_2e averted	111.61 million tons CO_2eq	Not applicable [f]	Medium certainty (30%-50% expectation of achieving these impacts by 2030, at this point)
Environmental health and biodiversity: # ha managed sustainably	4.36 million ha	Transformative [b,g]	High certainty (50%-80% expectation of achieving these impacts by 2030)

[a.] Defined as having 'some improvement disability-adjusted life year averted', as per page 23 of the Initiative Projection of Benefits guidance, available here.

[b.] Recognizing the potential risk of double-counting of people benefiting from different interventions and impact pathways in TAFSSA, this number reports the largest individual pathway projecting benefits for the number of people benefited compared across our estimates. Rather than sum across pathways, we adopted this conservative approach.

[c.] Defined as '100% of annual income or 10% permanent impact on income', as per page 29 of the Initiative Projection of Benefits guidance, available here.

[d.] In line with footnote 'b', this value is the same as for 'Nutrition, health & food security' because TAFSSA's work in nutrition is explicitly targeted at women beneficiaries. To be conservative, we have not included projections of potential intra-household benefit sharing.

[e] Defined as 'the different needs of men and women are identified and differentially met (but the underlying process by which these differing needs are generated are not affected)', as per page 30 of the Initiative Projection of Benefits guidance, available here

[f] Not applicable as per page 33 of the Initiative Projection of Benefits guidance, available here.

[g] Defined as 'where improved management delivers two of the following three benefits: improvements in soil health and fertility, delivers biodiversity gains, and provides additional ecosystem service improvement', as per page 37 of the Initiative Projection of Benefits guidance, available here

Nutrition, health, and food security (Number of people benefiting from CGIAR innovations)

TAFSSA's impacts on nutrition result from **(i)** diversified farm production practices (WP2) that can improve dietary diversity,[26] **(ii)** improved retail environments (WP3) that offer potential to improve access to nutritious foods and **(iii)** nutrition-sensitive social protection programs (WP4) with potential to support better diets.[27] The majority of our impact, however, is expected through uptake of information on healthy diets through nutrition program platforms targeting rural women with new nutrition content. Our analysis of regional Demographic and Health Survey datasets shows that health/nutrition programs, large-scale NGOs, and women's group programs are estimated to reach about 50% of rural women in TAFSSA countries.[28] Through these pathways, we estimate that interventions tested by TAFSSA will reach about **0.48 million women in TAFSSA's focus geographies in 2024** and be scaled broadly through national programs from 2025 onwards to reach 57% of rural women in 2030, and cumulatively benefiting **49.90 million by 2030**. Pathways to scale are informed by recent evidence on integration of nutrition interventions into national-scale programs, and by an anticipated focus on the non-economic cost to the poor of reducing consumption of unhealthy foods.[29] Despite this, we apply a conservative estimate that only 50% of the 99 million women potentially reached by 2030 will actually reduce consumption of unhealthy foods. Our estimate is also conservative in that we have not included women benefiting from **points i** or **ii** above, in order to avoid double counting risks. Substantial depth is anticipated because poor diets affect the overall burden of disease in all countries in the region;[30] high certainty is assigned, because nutrition interventions tested by CGIAR[31] have been successfully integrated into large-scale programs in India, Bangladesh, and Nepal and TAFSSA's nutrition partnerships in the region offer credible routes to scale.

Poverty reduction, livelihoods, and jobs (Number of people benefiting from CGIAR innovations)

Agriculture is still the main source of income for more than 50% of rural women in TAFSSA locations; the incidence and density of poverty in these locations are higher than the national or regional averages (except in Pakistan's Punjab and Haryana). TAFSSA will help poor families by enabling sustainable intensification and diversification of agriculture in its research locations and the wider region (WPs 2 and 5). Uptake of sustainable agricultural practices by farmers can increase system productivity, cropping intensity, input use efficiency, water productivity, and farm incomes.[32] It can also make agriculture more resilient to weather shocks and prevent farmers from falling into transient poverty.[33] Action research on new aggregation models in WP3 can increase farmers' income by improving their bargaining power in both input and output markets.[34] Our work in these locations will enable us to reach **1.16 million people (0.41 million women) 2024**. The multistakeholder learning platform created by WP1 will work closely with government and non-government stakeholders to accelerate the diffusion of TAFSSA's innovations to **3.26 million people (1.15 million women) living in poor families by 2030**. High poverty rates with the majority of populations involved in agriculture in TAFFSA locations (see Annex 2.4) imply that the adoption of improved agricultural practices (WP2 and 5) and better access to markets (WP3) could lead to a substantial increase in farm incomes and a decline in the incidence of poverty among farm households. We have high confidence because global evidence shows that growth in agriculture is on average more poverty reducing than growth in other sectors of the economy.

Gender equality, youth, and social inclusion (Number of women benefiting from relevant CGIAR innovations)

TAFSSA's research and engagement is explicitly tailored to ensure that gender considerations are at the forefront. Within all WPs, data will be disaggregated by gender for critical areas from production to consumption to highlight gender gaps and inequities and form the evidence base for corrective actions.[35] WPs 2 and 3 will benefit women by using gender-focused strategies to ensure that 35-50% of populations reached with agricultural innovations and activities are women.[36] WP4 ensures widespread reach through health, nutrition, and other programs that primarily target women**, benefiting 0.48 and 49.90 million women by 2024 and 2030, respectively, as women-focused nutrition programming is adopted into programs and policies and accelerates.** While women will also benefit from other TAFSSA work packages (e.g., we anticipate that 0.41 and 1.14 million women will benefit from WP2 pathways by 2024 and 2030, respectively), our broadest reach to women will come from nutrition behavior change platforms since scaling platforms for nutrition interventions are focused mainly on women. Because we anticipate that many of these women may come from the same pool of overall beneficiaries, we conservatively choose to include only the WP4 pathway for this CGIAR Impact Area. Given findings on the impact of reaching women for household welfare outcomes,[37] we assign these findings significant depth. We believe there is high certainty of delivering these impacts, because we will be designing for gender-transformative interventions and reach from the beginning instead of just measuring gendered reach and impacts.

Climate adaptation and mitigation (Number of tons of CO2e averted)

TAFSSA's conservative mitigation projections include four pathways. **(i)** Increased availability of low-cost farm management and technologies that reduce energy use, mitigate emissions, and sequester carbon, **(ii)** diversification from rice supported by policies and market interventions studied by TAFSSA in WP 2, 3 and 5 in feasible landscapes in South Asia's current rice-wheat cropping systems[38]. These are assisted by **(iii)** an improved energy use and efficiency path reducing energy consumption in irrigation through innovations generating cost parity for solar power, improved pump efficiencies, and policies favoring renewable energy from WP 5.[39] Importantly, these approaches have mitigation-adaptation co-benefits. Finally, **(iv)** we consider reductions in CRB (WP 5). In **i** and **ii,** prior experience[40] suggests that a rice-based cropping sequence area of 1.29 million ha could fall under low-carbon technologies and practices, respectively, as public and private extension increases in effectiveness, as farm service provision markets grow, and as farmer-to-farmer adoption spreads.[41] Applying innovation diffusion theory and reaching 19% of total rice-wheat area in 2024 to catalyze self-sustaining change,[42] we anticipate reaching 3.73 million ha with low-carbon farm practices by 2030, respectively. Using experimental data and simulation modeling,[43] our conservative emissions offset estimate with medium certainty reaches **12.92 and 88.07 million tons CO_2eq by 2024 and 2030**, respectively. In **iii**, TAFSSA will support policies currently under development to reduce irrigation-source emissions by 30% by 2030.[44] This could mitigate another 0.43 and 6.75 million tons CO_2eq by 2024 and 2030. Lastly, in **(iii)** rapid early CRB reductions on 1.02 ha by 2024 are anticipated given recent public interest and policy emphasis[45], increasing more slowly to 2.01 million ha by 2030. Pathways i-Iv interact, potentially resulting in **16.24 and 111.61 million Mt CO_2eq by 2024 and 2030,** respectively**.** Conversely, TAFSSA's focus on nutrient-rich diets will entail increased animal product consumption, representing a trade-off that could increase emissions. To reduce this risk, TAFSSA will emphasize improving feed quality (which can substantially reduce enteric fermentation emissions[46]) for existing livestock, rather than increasing livestock numbers.

Environmental health and biodiversity (number of hectares managed sustainably)

TAFSSA's WPs 2 and 5 will address biodiversity, ecosystem services, and soil health through resource-conserving agriculture[47] and farm- and landscape-level diversification.[48] We will target bottom-up improvements in rice-wheat system efficiencies, diversification, and also intensification of cropping by replacing fallows with crops in current rice-fallow cropping sequences. Based on prior project experience,[49] farmers with high capacity and low-to-medium risk preferences are anticipated to be early adopters potentially on **1.42 million hectares by 2024**. TAFSSA therefore also targets the remaining risk-averse farmers with extension messaging, decision-support, business models, and support to policies that could aid diversification and use of appropriate technologies.[50] If initial adoption constraints are overcome, a **total of 4.36 million ha could be brought under improved management by 2030**.[51] Early adopters are also innovators who may take-up multiple technologies.[52] We apply conservative estimates to avoid double counting of adoption, though some overlap is possible. Based on project experience,[53] medium-high certainty for these approaches. We also assume that environmental trade-offs resulting from intensification from rice-fallows to double cropping will be partially counteracted by our focus on low-environmental impact technologies that can also sequester carbon.[54] Finally, while we anticipate synergies with other initiatives as per our TOC, we have not assumed additional impact in these projections to be conservative and avoid double counting risks. Synergies and mechanisms to avoid attribution risks with other Initiatives will be addressed during inception.

3. Work Packages and theories of change (TOC)

3.1 Full Initiative TOC

Solving South Asia's complex agriculture and nutrition problems requires transforming food, land, and water systems amid ongoing socioeconomic and climatic change.[55] **An ambitious and grounded regional research Initiative is required to close crucial agrifood systems knowledge gaps, strengthen partnerships, and support nationally relevant strategies to propel evidence into action.** Co-designed with input from over 520 stakeholders (Section 2.6 and Annex 2.6), TAFSSA's includes five interlinked WPs addressing key ingredients needed for agrifood systems change.

The Initiative's pathways to impact begins with **Work Package 1**, which facilitates agrifood systems change through inclusive, multistakeholder learning platforms and efforts to co-**develop crucial data systems to fill key knowledge gaps for evidence-based decision making**. By connecting diverse stakeholders across the agriculture, nutrition, gender, and the climate and environmental sectors in an integrated knowledge community, this Work Package will **generate, validate, refine, and use research evidence towards agrifood systems transformation**. It also paves the way to co-learning, capacity development and scaling. **All other Work Packages connect with this Work Package that aids in co-defining data needs, co-generation of outputs, and supporting research and scaling partnerships.**

Work Package 2 emphasizes farm- and landscape-level interdisciplinary research to identify strategies to increase farmers' profits and nutritional yields, conserve resources, and maintain or enhance ecological services, while also mitigating greenhouse gas (GHG) emissions from farms and agricultural landscapes. **The pathway to impact for this work includes deployment of recommendations from research through public and private extension networks, and through policy design and reform support.** Work Package 2 also **partners with the private sector to develop business models supporting inclusive smallholder access to farm services** (including but not limited to mechanized land preparation, planting, irrigation, intercultural operations, harvest and post-harvest) on an affordable fee-for-services basis.

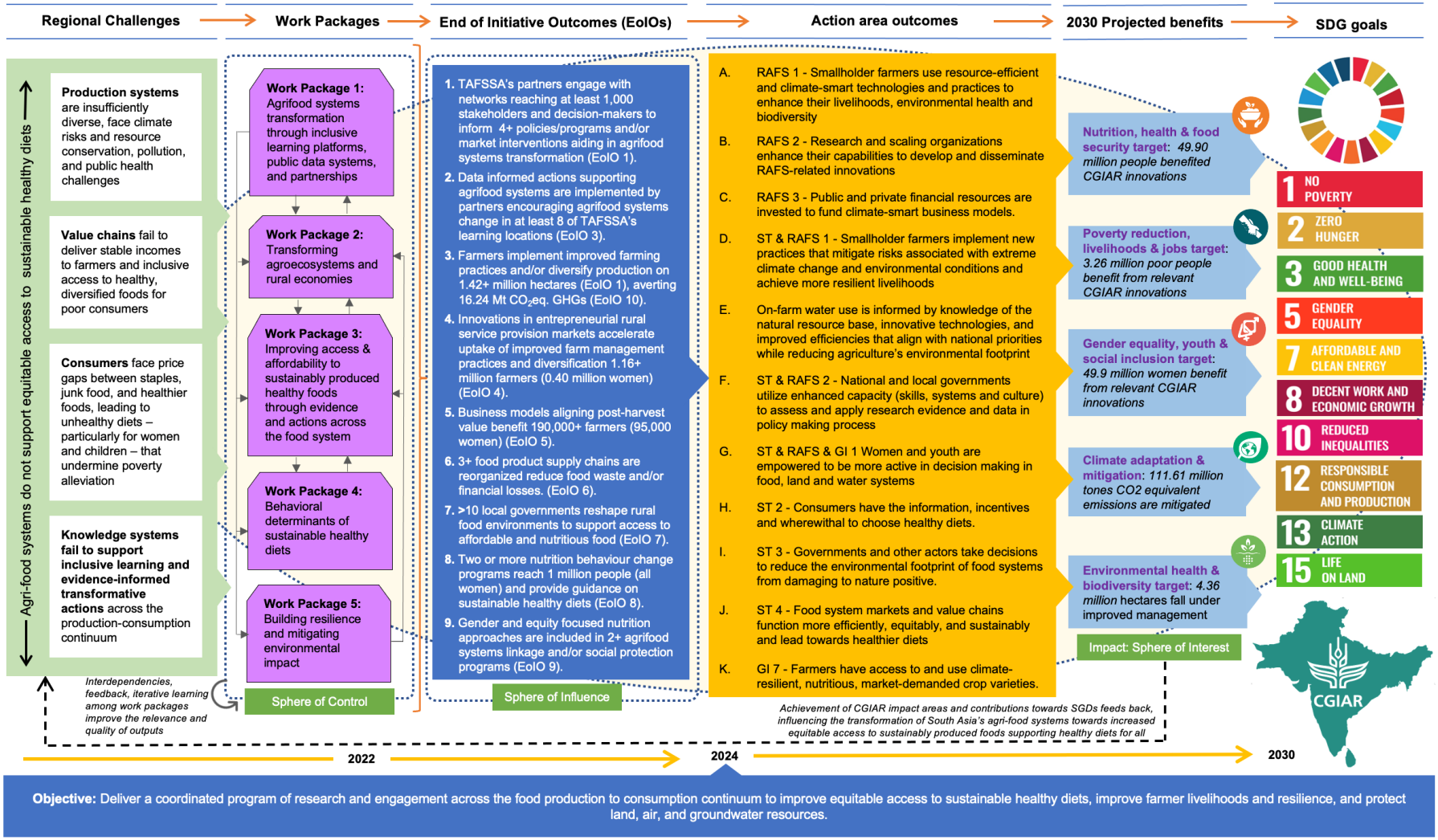
Work Package 3 focuses on post-harvest value chains and docks with Work Package 2 at the farmgate. Its **first impact pathway leverages established partnerships with the private sector and cooperatively tests farm product aggregation models to increase incomes** – with emphasis on women farmers – while reducing costs for food distributors and marketers. Its **second impact pathway develops tools for local governments and the private sector to realign value chains and retail systems to reduce food waste and improve profitability** to food sellers, while studying how food environments could boost consumer access to affordable and nutritious foods.

With three impact pathways, **Work Package 4** interacts with Work Package 3, connecting food environments with consumers. First, research will clarify dietary patterns and their drivers across the ten sites. **Engaging nutrition and public health program implementers and policy makers** will contribute focus attention on areas that need attention to SHDs. Second, using rapid scoping reviews, and short behavior change experiments focused on reducing unhealthy food consumption, we will **accelerate integration of behavior change innovations in large-scale public health and social welfare programs**. Third, research on affordability and gender related structural determinants will generate **equity-focused methods and recommendations for policies and programs to benefit poor consumers, including women** and marginalized groups.

Finally, **Work Package 5** interacts with Work Packages 2 and 3 by addressing climate adaptation and the mitigation of environmental externalities in farming systems and food value chains. Interdisciplinary research will **support partners to co-develop knowledge steering policies/programs and/or market interventions towards environmentally responsible agrifood systems that conserve energy and groundwater**. Social experiments will generate **policy proof of concept and cost assessments policies reducing air pollution**. Evidence will also **support existing public-private partnerships and policies enabling farmers to implement improved farming practices and/or diversify production**, thereby averting GHGs. The development of scaling strategies for improved agricultural climate services, including insurance products and dynamic management advisories, will **aid insurance companies, governments, tech startups, and extension services to aid farmers in reducing adoption risks**.

Crucially, **TAFSSA will coordinate with and amplify the impact of other CGIAR Initiatives** working in South Asia by **(i)** identifying, consolidating, and articulating partners' demand to improve the regional relevance of other Initiative's research, **(ii)** assisting other Initiatives as an innovation partner, and by **(iii)** providing a forum, via Work Package 1, for Initiatives to engage a range of partners.

3.1.1 Full Initiative TOC diagram



The context for agri-food systems transformation is shaped by economic development, trade, politics and resulting policies, institutional capabilities, the information environment, socio-cultural influences and change

3.2. Work Packages and Work Package theories of change

3.2.1 Work Package 1: Facilitating agrifood systems transformation through inclusive learning platforms, public data systems, and partnerships

Work Package 1	Facilitating agrifood systems transformation through inclusive learning platforms, public data systems, and partnerships
Work Package main focus and prioritization	Although platforms for knowledge exchange among development partners exist in South Asia, they tend to operate in silos and with insufficient use of evidence to guide actions and change. Major data gaps exist across the production-to-consumption continuum, undermining the evidence base for systematic change. Gender-disaggregated datasets are uncommon and data gaps are prominent for marginalized groups. In response, TAFSSA will **(i)** build on existing learning platforms built in prior CGIAR projects and develop new ones to support more equitable, evidence-based dialogue and **(ii)** improve the evidence base informing decisions and actions by firms, farmers, and policymakers. Research will **(iii)** increase the availability and accessibility of quality data and **(iv)** demonstrate the value of creating integrated agrifood systems datasets. **(v)** These datasets also contribute to subsequent research in Work Packages 2, 3, 4 and 5.
Geographic scope	34-Southern Asia / BD-Bangladesh, IN-India, NP-Nepal, and PK-Pakistan

Research questions

Research question 1: How can multiscale learning platforms effectively support, engage, and connect existing but siloed knowledge networks to accelerate the diffusion of data and evidence informing agrifood systems?

Research question 2: How can an integrated data effort – cutting across farms, markets, prices, consumers, and environmental issues – improve agrifood system decisions and actions across diverse sectors?

Methods

Methods for research question 1: Using confidential key-informant interviews, a scoping review, and network analyses, we will analyze and map South Asia's knowledge network landscape to identify existing credible and influential knowledge networks and mechanisms for knowledge mobilization in agrifood systems. Building on opportunities and identified gaps, we will connect existing networks and processes across disciplinary and functional silos (e.g., research, policy-making, or agribusiness, etc.) crucial for improving evidence to support agrifood systems policies.[56] Emphasis will be on structured stakeholder dialogue and formal and informal linkages to governments, development partners, agribusinesses, and donors. Platforms will focus on addressing key issues of regional relevance, and to identify mechanisms to sustain learning platforms beyond the Initiative timeline. Annual stakeholder surveys and other MELIA activities will be deployed to assess learning platform performance, quantify the diffusion and use of information to inform decision making, and to strengthen adaptive management.

Methods for research question 2: To close well-recognized data challenges in agrifood systems,[57] we will **(i)** develop a data and indicator framework outlining critical local data needs across the production-to-consumption continuum. We will **(ii)** assess gaps in the availability, quality, and usability of public data. **(iii)** assemble suitable datasets from multiple sources with learning platform collaborators, harmonize (where possible), combine, and repurpose, to develop, host and analyze exemplar integrated agrifood systems databases. **(iv)** To fill data gaps, we will design and field-test efficient data capture and analysis methods (e.g., lean

surveys, crowd-sourcing, remote sensing, capturing business transactions data, app- and photo-based food journaling, etc.). Data capture and equity analyses will highlight insights on women, marginal ethnicities and castes, landless farmers, small businesses, and remote and tribal communities. **(v)** We will also design and test how focused data use cases on the entire agrifood system in our focus geographies can help stakeholders identify actions around key aspects of the food system, including for the marginalized. **(vi)** We will mobilize TAFSSA's learning platforms to share and generate greater demand for integrated, inclusive, and innovative agrifood systems data.

Outputs

1.1. Multistakeholder learning platforms and sustainability plans at the regional, national, and subnational levels to maintain the co-production of knowledge and co-mobilize evidence-based actions.

1.2. Scientific papers documenting the process of learning platform formation and dataset curation.

1.3. A flagship conference and system to sustain the biennial generation of a report titled *State of food systems in South Asia: Exemplar integrated and equity-focused datasets supporting evidence-based decisions and actions from the plate to the farm*.

1.4. Open-access integrated agrifood systems databases and food systems profiles from key geographies.

1.5. Methodological innovations to capture and analyze missing elements in agrifood systems data.

Theory of change:

Causal process: Agrifood systems transformation requires a reliable, accessible, and integrated evidence base generating actionable insights to guide demand, innovation, and scaling partners to coordinate and catalyze change.[58] Prior experience (Annex 2.3) suggests that learning platforms assist in building a common understanding of key evidence needs and gaps, while also mobilizing resources (including human resources, funds, policy and business support) to plug data and evidence gaps. Learning platforms are also a strong way to support young and women researchers by providing opportunities for increased leadership and to highlight their work. By integrating data co-generation with knowledge co-mobilization in the context of multistakeholder platforms, TAFSSA will improve the systematic understanding of challenges and opportunities and support better informed decisions and actions toward socially inclusive agrifood systems transformation.

Interdependencies with other Work Packages, partnerships, and Initiatives: Outputs 1.1 and 1.2 contribute to Intermediate Outcomes including: **(i)** co-identification by stakeholders (Annex 3.2.2) of evidence gaps and allocation of resources addressing them. Capacity development efforts will boost data acquisition, curation, and analytical capacities among national innovation partners. **(ii)** Building on Output 5, researchers will develop and deploy state of the art mixed methods data collection (Output 1.3). **(iii)** Data will be curated in an open-access system (aligned with Output 1.4). **(iv)** To affect policy, researchers will develop data use cases based on Outputs 1.1–1.5 on **(a)** improved food-based social welfare programs (WP4), **(b)** the testing of farm produce aggregation models to support smallholders growing nutrient dense foods (WP3), and **(c)** demand-responsive farmer extension services (WP2, WP5). **(v)** Supported by Outputs 1.1-1.6 previously siloed actors and/or knowledge networks will engage and contribute to joint learning platforms on agrifood systems, while **(vi)** governments, donors, the private sector, and aligned organizations implement evidence-based changes.

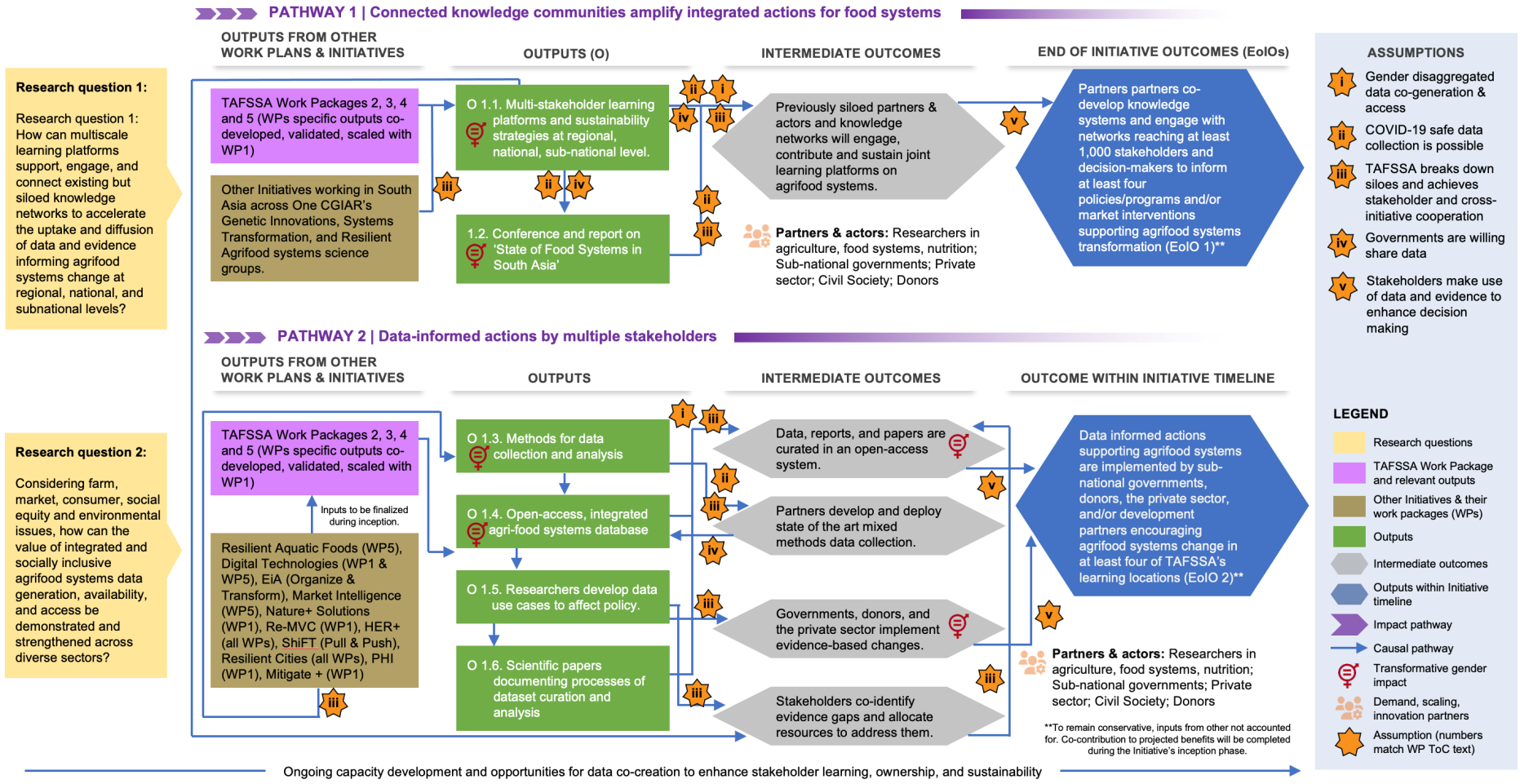
Initially, TAFSSA will support learning platforms through informal and formal engagements demonstrating platform value. In combination with regular business, donor, and subnational government dialogue within TAFSSA's learning locations, co-creation and analysis of data will lead to mobilization of more resources for **(i)** collecting and curating integrated food systems data and **(ii)** encouraging governments and businesses to make more non-sensitive data publicly available. Combined with capacity development efforts, this will **(iii)** convince researchers, policymakers, businesses, and extension officials to design their activities in ways that respond to evidence (partner details: Annex 3.2.2). Through learning platforms that provide significant opportunities to amplify the work of other Initiatives that may otherwise lack deep and on-the-ground partnerships, WP1 is expected to engage most Initiatives working in South Asia.

Assumptions and risks: Based on experience in previous projects with close governmental partnership in data co-generation and use,[59] we assume **(i)** that researchers, governments and businesses will allow access and use of non-sensitive, deidentified but gender-disaggregated data and that they engage in data co-generation **(ii)** COVID-19 may create risks to primary data gathering efforts, and/or challenges to operations. If encountered, these will be surmounted using remote data gathering or crowdsourcing approaches. **(iii)** based on evidence from prior successful bilateral projects (Annex 2.3), we are confident that TAFSSA can successfully mobilize cooperation among siloed partners and Initiatives. **(iv)** governments can be sensitive to datasets showing slow progress in development indicators. However, our prior experience suggests that relationship management and dialogue can overcome this challenge. Finally **(v)** we assume that data-co-generation will enhance use of data and evidence for improved decision making. Risks to Initiative success are in Section 7.3.

Links to Innovation Packages and scaling readiness plans: WP1 will generate one Innovation Package (multistakeholder, multilevel learning platforms generating evidence-based actions to improve agrifood systems) with five component innovations. A light-track, second wave scaling readiness assessment will be applied to relevant components of this Innovation Package, particularly innovations ii, iii, and iv, described in Annex 4.1, starting Q4 2022, budgeted at US$20,000. Details on linkages to projection of benefits and MELIA as they pertain to innovation packages are found in sections 2.7 and 6, respectively.

TOC for Work Package 1

TAFSSA WORK PACKAGE 1:
Facilitating agrifood systems transformation through inclusive learning platforms, public data systems, and partnerships



3.2.2 Work Package 2: Transforming agroecosystems and rural economies to boost income, and support diversified food production within environmental boundaries

Work Package 2	Transforming agroecosystems and rural economies to boost income, generate jobs, and support diversified food production within environmental boundaries
Work Package main focus and prioritization	This Work Package generates linkages between farmers, landscapes, and markets to diversify agricultural production, increase farmers' incomes, and foster rural entrepreneurship from intensified and mixed farm enterprises within environmental boundaries. Focused on hot-spots of poverty, malnutrition, and ecological degradation in TAFSSA's learning locations, activities in the rice-based systems of the IGP; the mixed farming and rice-fallow systems of eastern India and southern Bangladesh, respectively; and the rainfed Himalayan mid-hills will result in targeted and socially-inclusive options to optimize farming enterprise performance. Research will yield insights supporting sustainable and nutrition sensitive landscapes, while also developing business models and pathways for policies supporting income generation.
Geographic scope	34-Southern Asia / BD-Bangladesh, IN-India, and NP-Nepal.

Research questions

Research question 1: At the farm level, can crop diversification, biofortification, and animal components be managed to increase production of nutritious foods and improve women's and men's livelihoods while conserving resources and mitigating GHG emissions?

Research question 2: How can foodsheds, watersheds, and airsheds be managed at the landscape level to increase nutritional yields and agrobiodiversity while maintaining or augmenting ecological services?

Research question 3: Within the emerging culture of agricultural entrepreneurship in South Asia, how can public-private partnerships and rural service provision markets be made socially inclusive to support innovations that generate income and lower production costs for farmers diversifying their enterprises?

Methods

Methods for research question 1: (**i)** Through a network of researcher-led "mother" and farmer-led, on-farm "baby" experiments managed as innovation systems 'hubs' in TAFSSA learning locations (2.4 Priority Setting),[60] we will go beyond typical agriculture-nutrition programs in South Asia that focus on homestead food production[61] to explore field- and landscape-scale crop and animal farm diversification options supporting multiple benefits, including nutritional yield, across environmental and socioeconomic gradients of rice-based farming systems. Species composition, varieties, and rotations will be chosen with participatory input from farmers, including women, and include biofortified cultivar options. Mother trials will complement baby trials in learning sites of the IGP, with additional on-farm trials exploring diversification options and novel, cost-reducing methods for vegetable and tuber establishment in other learning sites.[62] **(ii)** Experiments will be supplemented by datasets from prior projects[63], with multicriteria analysis employed to assess gendered economic performance, environmental sustainability, and nutritional yield. Simulation modeling will be used to identify pathways toward multi-objective optimization farm management, including improved livestock feeding options to reduce GHGs.[64] Finally, (**iii)** choice experiments will used to elicit farmers' *ex-ante* gendered preferences and ability to invest in agronomic biofortification, biofortified varieties, and new crop and animal species.[65] Funding contingent, these may be complemented by (iv) randomized control trials (RCTs)

assessing extension methods encouraging synergies between production diversification, women's empowerment, nutrition education messaging, and household nutritional outcomes.

Methods for research question 2: This work will deliver a framework using adapted methods and tools to support nutrition sensitive landscapes.[66] Anticipated approaches include **(i)** community- and household-level surveys characterizing farming systems' nutritional functional diversity and participatory assessments of ecosystem services,[67] complemented by innovative **(ii)** satellite-derived estimates of nutritional yield at the landscape level.[68] Finally, **(iii)** learning platforms (WP1) will inform women's and Small Farmer Large Field (SFLF)[69] groups' **(iv)** participation in landscape planning and model-based scenario analysis to co-design socially inclusive and nutrition-sensitive landscape management strategies with the added goal of sustainably maintaining groundwater resources.[70]

Methods for research question 3: Public-private action research partnerships with farm machinery companies will identify scalable strategies to overcome labor bottlenecks in diversified farms and landscapes, particularly for women and marginal farmers.[71] **(i)** Machinery performance and service provision potential will be evaluated through mother and baby trials for crop establishment, irrigation, harvesting, and postharvest operations. We will also co-develop business approaches for **(ii)** reducing market entrance barriers for companies, machinery dealers, and farm services providers through research studying socially inclusive farm services markets.[72] Jointly implemented adoption and scaling of potential assessments will catalyze public-private coordination and increase technology availability for poor farmers, including women.[73]

Outputs

2.1 Evidence informing the development of extension recommendations and materials tailored and appropriate for men, women, and farmers from marginal groups to build profitable, equitable farming enterprises that support nutrition.

2.2 A decision support framework tailored to South Asia's farming systems supporting governments and communities in managing nutrition-sensitive landscapes.

2.3 Landscape- and watershed-level assessments of groundwater use sustainability.

2.4 At least four public-private partnerships supporting farm services provision business models that overcome innovation bottlenecks to socially inclusive income generation.

2.5 Open-access peer-reviewed papers, reports, and datasets.

Theory of change

Causal process: WP2 has two impact pathways that coordinate with and benefit from work conducted by a range of other initiatives. The first focuses on farm diversification and nutrition-sensitive landscapes. The second addresses public-private partnerships to support rural service provision economies. Both interact to generate three outcomes: **(i)** farmers are exposed to innovations and improved farm management recommendations, **(ii)** farming services (including machinery) are made accessible, affordable, and socially inclusive in ways that lower farmers' production costs and generate income for entrepreneurs, and **(iii)** smallholders adopt diversified production systems.

Interdependencies with other Work Packages, partnerships, and Initiatives: In the first pathway, action research with national and international research and extension institutes will facilitate endorsement and use of Outputs 2.1 and 2.3 in development programs implemented by subnational governments, extension agencies, and large livelihood-, environment-, and nutrition-oriented NGOs (Annex 3.2.2). Multistakeholder learning platforms developed in WP1 will be mobilized to co-identify knowledge gaps, raise awareness, and generate demand for knowledge and products from Outputs 2.1-2.4. Farming communities and women's self-help

groups engaged in research will benefit Output 2.1 through training by development and extension partners on farm practices that support income generation, nutritional yield, and ecosystem services. The private sector will benefit from Outputs 2.3, influencing landscape-scale diversification through farm product aggregation, after-sales processes, and value chain interventions to increase consumer demand for sustainable and nutritious farm products in WP3 and WP4. WP2 Outputs 2.1-2.4 interact and yield intermediate outcomes to increase exposure of farmers to extension information and decision tools supporting increased adoption of diversified production systems

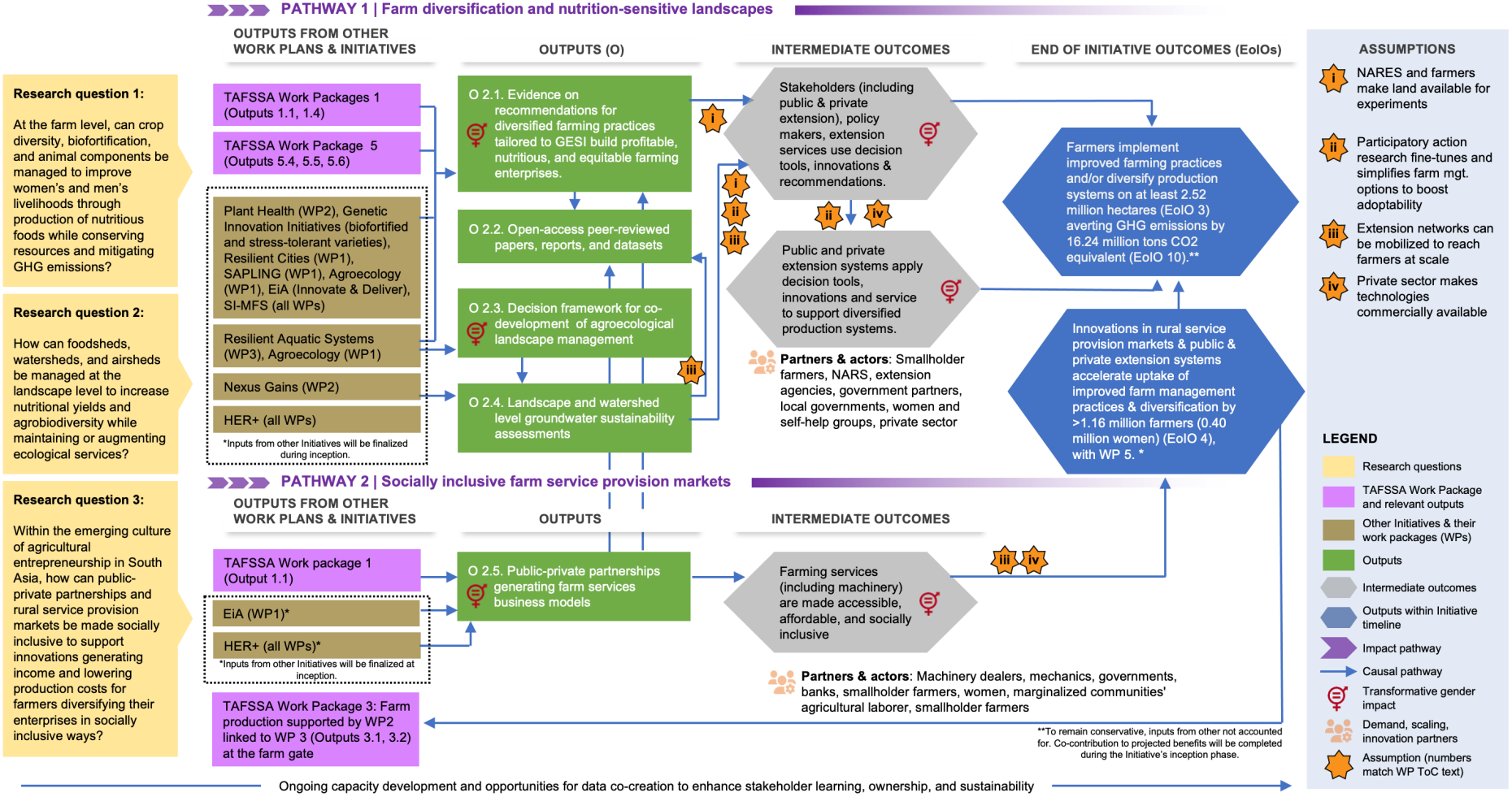
In the second pathway, inclusive farm service provision markets**,** innovative partnerships with the private sector (Annex 3.2.2)**,** will aid in generating business models that will increase the availability of technologies and services necessary for farm diversification (Output 2.5). Extension services will be better informed (Output 2.1) and act to aggregate farmers' demand for machinery services to support land preparation, crop establishment and intercultural operations, harvest, and postharvest activities. Business models will assure training as well as after-sales and repair services. This will **(i)** help farmers to overcome gendered capital, labor, knowledge, and logistical constraints to diversified production while also **(ii)** reducing production costs and generating income for rural entrepreneurs. These pathways interact with each other resulting in farmers implementing improved farming practices and/or diversifying production systems on at least 1.29 million hectares averting GHG emissions by 1.92 million tons CO_2 equivalent by 2024 (the remainder of TAFSSA's CO_2 equivalent averted is from WP 5). This is enabled by 1.16 million farmers (0.41 million women) benefiting from innovations in entrepreneurial service provision markets facilitate production diversification (additional mitigation benefits are accrued in WP 5). Key collaborative initiatives include EiA, Agroecology, SI-MFS, Plant Health, SAPLING, Resilient Aquatic Systems, and NEXUS Gains, among others.

Assumptions: Based on prior experience,[74] we assume that **(i)** national research partners and farmers will be willing to provide land experiments. TAFSSA scientists' social capital and relationships with NARES mitigates the risk of land shortages. **(ii)** WP2 may generate complex farm management configurations that are difficult for resource-poor farmers to implement. This risk is overcome through participatory action research and learning feedback loops to fine-tune and simplify options, and through co-development of equitable landscape decision support frameworks.[75] We also assume that **(iii)** subnational governments and regional extension services will be sufficiently resourced to reach farmers to increase awareness and demand for diversification options at scale. To mitigate this risk, TAFSSA will work closely with private sector partners and large livelihood-, environment-, and nutrition-oriented NGOs to fill information-reach gaps and address marginalized farmers. Finally, based on previous project experience,[76] we reasonably assume that **(iv)** the private sector will support the commercial availability of affordable farm technologies. Nonetheless, risk of failure is mitigated through the cooperative development of business plans and actions to overcome constraints identified in scaling analyses. Risks to Initiative success are detailed in Section 7.3.

Links to Innovation Packages and scaling readiness plans: WP2 will generate one Innovation Package (a support framework for landscape diversification and associated rural service business models) with five component innovations. Scaling readiness assessment is will be rigorously applied across research questions and specifically to innovations ii and iii in Annex 4.1. A light track (second wave) assessment in Q2 2022 will be followed by a standard track assessment (second wave) starting Q2 2023. Projection of benefits and MELIA as they pertain to Innovation Packages are in sections 2.7 and 6, respectively.

TOC for Work Package 2:

TAFSSA WORK PACKAGE 2:
Transforming agroecosystems and rural economies to boost income and support diversified food production within environmental boundaries



3.2.3 Work Package 3: Improving access to and affordability of sustainably produced healthy foods through evidence and actions across the post-harvest value chain

Work Package 3	Improving access to and affordability of sustainably produced healthy foods through evidence and actions across the food system
Work Package main focus and prioritization	South Asia's agricultural systems are dominated by millions of smallholders. Most are unable to participate in markets due to diseconomies of scale, weak market linkages, unsustainable supply chains, and high price fluctuations, which lead to low farm diversification and compromised farmer incomes. WP3 docks with WP2 at the farmgate, and works to creates favorable environments for diversification by linking smallholders — with an emphasis on women and marginalized groups — to supply chains through aggregation models. Supply chain research generates insights to improve access to inputs and marketability of sustainably produced and nutritious food. At the consumer level, WP3 focuses on improving access to healthy food for the poor through changes in food retail environments.
Geographic scope	34-Southern Asia / BD-Bangladesh, IN-India, and NP-Nepal.

Research questions

Research question 1 focuses on the challenges smallholders face with obtaining profits at the farmgate. It asks how to strategically link and improve the participation of hundreds of millions of small and marginal farmers, including women and youth in the agrifood value chain, while supporting the sustainable production of nutritious crop and animal-based foods?

Research question 2 focuses on improving efficiency and fiction of midstream value chain actors. It asks how key food supply chains in South Asia be supported to supply sustainably produced, healthy foods?

Research question 3 focuses on food environments and consumers' food purchasing habits. Acknowledging that most of the food consumed in South Asia is bought in markets, and that research on food environments in the region is near absent, we ask what factors in the food environment influence access to and purchase of nutritious food for poor consumers — with emphasis on women — and how these environments can be improved?

Methods

Methods for research question 1: A scoping review will study aggregation models[77] for crops and animal products grown in South Asia and identify key drivers of success and failure. Participatory action research will be subsequently deployed to select learning locations (2.4 Priority Setting) involving horizontal aggregation of smallholders into selected value chains, with emphasis on women farmers[78], thereby bridging WP2 and WP4. Diversification strategies developed in WP2 will be combined with market and nutrition data to design a scaled experiment that tests alternative, multipronged development and market pathways toward farm diversification (including maintenance of appropriate landraces) and intensification in rice-fallows cropping sequences.[79] Gendered changes in farmers' bargaining power will be measured using mixed methods, including surveys, farmer diaries, and qualitative interviews. Agronomic and economic data from tissue culture pilots in WP2 will be combined with participatory farm budgeting conducted with SFLF and women's self-help groups to develop business models that attract investment into seed supply chains.[80]

Methods for research question 2: To address sustainability of the midstream food product value chain, we will use an innovative "lean thinking" approach[81] and "Value Stream Mapping"

(VSM) to systematically map values (social, economic, and environmental) in primary food group supply chains.[82] VSM will focus on a plate-to-farm approach to study the economic and social challenges and recycling opportunities associated with food waste.[83] Data will be collected during site visits (e.g., to food processing units) and through semi-structured interviews and focus groups with food processors, retailers, and other stakeholders (including municipal governments and recycling companies). The resulting maps of food production and waste generation will enable visualization and informed discussion toward interventions to close gaps.

Methods for research question 3: Passive data collection tools (photography,[84] videography, and eye tracking[85]) will be used to characterize food retail environments along with geospatial mapping of consumer access to different types of food environments, with emphasis on rural areas that have been neglected in the research literature[86]. Linking to WP4, we will deploy a cluster RCT on food placement and labeling in local shops to analyze differences in men and women consumers' purchasing behavior and demand for sustainably produced and nutritious food. Market and retail surveys will map the food products, prices, and price fluctuations of healthy and unhealthy products, as well as consumer choices, constraints, and purchasing behavior for healthy and nutritious products disaggregated by gender and age. In-depth qualitative interviews will examine the behavior of urban and rural retailers and elicit their responses to delivering sustainable healthy food products.

Outputs

3.1 Evidence synthesis of viable output aggregation models to encourage diversification and sustainable production of nutritious foods by men, women, and marginal groups.

3.2 Business models for increased participation of marginal groups in local seed production for noncereal crops.

3.3 VSMs depicting sustainability indicators for agrifood supply chains.

3.4 Tools for rural food retail design to increase consumer demand for sustainably produced and nutritious foods.

3.5 Geospatial maps of consumer (specifically poor people) access to food environments delivering healthy and nutritious food in urban and rural markets.

3.6 Open-access peer-reviewed papers, reports, policy-briefs, and datasets.

Theory of change

Causal process: In addition to other initiatives, WP3 responds to demand from governments, NGOs, and farmers' groups (these partners are described online Annex 3.2.2) to generate three intermediate outcomes: **(i)** Farm product aggregation models that leverage SFLF and women's self-help groups and establish market linkages that reduce costs and improve farmers' income from diversified production; **(ii)** supply chains that are reorganized to reduce food waste and financial losses; and **(iii)** research evidence that catalyzes a reshaping of rural food environments to support access to affordable SHDs. These outcomes will increase at least 190,000 farmers' (95,000 of whom will be women) participation in profitable value chains by 2024, while food retail systems will also be reorganized to increase the availability and affordability of nutritious foods. As a result, the rural poor, and especially women, will experience improved food access and make healthier food choices.

Interdependencies with other work packages, partnerships, and Initiatives: By positioning the private sector as an innovation and scaling partner, the socially inclusive co-generation of business models and capacity development activities that contribute to Outputs 3.1 and 3.2 will encourage farmers to respond to new market demand for sustainably produced and nutritious foods. In particular, Output 3.1 interacts with Work Package 2 and will aid in

farm diversification and intensification by validating and demonstrating methods to increase farmers' bargaining power at the farmgate and on price-support policies. An assured supply of bulk quality produce is anticipated to attract the private sector and reduce transaction costs.

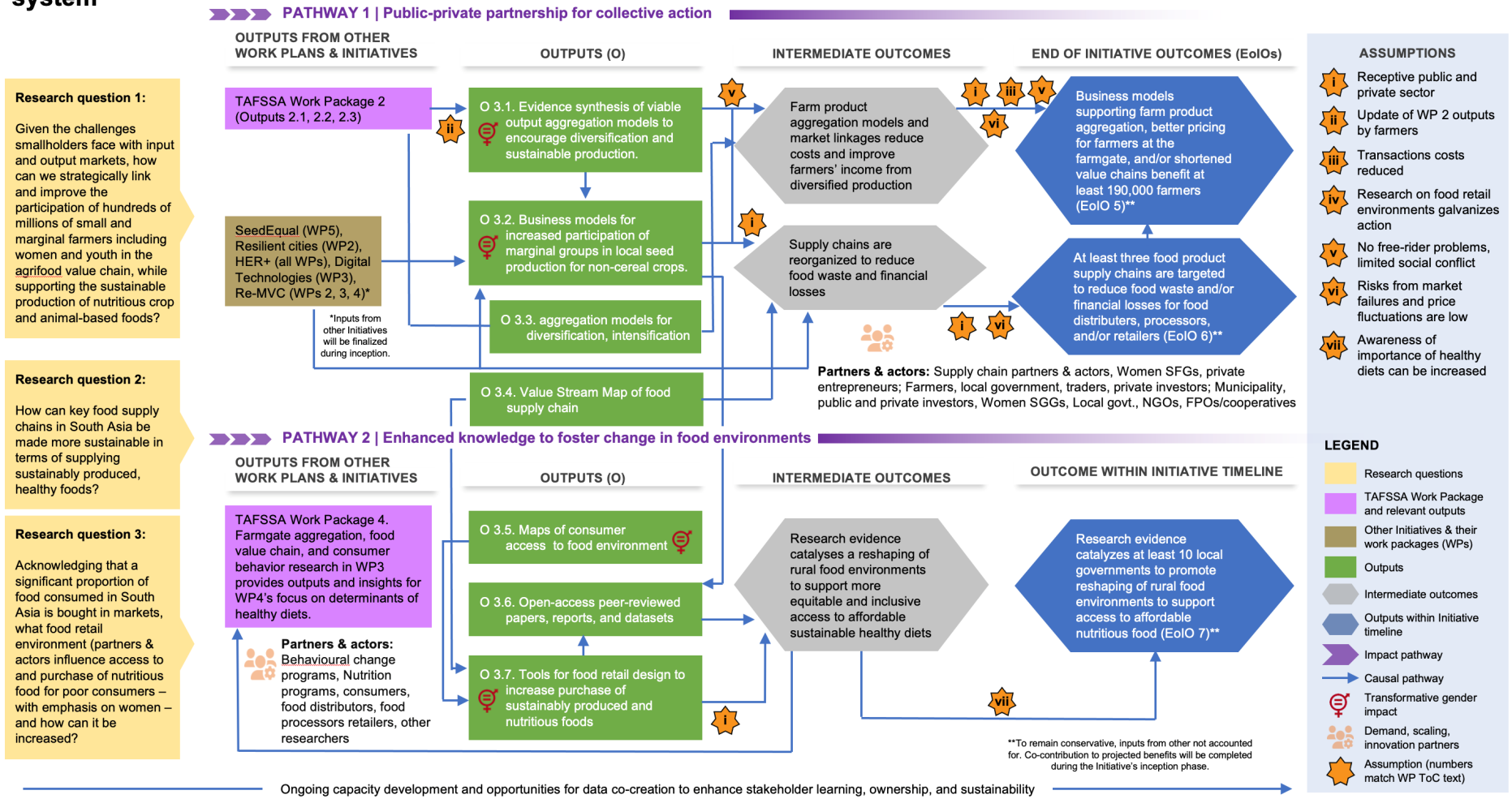
Findings from lean thinking and VSM (Output 3.3) will provide insights for private partners to reduce transaction costs and reorganize supply chains. Food environment maps and evidence on food retail environments and their influence on consumer behavior (Outputs 3.4 and 3.5) will be used by the public and private sectors to increase access to affordable and nutritious food for poor consumers. Multistakeholder learning platforms (WP1) will be mobilized to support dialogue aimed at reducing retail practices that favor unhealthy foods. Output 3.6 (innovative tools on retail environment characterization) will be used to help private businesses target women and increase profits by encouraging increased consumer purchasing of healthy foods. Key collaborating initiatives will include Digital Agriculture, Resilient Cities and Re-MVC, among others.

Assumptions: We assume that **(i)** the public and private sector will be receptive to evidence on business models that increase farmers' incomes, raise profits for the food industry, and reduce transaction costs.[87] Similarly, **(ii)** WP3 is contingent on outputs from WP2 and on reasonably high levels of uptake of appropriate production practices for nutritious farm products. We also assume that **(iii)** the private sector will recognize the value of reducing transaction costs[88] and **(iv)** data and research on food retail environments can be galvanized into actions supporting access to and affordability of more nutritious foods.[89] **(v)** Free-rider problems and social conflict in aggregation models constitute risks,[90] as do **(vi)** market failures and price fluctuations for nutritious products resulting from demand-supply mismatches.[91] Similarly, **(viii)** low awareness of the importance of healthy diets among the poor[92] represents an additional challenge. From the beginning, TAFSSA will involve state/provincial governments, the private sector, and other stakeholders to take ownership in mitigating these risks. Risks to Initiative success are detailed in Section 7.3.

Links to Innovation Packages and scaling readiness plans: WP3 will generate two Innovation Packages — (a) Options to reorganize value chains and food environments to improve sustainable production and (b) Better food environments to improve sustainable consumption — with five and two component innovations, respectively A scaling readiness assessment will be applied to Innovation i (see Annex 4.1) of this Innovation Package. A light track (second wave) assessment will begin in Q2 2022, followed by a standard track assessment (second wave) starting Q2 2023. Details on linkages to projection of benefits and MELIA as they pertain to Innovation Packages are found in sections 2.7 and 6, respectively. Details on linkages to projection of benefits and MELIA as they pertain to innovation packages are found in sections 2.7 and 6, respectively.

TOC for Work Package 3

TAFSSA WORK PACKAGE 3:
Improving access and affordability to sustainably produced healthy foods through evidence and actions across the food system



3.2.4 Work Package 4: Tackling the behavioral and structural determinants of sustainable healthy diets

Work Package 4	Behavioral and structural determinants of sustainable healthy diets
Work Package main focus and prioritization	While South Asia's food environments are diverse, diets are poor and limited in diversity. They increasingly include unhealthy foods. Insights are needed into how factors across agrifood systems and within households and communities shape diets to support actions toward equitable SHDs. To address this challenge, WP4 docks with WP3 to study dietary practices of food consumers and identify determinants of food choices. WP4 synthesizes evidence shaping dietary behaviors, and tests innovations to support consumption of SHDs. Given the burden of poverty and inequity in the region, we also focus on challenges related to affordability, as well as other gendered and structural constraints across the acquisition-preparation-consumption spectrum.
Geographic scope	34-Southern Asia / BD-Bangladesh, IN-India, NP-Nepal, and PK-Pakistan

Research questions

At the tail-end of the food value chain, and with a strong integrated focus on gender and equity, including dynamics and norms at the household and community level, Work Package 4 links to WP and focuses on three major research questions across learning locations to enable a strengthened understanding of "plate-to-farm" dynamics. Three areas of research will come together to inform programs, policy and markets and ultimately stimulate agrifood systems change.

Research question 1: What are the primary determinants of current dietary patterns, especially the consumption of diverse diets and unhealthy foods?

Research question 2: How can behavior change programs in South Asia help shape dietary behaviors that subsequently affect human and planetary wellbeing?

Research question 3: How can programs and policies across sectors tackle major structural and gendered drivers of dietary choices?

Exploring these closely related questions for specific food groups allows an enhanced understanding of the consumption to production (*plate-to-farm)* value chains, including the role of markets and the private sector in shaping both consumer and producer behaviors. Historical and political economy analysis across the food systems and over time will be a cross-cutting feature, shedding light on food production, availability and affordability, and thus, influences on consumption.

Methods

Critical to these questions is access to adequate data on dietary patterns, including data disaggregated by gender, economic status, and geographic areas. In coordination with Work Package 1, Work Package 4 will build and analyze data to consolidate insights for governments and enable food system actors to generate more frequent, high quality public domain data on diets and dietary determinants.

Methods for research question 1: Research will characterize current dietary patterns in the region by assembling existing data, gathering new data (with WP1) and conducting analyses on dietary patterns. Using methods from anthropology and other behavioral sciences, we will conduct primary research studies on dietary patterns and their determinants, including

practices related to unhealthy foods. We will conduct lean plate-to-farm mapping exercises with food systems experts to identify household-level (cultural, financial, and structural) as well as food system-level (prices, market availability, storage, and production) and policy-level determinants. Analyses will also deliver insights on the patterns and drivers of consumption of unhealthy foods, including ultra-processed foods. All analyses will include a strong equity lens.

Methods for research question 2: Research will synthesize regional evidence on behavior change interventions to distill **(i)** insights on contextual factors shaping program impacts and **(ii)** identify innovations and implementation experiences focused on reducing consumption of unhealthy foods. With innovation and scaling partners, TAFSSA will design and pilot behavior change communications (BCC) innovations focused on consumption of unhealthy foods that use short time-frame randomized trials or behavioral experiments in different contexts, especially crucial as South Asia undergoes rural to urban and demographic transition.

Methods for research question 3: Analyses of available data on food prices will assess affordability constraints around nutritious diets in the region and generate price indices for the region. Modeling and policy analyses will inform how affordability constraints can be tackled through social protection and other income-enhancing programs. Given strong interest in fortification and biofortification to improve the nutrient content of foods in regional social protection programs, we will conduct implementation research, including modeling studies, on these strategies in safety net programs. We will conduct scoping reviews, analyze available large bodies of data on integrated agriculture-gender-nutrition programs, and conduct expert consultations to consolidate insights on gender- and social equity-related structural determinants across the acquisition-preparation-consumption spectrum.

Outputs

4.1 Primary research papers and maps on plate-to-farm studies of major food groups, including unhealthy foods.

4.2 Methods tool kits to support rapid analyses of dietary patterns and drivers.

4.3 Evidence summaries on addressing consumption of unhealthy foods in behavior change programs.

4.4 Practice insights and RCT-based recommendations on behavior change on unhealthy diets.

4.5 Compilation of tools, insights, and recommendations on addressing affordability of healthy diets.

4.6 Gender- and equity-focused methods, research papers, and insights on improving diets.

Theory of change

Causal process: Research question 1 will generate two outcomes: **(i)** Increased effectiveness of nutrition programs through the co-development of insights on multiple determinants of dietary practices with national agriculture-nutrition networks. TAFSSA's plate-to-farm approach (articulated through Output 4.1) will build awareness for production- and market-focused stakeholders in identifying drivers of poor consumption. Methods for analyzing local diets (Output 4.2) will shape the multifaceted understanding of issues affecting consumption among the nutrition program community. Identifying determinants of unhealthy food choices will further help to facilitate **(ii)** the improved ability of advocates and nutrition policy actors to shape policies and identify actions to increase food industry accountability.

Research question 2 is focused on BCC. Outputs 4.3 and 4.4 will generate evidence and decision support for policy partners and nutrition program implementers (Annex 3.2.2). Structured use of this evidence will **(iii)** improve stakeholders' ability to tackle diverse

determinants of healthy and unhealthy foods more effectively, which will help to raise awareness around SHDs, while **(iv)** governments and program implementers will integrate robust content from BCC innovations to reduce unhealthy food consumption.

Research question 3 holds implications for all food system actors and addresses challenges related to affordability. Outputs 4.5 and 4.6 will **(v)** improve analytical tools in social protection programs to address nutritious diets and **(vi)** result in more gender- and equity-focused nutrition approaches to agricultural production, markets, and consumer policies, including new insights on time use in food related activities. Working with policy makers and the nutrition advocacy community, which exerts political influence and can make public programs more nutrition sensitive, TAFSSA will reach about 0.48 million women in TAFSSA's focus geographies in 2024 while charting pathways to impact of 49.90 million women by 2030.

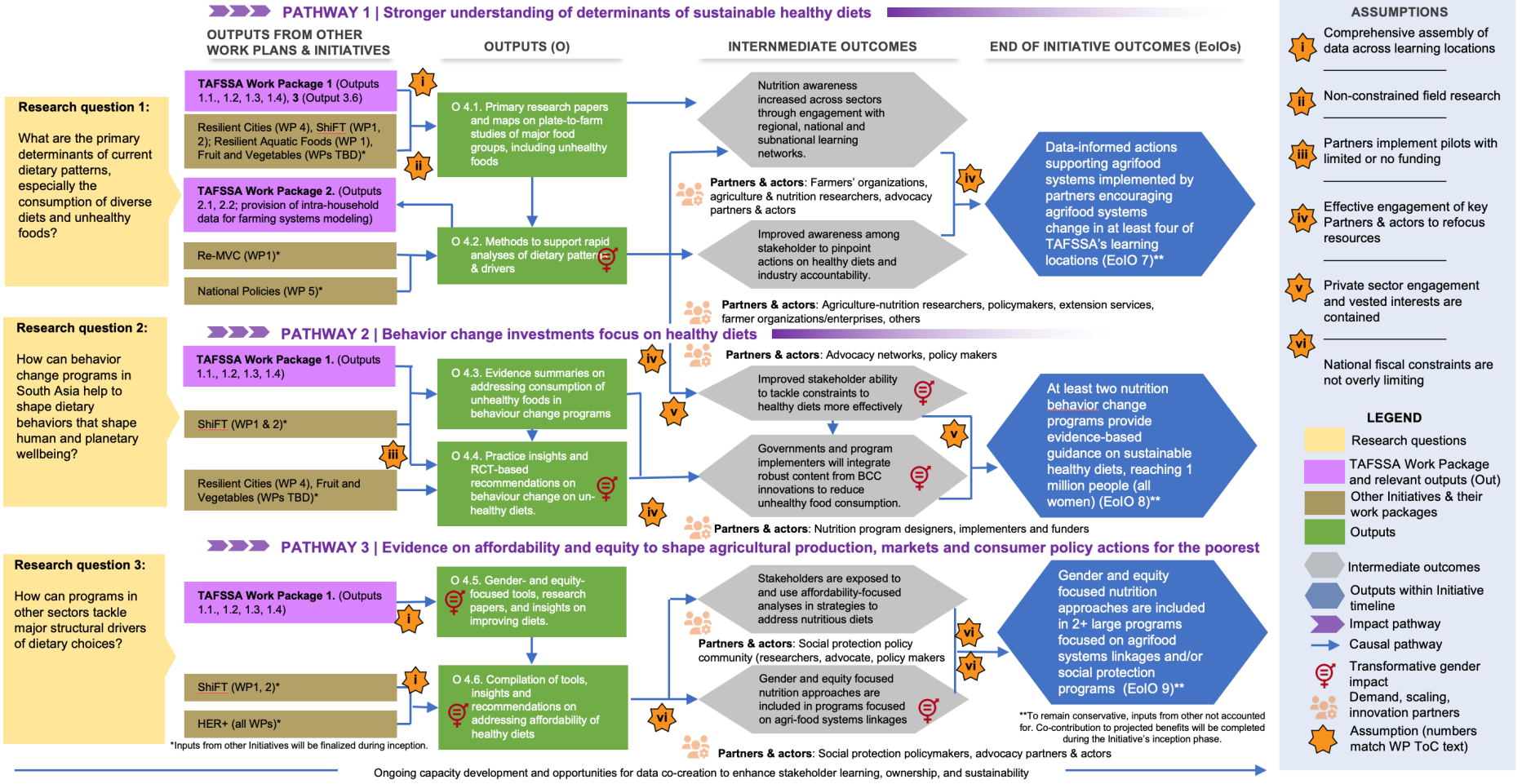
Interdependencies with other work packages partnerships, and Initiatives: WP4's partners are detailed in Annex 3.2.2 and include program implementers, international public and development organizations, universities, non-academic research institutes, and government. A key goal of this WP is engagement with thematic Initiatives focused on diets. These include SHIFT, Resilient Cities, Fruit/Veg, and Resilient Aquatic Systems, among others.

Assumptions: We assume that **(i)** data on diets and determinants of diets can be assembled across learning locations. In alignment with WP2 and WP3, we also assume **(ii)** that field research to understand dietary determinants and innovations around BCC will not be constrained. Another assumption is that **(iii)** program implementers will be willing to undertake small pilots on unhealthy food consumption without additional funding, or that TAFSSA will secure additional resources for pilots. Tackling affordability challenges requires engagement with governments and donors and the creation of fiscal space. We therefore assume that **(iv)** we will be able to engage key actors effectively to access or refocus these resources. While COVID-19 continues to hamper field-based data collection, WP1 innovations will assist in collecting data remotely if required. **(v)** Private sector engagement and vested interests related to the production and marketing of unhealthy foods constitute another risk. **(vi)** TAFSSA will approach this risk with care but also with courage. National fiscal constraints may limit the ability to deliver multisectoral programs tackling structural drivers of poor diets. However, we anticipate that fiscal constraints will not hamper design efforts**.** Risks to Initiative success are detailed in Section 7.3.

Links to Innovation Packages and scaling readiness plans: WP4 will generate two Innovation Packages — (a) plate-to-farm food system maps and related nutrition BCC innovations and (b) Evidence base for food policy addressing accessibility and affordability — with five and two component innovations, respectively. A light track scaling readiness assessment will be applied to innovation a-i of Innovation Package 'a' starting in as described online in Annex 4.1 in Q2 2022. A light track, second wave assessment starting Q2 2022 will be applied to Innovation Package 'b' followed by standard track, second wave, assessment in Q2 2023. Details on linkages to projection of benefits and MELIA as they pertain to Innovation Packages are found in sections 2.7 and 6, respectively.

TOC for Work Package 4

TAFSSA WORK PACKAGE 4:
Behavioral and structural determinants of sustainable healthy diets



3.2.5 Work Package 5: Building resilience and mitigating environmental impact

Work Package 5	Building resilience and mitigating environmental impact
Work Package main focus and prioritization	Work Package 5 addresses climate risks and environmental externalities associated with Work Packages 2 and 3. It examines how South Asia can produce healthy diets within an environmentally safe and socially equitable operating space, and in consideration of ongoing climate change and farmers' resilience to shocks. This Work Package provides actionable insights and assessments on (a) the ecological consequences of South Asia's agrifood systems, (b) transition pathways to avoid groundwater over- and under-use across water- scarce and -abundant regions, (c) policy options to limit agricultural residue burning contributions to air pollution and mitigate GHG emissions, and (d) approaches to overcome scaling bottlenecks for climate service-based dynamic crop and animal management advisories, and drought and flood insurance products.
Geographic scope	34-Southern Asia / BD-Bangladesh, IN-India, NP-Nepal, and PK-Pakistan

Research questions

Research question 1: Can South Asia's agrifood systems produce the food groups required to provide healthy and culturally appropriate diets for men, women, youth, and children without transgressing ecological boundaries?

Research question 2: How can energy and food policies be deployed to curtail groundwater overuse in the water-scarce western IGP and catalyze equitable, sustainable use in the water-abundant eastern IGP?

Research question 3: How can crop residue burning (CRB) be limited to mitigate air pollution, limit GHG emissions, and build soil health without exacerbating groundwater overdraft?

Research question 4: How can climate service-based dynamic crop advisories and insurance be effectively designed and scaled-out to strengthen the resilience of diverse farm enterprises to extreme weather events?

Methods

Methods for research question 1: Case studies and/or scoping reviews[93] will first provide a framework assessing the current and future ecological boundaries of South Asia's food system.[94] We will then calculate the production requirements to sustain healthy diets in South Asia.[95] Based on ecological footprint modeling based in India,[96] we will expand work to Nepal, Bangladesh, and Pakistan and account for water, GHG, land, and energy footprints from the production of key food groups required to supply SHDs for men, women, and children. Additional scenario analysis will include matching crop choice to local water resource endowments; alternative, energy-efficient farm and postharvest technologies; and regional trade options.

Methods for research question 2: Scoping and policy reviews will trace the historical trajectory of water, food, and energy policies and use it to frame policy experiments to develop equitable and gender-sensitive solutions aligning production systems with local water resource endowments. Solutions will consider economic and policy trade-offs, as well as bottlenecks across the energy, food, and water nexus.[97] These include the alignment of monetary incentives, such as experiments with modes of energy pricing,`[98] with appropriate crop choices that match agroecological endowments, especially water endowments.[99]

Methods for research question 3: The western IGP remains South Asia's CRB hot spot.[100] CRB is a trade-off indirectly caused by policies aimed at conserving groundwater resources by delaying rice transplanting until monsoon onset. This in turn delays rice harvests, encouraging farmers to burn rice residues to rapidly clear fields for timely winter cropping.[101] TAFSSA examines promising agronomic technologies from WP2 and policy mechanisms from WP3 to reduce CRB in ways that achieve timely planting, sequester carbon and reduce pressure on groundwater resources. Gendered "willingness to accept" experiments will assess minimum financial support that may be required for farmers to limit burning and evaluate technological solutions,[102] such as staggered rice planting/harvesting dates and using the "happy seeder" to establish post-rice crops without CRB.[103]

Methods for research question 4: To strengthen climate services boosting farmers' resilience, we will combine scaling readiness assessments, climate "hindcasts," risk scenario decision analyses, and "willingness to pay" experiments to identify obstacles to and potential solutions for increased use of dynamic weather forecast-based crop and animal management advisories. Concurrently, *ex-post* insurance adoption studies will assess the potential of bundled insurance products (e.g., coupled with credit, input provision, group insurance, and market price stabilization mechanisms etc.) to reduce risk for smallholders investing in = diversified farming systems.

Outputs

5.1. Three scoping reviews of **(a)** the ecological boundaries of South Asian agrifood systems, **(b)** the causes and consequences of groundwater over- and underuse in different states/provinces using a historical policy lens, and **(c)** the promises and pitfalls of insurance to "climate-proof" agrifood systems.

5.2. Ecological footprint assessment of current and potential agrifood system configurations that support SHDs across South Asia.

5.3. Open-source reports, peer-reviewed papers, and policy briefs on socially inclusive and gender-sensitive policy and energy solutions addressing groundwater over- and under-use.

5.4. Proof-of-concept for alternate policy instruments and cost assessments regarding integrated options to reduce CRB, sequester carbon, and limit groundwater overdraw.

5.5. Scaling strategies to increase farmers' gender-equitable use of dynamic weather forecast-based farm advisories.

5.6. Design options for improved flood and drought insurance products accessible to women and marginal farmers investing in diversified farming enterprises.

Theory of change

Causal process: WP5 generates two outcomes that aim to ensure South Asia's agrifood systems transformation to support SHDs is achieved with environmental mitigation and climate adaptation co-benefits. Outputs 5.1a, 5.1b, and 5.2–4.4 will aid in **(i)** the integration of evidence by governments to foster more sustainable water resource use and low-emissions agriculture through policies and programs. Outputs 5.1c and 5.4–5.6 will aid in supporting **(ii)** public-private partnerships that bring advisories and insurance — as well as low-particulate and GHG emission practices — to farmer. These outputs will inform Ministries of Food, Agriculture, Environment, Water (including Groundwater), and Energy and Climate Change, in addition to energy utility companies that enable transformative work on solar and reduced-emissions irrigation.

Interdependencies with other Work Packages, partnerships, and Initiatives: By linking demand and scaling partners in the energy, water management, and agricultural sectors,

TAFSSA will build on established collaborations with regional innovation partners (Annex 3.2.2). Outputs 5.1a, 5.1b, and 5.2–5.4 will inform policies leading to sustainable groundwater use in areas of water scarcity and underdevelopment. From prior project experience,[104] we assume that evidence generated by TAFSSA and the Initiative's partner networks can influence policy reforms and business models, including grid-connected solar irrigation that can enable women and small and marginal farmers to produce and sell electricity to the grid. This can also reduce dependence on growing water-demanding crops without compromising incomes. In areas of groundwater underuse, energy and farm policy reform options will improve affordable irrigation access. This could decrease risk for resource-poor farmers who grow more water-demanding cereals for food security, while also supporting the cultivation of more nutritious crops like vegetables for personal consumption and markets.

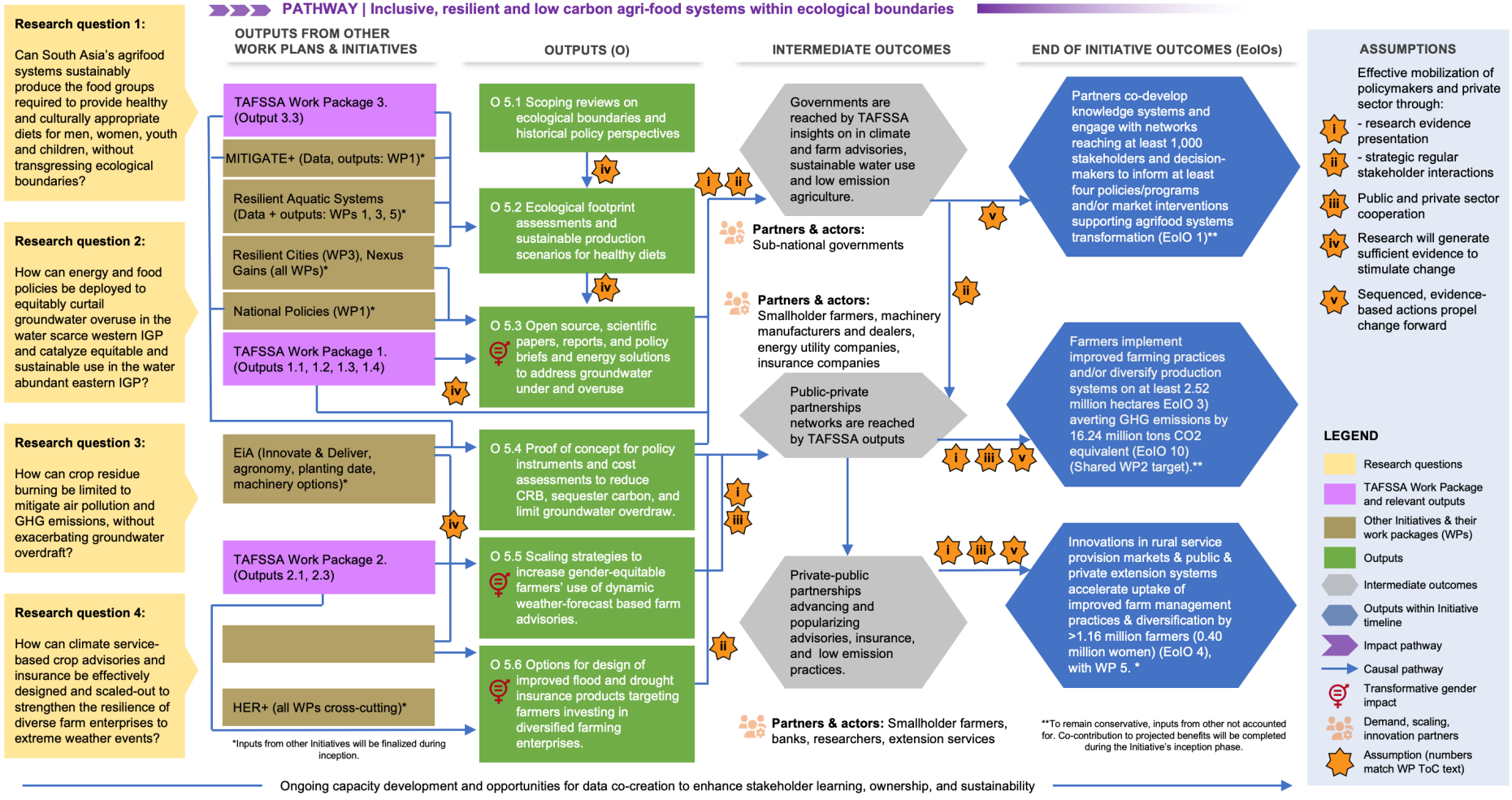
Output 5.4 will provide evidence for layered policy interventions supporting agronomic technologies (e.g., mechanical seeders that facilitate crop establishment without burning and shorter duration rice cultivars to increase postharvest turnaround time between crops for burn-free residue management), market incentives for diversification away from rice, and novel policy innovations linking groundwater conservation to air pollution mitigation goals. To catalyze policy change, these proof-of-concept options can be popularized through TAFSSA's multistakeholder platform in the western IGP and through interactions between TAFSSA scientists, policy makers, and influential donors in India.

The CGIAR has already co-developed proven, dynamic weather forecast-based crop advisory services and index-based insurance products with public and private sector partners in South Asia.[105] Outputs 5.5 and 5.6 will assist in enhancing scaling strategies for these innovations with meteorological agencies, extension services, insurance companies, and value chain actors. Based on this, we anticipate farmers will improve use of resilience-enhancing and regenerative management on 1.42 hectares by 2024, with scaling pathways catalyzing actions that could result in up to 4.36 million hectares by 2030. Key partner Initiatives will include EiA, Nature-Positive Solutions, NEXUS Gains, and National Policies, among others.

Assumptions: Based on a range of precursor bilateral projects (detailed online in Annex 2.3), we reasonably assume that policymakers and the private sector can be mobilized into action through **(i)** presentation of research evidence and **(ii)** concerted, strategic, and regular interactions to build research insights into policies and profitable business models. We further assume **(iii)** that public and private partners can be incentivized to cooperate, and **(iv)** research will generate sufficient information **(v)** to systematically identify constraints and encourage sequenced actions that facilitate scaling of the water management, air pollution mitigation, and agricultural risk-reduction methods clarified by WP5. High-level risks to Initiative success are detailed in Section 7.3.

Links to Innovation Packages and scaling readiness plans: WP5 will generate three Innovation Packages — (a) Gender-sensitive solutions aligning production systems with local water resource endowments, (b) Baskets of technological and policy options reducing agriculturally-based nonpoint air pollution, and (c) Improved climate services options accessible to women and marginal farmers — with one, two, and two component innovations, respectively. A scaling readiness assessment will be applied to relevant components of this Innovation Package (particularly a-i and b-i; scaling assessments are built-in methods for c-ii Annex 4.1 described online in starting in 2023. Details on linkages to projection of benefits and MELIA as they pertain to Innovation Packages are found in sections 2.7 and 6, respectively.

TOC for Work Package 5: Building resilience and mitigating environmental impact



4. Innovations and scaling

4.1 Innovation packages and scaling readiness plan

TAFSSA uses the Scaling Readiness Assessment and similar participatory tools to improve Innovation Package design, identify ways to co-design and leverage scaling approaches with other initiatives, and to identify bottlenecks and improve pathways to impact.[106] By doing so, TAFSSA contributes to CGIAR's healthy and diverse innovation portfolio. TAFSSA aims to apply the Innovation Packages and Scaling Readiness approach to 76-100% of the total Initiative innovation portfolio by the end of 2024. TAFSSA's Innovation Inventory includes eight Innovation Packages (IPs) that span Work Packages under which 16 innovations will be developed (detailed online in Annex 4.1, which also describes IP specific waves and tracks).

IPs include **(i)** multistakeholder leaning platforms, **(ii)** a support framework for farm and agricultural landscape diversification and rural service market innovations, **(iii)** options to reorganize food value chains and improve sustainable consumption **(iv)** plate-to-farm food system maps and related nutrition BCC innovations, **(v)** an evidence base for food accessibility and affordability policies, **(vi)** gender-sensitive solutions for aligning production with water resource endowments, **(vii)** baskets of options to reduce agriculturally-based air pollution, and **(vii)** improved climate services options. Within these IPs, 13 innovations are likely to be assessed.

Although scaling readiness assessments will be used in all WPs to identify obstacles to innovation and to facilitate dialogue and actions toward a more enabling scaling environment, WP2 in particular employs both the Scaling Readiness Assessment and ADOPT, the latter of which projects the potential scope of farmer adoption and tracks progress through MELIA activities. TAFSSA has flexibly allocated US$410,000 to implement the IPs and Scaling Readiness plans to ensure that activities and partnerships can adaptively respond to new innovations and scaling bottlenecks (2022: US$120,000; 2023: US$250,000; 2024: US$40,000). Dedicated activities, deliverables, indicators, and line items are included in the Management Plan, MELIA, and Budget Sections

5. Impact statements and end-of-Initiative (EoIO) outcomes

5. 1 Nutrition, health, and food security

Challenges and prioritization: Although the Green Revolution significantly boosted food production, South Asia's agrifood systems currently fail to ensure an adequate, accessible and affordable supply of all foods needed for SHDs.[107] Malnutrition is high,[108] and social, economic, and geographic inequalities limit the affordability of healthy diets in South Asia. Indeed, the poor may have more access to unhealthy foods.[109] TAFSSA's research and engagement is designed to inform strategies used by agriculture, nutrition, and social protection sectors to improve knowledge and strengthen access to affordable healthy diets.[110]

Research questions: WP1 asks how multi-stakeholder learning platforms can support agrifood systems transformation. **WP2** asks how landscape-level efforts can optimize the production diversity. **WP3** asks how food environments can support the consumption of nutritious food. **WP4** identifies primary determinants of dietary patterns, linking to evidence on BCC programs, social safety nets and gender-focused programs.

WP	Research / Activities	Outputs	Intermediate Outcomes	2024 Outcomes and Metrics
1	Strengthen agrifood system learning platforms. Generate integrated data on agriculture, markets, diets, and consumers.	**(1)** Multistakeholder learning platforms **(2)** "State of Food Systems" conference and report. **(3)** Scientific methods and tools, **(4)** open-access datasets, and **(5)** scientific papers, all addressing aspects of SHDs.	**(a)** Knowledge networks contribute to and sustain learning platforms. **(b)** Partners implement evidence-based food and nutrition program changes.	**EoIO 1.** Stakeholders engage with networks to inform 4+ policies / programs / market interventions. (Metrics: # of policies / practice / strategies). **EoIO 2.** Data informed actions implemented in 8+ of TAFSSA's learning locations (Metric: # of policies / practice / strategies). **EoIO 3.** Farmers **diversify production systems on at least 2.52 million hectares** (# of hectares reached by improved farming practices). **EoIO 6.** At least 10 local governments engage on efforts to reshape rural food environments to support access to affordable nutritious food (# of policies / practice / strategies) **EoIO 8.** >2 nutrition programs provide evidence-based guidance on sustainable healthy diets, reaching 1 million people (all women) (Metric: # of BCC programs that include content on unhealthy eating)
2	Farm trials and modeling to study the scope for integrated crop and animal diversification options	**(1)** Evidence informing extension to support production of nutritious foods. **(2)** A decision support toolkit supporting nutrition-sensitive landscapes.	**(a)** Farmers adopt diverse farming systems producing nutritious products.	
3	Food environment surveys and geospatial mapping of access to nutritious foods. Market experiments	**(1)** Farm output aggregation models encouraging diversified production of nutritious food groups. **(2)** Tools for food retail design to increase consumer demand for nutritious foods.	**(a)** Farm product aggregations models increasing production of diverse and nutritious foods. **(b)** Food retail environments reshaped to increase access and affordability of SHDs.	
4	Analyzing plate-to-farm dynamics, understanding historical shifts in food patterns, building evidence on BCC on SHDs, and assessing affordability of nutritious diets	**(1)** Plate-to-farm studies **(2)** Methods tool kits to support rapid analyses of dietary patterns. **(3)** Recommendations for BCC on unhealthy diets. **(4)** Tools, insights and recommendations addressing affordability. **(5)** Gender- and equity-focused tools, research papers.	**(a)** Insights on determinants of dietary practices; (b) stakeholder awareness on constraints to healthy diets. **(d)** BCC innovations supporting SHDs. **(e)** Improved social protection programs. **(f)** Gender-equity focused nutrition approaches in agrifood systems	

Partners: Key partners in this Impact Area are found in Annex 5.1 **Human resources and capacity development:** Team members include nutritionists, economists, anthropologists, value chain experts, and agronomists (see Section 9). Cross-disciplinary communication, teamwork, and collaborative research design skills will be prioritized for team members addressing this Impact Area (see Section 9.3).

5.2 Poverty reduction, livelihoods, and jobs

Challenges and prioritization: South Asia is home to one-third of the global population living in extreme poverty, with higher poverty among marginal farmers, farm laborers, and women and children.[111] The share of household food expenditures is high, and two-thirds of all households cannot afford a healthy meal.[112] Ensuring remunerative prices for farmers and affordable access to healthy foods for all consumers is essential. Efficient use of inputs, more smallholder bargaining, efficient value chains, and well-designed safety nets can help address these challenges. TAFSSA focuses on testing scalable strategies and innovations to increase farm incomes, empowering women and other marginalized groups, creating more jobs in the food economy, and linking with social safety nets to improve food access and affordability.

Research questions: WP1 asks how integrated agrifood systems data can strengthen evidence-based. **WP2** examines how public-private agricultural service provision innovations can create jobs and raise farmers' incomes. **WP3** explores implications of increased farmer bargaining power and participation in value chains; **WP5** assesses how grid-connected solar irrigation systems can create jobs.

WP	Research / Activities	Outputs	Intermediate Outcomes	2024 Outcomes and Metrics
1	Develop agrifood system-wide learning platforms. Identify data gaps, test new data capture methods, and co-create datasets.	**(1)**Tool kits to capture and interpret data pertaining to income, jobs, and safety nets.	**(a)** Improved social welfare programs and business models generating income.	**EoIO 1:** >1,000 stakeholders inform 4+ policies / programs / market interventions. (Metrics: # of policies / practice / strategies). **EoIO 2.** Data informed actions implemented in 8+ of TAFSSA's learning locations (Metric: # of policies / practice / strategies). **EoIO 4.** Service provision and extension systems improve farm mgt. & diversify production >1.16 million farmers (0.40 million women) (Metric: # of farmers using improved farming practices). **EoIO 5 .** Business models, better pricing, and/or shortened value chains benefit > 190,000 farmers (95,000 women) (# of people reached by aggregation model). **EoIO 6. 3+ food supply chains** reduce food waste and/or financial losses (Metric: # of supply chains) **EoIO 9.** Gender & equity focused nutrition approaches inform 2+ programs. (Metric: # of program strategies)
2	Public-private action research and scaling assessments evaluating farm services provision models.	**(1)** At least four public-private partnerships supporting business models overcoming bottlenecks to socially inclusive income generation.	**(a)** Entrepreneurial farm service options creating income (particularly for youth) and lowering farmers' production costs.	
3	Scoping review for study aggregation models for crops and animal products. Market experiments test alternative market development pathways for input, output provision / procurement.	**(1)** Farm produce aggregation models generating income from farm diversification. **(2)** VSMs**. (3)** Business models for increased participation of marginal groups in local seed production for non-cereal crops. **(4)** Tools for profitable retail design.	**(a)** Farmers and companies prioritize input and output product aggregation creating income and jobs. **(b)** Food supply chains reorganized to reduce waste and profit loss.	
4	Research on affordability of SHDs, inc. via social safety net programs.	**(1)** Tools, price indices, policy suggestions addressing affordability of healthy diets	**(a)** stakeholders exposed & use affordability-focused analyses in strategies to address SHDs.	
5	Scoping reviews, policy, and market experiments.	**(1)** Irrigation services provision models increasing affordable access to water and generating income from grid-connected solar pumps that sell electricity to the grid.	**(a)** Policies supporting irrigation services and grid-connected solar irrigation lower farmers' production costs and diversify income sources.	

Partners: Annex 5.2 lists the specific demand, scaling, and innovation partners delivering in this Impact Area. **Human resources and capacity development:** TAFSSA's team contributing to this Impact Area includes economists, value chain and business development specialists, and innovation system scientists, many of whom have interdisciplinary backgrounds and training (see section 9.1). Cross-disciplinary communication, teamwork, and collaborative research design skills will be prioritized for team members addressing this Impact Area (see Section 9.3)

5.3 Gender equality, youth, and social inclusion (GESI)

Challenges and prioritization: Social, economic, and geographic inequalities affecting women, youth, and under-represented groups are common in South Asia.[113] Agricultural activities by women and under-represented groups are often overlooked in the framing of research and collection of data,[114] with patriarchy, and cultural hegemony undermining inclusion efforts.[115] Out-migration has accelerated loss of youth from rural areas and agricultural feminization, heightening poverty and women's burdens.[116] Low women's empowerment also affects nutrition.[117]

Research questions: WP1 asks how co-creation of gender-disaggregated data can support evidence-based discourse for agrifood systems change. **WP2** considers how farming systems diversification creates opportunities for women and marginalized groups, and how farm services provision can increase equitable technology access. Models to increase women's empowerment at the farmgate are tested in **WP3**; **WP4** identifies gender- and social determinants of diets. **WP5** asks if regional agrifood systems can produce the foods required for culturally appropriate SHDs diets for men, women, youth, and children.

WP	Research / Activities	Outputs	Intermediate Outcomes	2024 Outcomes and Metrics
1	Key-informant interviews, hyperlink & network analysis	**(1)** Multistakeholder learning platforms and **(2)** flagship conference/report on "State of Food Systems in South Asia"	**(a)** Stakeholders make better informed decisions and actions toward socially inclusive agrifood systems.	**EoIO 1:** >1,000 stakeholders inform 4+ policies / programs / market interventions. (Metrics: # of policies / practice / strategies). **EoIO 2.** Data informed actions implemented in 8+ of TAFSSA's learning locations (Metric: # of policies / practice / strategies). **EoIO 4.** Service provision markets and extension systems accelerate improved farm mgt. & production diversification by >31.16 million farmers (10.40 million women) (Metric: Number of farmers using improved farming practices). **EoIO 5.** Business models, better pricing, and/or shortened value chains benefit > 190,000 farmers (95,000 women) (Number of women, and other
2	Participatory on-farm experimentation, participatory modeling and scenario analysis, business model design, testing, and scalability assessment.	**(1)** Evidence informing extension recommendations appropriate for men, women, and farmers from marginal groups. **(2)** 4+ public-private partnerships supporting inclusive farm services provision.	**(a)** Women and marginal groups experience increased exposure to decision tools and extension services for diversified production. **(b)** Farm service providers increase access to women and marginal groups.	
3	Scoping review, action research, and market and food retail experiments.	**(1)** Evidence on farm product aggregation models suitable for men, women, and marginal groups. **(2)** Business models increase participation of marginal groups in value chains. **(3)** Tools for food retail design.	**(a)** Farm product aggregation models reduce costs and improve income for women and marginalized farmers. **(b)** Consumers, especially women, experience more inclusive access to affordable SHDs.	
4	Scoping reviews of gender- and social equity-related determinants of SHDs.	**(1)** Gender-sensitive tools for studying determinants of SHDs. **(2)**. Evidence on structural barriers	**(a)** Nutrition behavior change programs use new tools and evidence to design more GESI activities. **(b)** Governments reshape social welfare programs	
5	Research on access to energy and	**(1)** Reports/papers on GESI policy & energy	**(a)** Women and marginal farmers in water-	

	irrigation by marginalized groups. Climate studies explicitly account for GESI.	solutions to address groundwater over- & underuse. **(2)** Gender-equitable scaling strategies for agricultural climate services.	abundant areas experience increased access to irrigation and generate income. **(b)** Climate services redesigned for GESI.	smallholders reached by aggregation model).

Partners: Annex 5.3 lists the specific demand, scaling, and innovation partners delivering in this Impact Area. **Human resources and capacity development:** Team members contributing to this Impact Area include gender specialists, economists, behavioral scientists, anthropologists, and innovation systems scientists (see Section 9.1). Cross-disciplinary communication, teamwork, and collaborative research design skills will be prioritized for team members addressing this Impact Area (see Section 9.3).

5.4 Climate adaptation and mitigation

Challenges and prioritization: South Asia experiences frequent extreme rainfall[118] and dry spells (due to changes in monsoon patterns),[119] which result in floods[120] and droughts in close spatial and temporal proximity. Climate change will affect South Asia's agriculture — irrigation in the region has already affected its climate,[121] and a warmer and wetter climate is projected for the future.[122] Air pollution, caused in part by CRB, further worsens drought impacts.[123] TAFSSA prioritizes equitable, resilient, and low-carbon development pathways through a combination of action research and policy tools to build climate-resilient farming enterprises, landscapes, and private-public partnerships. Informed by scoping reviews on ecological boundaries, TAFSSA generates insights to mainstream innovative energy solutions, carbon sequestration and GHG mitigation options, and climate service-based crop management advisories and insurance products. We equitably address underutilization of groundwater resources and extreme climate risks in the eastern IGP, while curbing groundwater decline & CRB emissions in the western IGP.

Research questions: WP1 asks how data systems can be strengthened to monitor, assess, and identify action items for building climate resilience and mitigating emissions. **WP2** asks how climate-resilient farms, landscapes, and public-private partnerships can be best configured to produce SHDs while reducing emissions. **WP5** then asks how tweaks in policies from the national- to local-levels and innovative energy solutions can be leveraged to induce behavioral change in smallholders toward climate resilient and low-emission farming practices.

WP	Research / Activities	Outputs	Intermediate Outcomes	2024 Outcomes and Metrics
1	Identify and fill data gaps with stakeholders through learning platforms.	**(1)** Learning platforms addressing adaptation and mitigation. **(2)** Open-access data sets. **(3)** Scientific papers on low-carbon production practices.	**(a)** Previously siloed actors and/or knowledge networks have access to information to make improved adaptation and mitigation decisions.	**EoIO 1.** 4 TAFSSA's partners engage with networks reaching >1,000 stakeholders & decision-makers to inform 4+ policies / programs / market interventions. (Metrics: # of policies / practice / strategies). **EoIO 2.** Data informed actions supporting agrifood systems are implemented in 8+ of TAFSSA's learning locations (Metrics: # of policies / practice / strategies). **EoIO 10:** Farmers implement improved farming practices and/or diversify production on 1.42+ (EoI 3) million hectares, averting 16.24 million tons CO_2eq. GHGs. (Metrics: Million tons CO_2 eq. averted)
2	Farm- and landscape-level participatory experimentation and scenario analysis under current and future climates.	**(1)** Validated options for low-environmental impact farming systems diversification that inform extension recommendations. **(2)** Decision support tool kit for nutrition-sensitive, agrobiodiverse, resilient, and low-carbon farming landscapes.	**(a)** Farmers experience increased exposure to decision tools and extension services related to climate adaptation and mitigation in the context of diversified production. **(b)** Energy-efficient farm machinery services are made affordable.	
5	Scoping reviews, ecological footprint modeling, policy experiments, scaling assessments, and ex post adoption studies	**(1)** Scoping review, papers, and datasets on (a) ecological boundary assessments, (b) groundwater over- and underuse, and (c) climate adaptation insurance. **(2)** Ecological footprint assessments. **(3)** Policy instruments and cost assessments to reduce CRB, sequester carbon, and limit groundwater overdraw. **(4)** Strategies to increase farmers' use of weather forecast-based farm advisories. **(5)** Options for improved flood and drought insurance products.	**(a)** Governments integrate insights in sustainable water use and low-emission agriculture into core policies. **(b)** Private-public partnerships bring advisories, insurance, and low-emission practices to farmers.	

Partners: Annex 5.4 lists the specific demand, scaling, and innovation partners delivering in this Impact Area. **Human resources and capacity development:** TAAFSSA's team includes systems agronomists, modelers, GIS, and RS experts, and landscape ecologists (see Section 9.1). Cross-disciplinary communication, teamwork, and collaborative research design skills will be prioritized for team members addressing this Impact Area. (see Section 9.3)

5.5 Environmental health and biodiversity

Challenges and prioritization: Leveraging ambitious partnerships across government, energy and food industries, and environmental conservation and public health sectors, we identify and facilitate opportunities to limit unsustainable groundwater use,[124] mitigate agriculturally-based air pollution,[125] increase productivity and functional agrobiodiversity, and maintain or augment ecosystem services. These challenges have informed targeted research in learning site with groundwater overuse (Haryana, India; Punjab, Pakistan and the Indus Basin; NW Bangladesh) and underuse (Bihar, India, the Nepali Terai), and places where air pollution is prominent (Haryana, India, and Punjab, Pakistan). Low cropping intensities, limited input use, and weak markets in the Himalayas (Karnali Province, Nepal), southern Bangladesh, and Odisha and Assam (India) are challenges, but offer opportunities to augment ecosystem services while increasing agrobiodiversity.

Research questions: WP1 asks how integrated agrifood systems data generation, availability, and access can be strengthened to address environmental concerns across diverse sectors. **WP2** asks how crop and animal diversity can be managed to conserve resources while mitigating GHGs. At the landscape level, **WP2** enquires how foodsheds, watersheds, and airsheds can be collectively managed to limit land and groundwater degradation while mitigating air pollution. **WP3** assesses how food supply chains can be made more sustainable and profitable by reducing waste. Finally, **WP5** explores alternative regional scenarios to supply healthy diets while limiting ecological footprints and examines how energy and food policies can be managed to curtail groundwater overuse. **WP5** also addresses environmental health by investigating how CRB can be mitigated to reduce GHGs and groundwater overdraft.

WP	Research / Activities	Outputs	Intermediate outcomes	2024 Outcomes and metrics
1	Secondary + remotely sensed agricultural production and landscape-level data collection.	**(1)** Multistakeholder learning platform, **(2)** Integrated datasets, **(3)** "State of South Asian Food Systems" conference/report.	**(a)** Knowledge networks use evidence to address environmental health. **(b)** Stakeholders implement evidence-based changes toward environmental health.	**EoIO 1:** 4 partners engage with networks reaching >1,000 stakeholders & decision-makers to inform 4+ policies / programs / market interventions. (Metrics: # of policies / practice / strategies). **EoIO 2:** Data informed actions supporting agrifood systems are implemented in 8+ of TAFSSA's learning locations (#: Number of policies / practice / strategies). **EoIO 3.** Farmers implement improved farming practices and/or diversify production systems on at least 1.24 million hectares (Metric: # of hectares reached by improved farming practices).
2	Assess farming systems (a) resource use efficiencies (RUE), (b) potential for sustainable groundwater use, (c) agrobiodiversity and ecosystem services	**(1)** Evidence informing farm and landscape management recommendations. **(2)** Decision support tool kit for nutrition-sensitive, agrobiodiverse, resilient, and low-carbon farming landscapes.	**(a)** Farmers adopt diversified production systems that limit environmental degradation and support increased functional agrobiodiversity.	
3	Assessment of the economic and social challenges and recycling opportunities for food waste.	**(1)** VSMs depicting sustainability indicators for agrifood supply chains.	**(a)** Supply chains reorganized to reduce food waste.	
5	Ecological footprint analysis, energy and food policy analysis linked to groundwater, experiments to limit residue burning.	**(1)** Scoping reviews, papers, and datasets on (a) ecological boundary assessments, (b) groundwater over- and under-use. **(2)** Policy instruments and cost assessments.	(**a)** Governments integrate insights in sustainable water use into core policies	

Partners: Annex 5.5 lists the specific demand, scaling, and innovation partners delivering in this Impact Area. **Human resources and capacity development:** TAFSSA's team includes systems agronomists, environmental geographers, and groundwater hydrological modelers, and behavioral economists (see Section 9.1). Cross-disciplinary communication, teamwork, and collaborative research design skills will be prioritized for team members addressing this Impact Area (see Section 9.3).

6. Monitoring, evaluation, learning, and impact assessment (MELIA)

The goals of TAFSSA are to increase the uptake and impact of evidence and evidence-based tools and innovations by diverse communities of practice and policy in South Asia. Intermediate outcomes include exposure to TAFSSA tools and innovations, as well as exposure and engagement of stakeholder communities across the production-to-consumption continuum with data, tools, and evidence. These outputs will be delivered jointly by TAFSSA and our broad network of partners.

We draw on a combination of approaches to capture and track the delivery of our outputs, intermediate outcomes and end-of-initiative outcomes. These approaches will capture the production of, engagement with, and uptake and scaling of tools, insights and recommendations by partners, as well as the influence and impact of our actions and outputs. We will ensure all MELIA processes also contribute to shared ownership of the TAFSSA mission, because a shared common commitment to the vision and program of TAFSSA is essential to accountability and delivery. These plans are described below in sections 6.1.1 and 6.1.2

6.1 Result framework

Nutrition, health and food security	**Poverty reduction, livelihoods and jobs**	**Gender equality, youth and social inclusion**	**Climate adaptation and mitigation**	**Environmental health and biodiversity**
Collective global 2030 targets				
The collective global 2030 targets are available centrally here to save space.				
Common impact indicators that TAFSSA will contribute to and provide data toward				
#people benefiting from relevant CGIAR innovations	*#poor people benefiting from relevant CGIAR innovations*	*#women benefiting from relevant CGIAR innovations*	*#tonnes CO2 equivalent emissions*	*#ha under improved management*

Action Area Outcomes	Action Area Indicators
RAFS 1 - Smallholder farmers use resource-efficient and climate-smart technologies and practices to enhance their livelihoods, environmental health and biodiversity	RAFS 1.1 Number of resource-efficient and climate-smart technologies at stage IV (uptake by next user), disaggregated by type
RAFS 2 - Research and scaling organizations enhance their capabilities to develop and disseminate RAFS-related innovations	RAFS 2.1 Number of organizations
RAFS 3 - Public and private financial resources are invested to fund climate-smart business models.	RAFS 3.1 Total amount (US$) invested in climate smart business models.
ST & RAFS 1 - Smallholder farmers implement new practices that mitigate risks associated with extreme climate change and environmental conditions and achieve more resilient livelihoods	ST RAFS 1.1 Number of smallholder farmers who have implemented new practices that mitigate climate change risks, disaggregated by gender and type of practice

ST & RAFS 2 - National and local governments utilize enhanced capacity (skills, systems and culture) to assess and apply research evidence and data in policy making process	ST RAFS 2.1 Number of policies/ strategies/ laws/ regulations/ budgets/ investments/ curricula (and similar) at different scales that were modified in design or implementation, with evidence that the change was informed by CGIAR research
ST & RAFS & GI 1 Women and youth are empowered to be more active in decision making in food, land and water systems	ST RAFS GI 1.2 Number of women, youth and people from marginalized groups who report input into productive decisions, ownership of assets, access to and decisions on credit, control over use of income, work balance, and visiting important locations
ST 2 - Consumers have the information, incentives and wherewithal to choose healthy diets.	ST 2.1 Diet quality score
ST 3 - Governments and other actors take decisions to reduce the environmental footprint of food systems from damaging to nature positive.	ST 3.1 Area of land under improved mitigation plans (or area that is decreasing in net carbon emissions – more ambitious and longer term)
	ST 3.2 Area under improved water use plans (or water use efficiency measures – more ambitious and longer term)
	ST 3.3 Trends in measures of non-point pollution where available
ST 4 - Food system markets and value chains function more efficiently, equitably, and sustainably and lead towards healthier diets	ST 4.1 Number of commodity value chain x country combinations that use tested innovations to improve efficiency, inclusion, sustainability and nutrition objectives
	ST 4.2 Gaps between farm/processor gate and consumer prices (with some measures focused on smallholder farmers if possible)
	ST 4.3 Domestic market price integration, both spatial and temporal
	ST 4.5 Trends in relative prices of healthy to unhealthy foods
GI 7 - Farmers have access to and use climate-resilient, nutritious, market-demanded crop varieties	GII 7.1 Number of farmers who grow climate-smart crop varieties, disaggregated by gender.
	GII 7.2 Number of farmers who grow crop varieties with increased nutritional content, disaggregated by gender.
	GII 7.3 Area weighted average age of varieties in Farmers' fields

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
End of initiative outcomes (each EoIO is result of activities either in one or via multiple Work Packages)										
Outcome	**EoIO 1.** TAFSSA's partners engage with networks reaching at least 1,000 stakeholders and decision-makers to inform 4+ policies/programs and/or market interventions aiding in agrifood systems transformation.	Policies / practice / strategies People (stake-holders)	Number	Knowledge network scoping; stakeholder interviews; policy /document review,	Annual + end line	Regional, national, subnational	n/a	n/a	4 policies and 1,000 people	2024

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
				meeting minutes, participant lists						
Outcome	**EoIO 2.** Data informed actions supporting agrifood systems are implemented in at least 8 of TAFSSA's learning locations.	Number of policies / practice / strategies	Number	Knowledge network scoping; stakeholder interviews; policy / document review	Annual + end line	Regional, national, subnational	n/a	n/a	8	2024
Outcome	**EoIO 3.** Farmers implement improved farming practices and/or diversify production systems on at least 1.42 million hectares.	Hectares reached by improved farming practices	Number	Primary surveys of farmers; secondary sub-national level data from governments	Annual + end line	Sub-national	n/a	n/a	1.42 million ha	2024
Outcome	**EoIO 4.** Innovations in entrepreneurial rural service provision markets and public and private extension systems accelerate uptake of improved farm management practices and production diversification by at least 1.16 million farmers including 0.40 million women.	Farmers using improved farming practices	Number (by gender)	Primary surveys of farmers; secondary sub-national level data from governments	Annual + end line	Sub-national	n/a	n/a	1.16 million farmers (0.42 million women)	2024
Outcome	**EoIO 5.** Business models supporting farm product aggregation, better pricing for farmers at the farmgate, and/or shortened value chains benefit at least 190,000 farmers (95,000 of whom will be women).	Smallholders reached by aggregation models	Number (by gender)	Stakeholder survey	Annual + end line	sub-national	n/a	n/a	190,000 farmers (95,000 women)	2024

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
Outcome	**EoIO 6.** At least three food product supply chains are targeted to reduce food waste and/or financial losses for food distributers, processors, and/or retailers	Food supply chains	Number	Supply chain survey	End line	sub-national	n/a	n/a	3	2024
Outcome	**EoIO 7.** At least 10 local governments engage on efforts to reshape rural food environments to support access to affordable healthy and nutritious food.	Policies / practice / strategies	Number	Policy/document review; stakeholder interviews	Annual + end line	Regional, national, subnational	n/a	n/a	10	2024
Outcome	**EoIO 8.** At least **two nutrition behavior change programs** operated by provide evidence-based guidance to consumers on sustainable healthy diets, reaching 0.48 million people (all women).	BCC programs that include content on unhealthy eating	Number	Initiative monitoring database Stakeholder survey; Policy/document review;	Annual + end line	Sub-national	n/a	2022	2	2024
Outcome	**EoIO 9.** Gender and equity focused nutrition approaches are included in at least two agrifood systems linkage and/or social protection programs	Program strategies	Number	Initiative monitoring database; Stakeholder survey; Policy/document review	Annual + end line	Sub-national	n/a	2022	2	2024
Outcome	**EoIO 10:** Farmers implement improved farming practices and/or diversify production on 1.42 million hectares (from EoIO 3), averting 16.24 Mt CO_2eq. GHGs.	CO_2 eq. averted	Million tons	Primary surveys with farmers, governmental reports, emissions modeling	Annual + end line	Sub-national	n/a	2022	1.42 million tons	2024
Work Package 1: Inclusive learning platforms and public data systems										

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
Output	**O1.1.** Multistakeholder learning platforms built at regional, national, sub-national level	Stakeholder platforms	Number	Initiative monitoring database	Quarterly	Regional, national, subnational	n/a	n/a	13	
Output	**O1.2** Conference hosted on "State of Food Systems in South Asia" **and** all other platform engagements (meetings, events)	Conferences and events	Number	Initiative monitoring database	Quarterly	Regional, national, subnational	n/a	n/a	(13 x 3) + 1	2024
Output	**O1.3** Data framework and methods tool kits set-up for regionally-relevant integrated agriculture-nutrition data bases	Information products	Number	Initiative monitoring database	Annual	Regional, national, subnational	n/a	n/a	5	2024
Output	**O1.4** Open-access, integrated agrifood systems database	Information products	Number	Initiative monitoring database	Annual	Regional, national, subnational	n/a	n/a	10 (each learning location)	2024
Output	**O1.5** Scientific papers on data framework, data availability, and analyses of available datasets	Peer-reviewed journal papers	Number	Initiative monitoring database	Annual	Regional, national, subnational	n/a	n/a	6	2024
Output	**O1.6** Data use cases to support better understanding of food systems and nutrition	Data use cases	Number	Initiative monitoring database	Annual	National, subnational	n/a	n/a	4	2024
Outcome	**IO1.1** Previously siloed actors and or knowledge networks will engage to contribute to a joint learning platform on agrifood systems.	Stakeholders reached and engaged	Number	Knowledge network scoping; stakeholder interviews	Annual	Regional, national, subnational	n/a	n/a	1000	2024
Outcome	**IO 1.2** Partners will deploy new tools and methods of data collection.	Partners using TAFSSA data innovations	Number	Initiative monitoring database and stakeholder interviews	Annual	Regional, national, subnational	n/a	n/a	20	2024
Outcome	**IO1.3** Stakeholders will co-identify evidence gaps and identify approaches to address them. Jointly published data gap	Published information products	Number	Knowledge network scoping; stakeholder interviews	Annual	Regional, national, subnational	n/a	n/a	5	2024

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
	reports and policy recommendations									
Work Package 2: Transforming agroecosystems and rural economies to boost income, generate jobs, and support diversified food production within environmental boundaries										
Output	**O2.1** Scientific evidence informing the development of extension recommendations and materials tailored and appropriate for men, women, and farmers from marginal groups to build profitable, nutritious, and equitable farming enterprises.	Information products, peer-reviewed publications and extension recommendations	Number	Initiative monitoring database	Annual	Regional, National, Sub-national	n/a	n/a	10	2024
Output	**O2.2.** Decision framework for co-development of agroecological landscape management	framework	Number	Initiative monitoring database	Annual	Regional, National, Sub-national	n/a	n/a	1	2024
Output	**O2.3.** Landscape and watershed level groundwater sustainability assessments	groundwater sustainability assessment	Number	Initiative monitoring database	Annual		n/a	n/a	3	2024
Output	**O2.4** Open-access peer-reviewed papers, reports, and datasets	Information products/peer-reviewed papers/data sets	Number	Initiative monitoring database	Annual	Regional, National, Sub-national	n/a	n/a	10	2024
Output	**O2.5** PPPs developed to aid in generating farm services business models	PPP models implemented	Number	Initiative monitoring database, company records	Annual	Regional, National, Sub-national	n/a	2022	4	2024
Outcome	**IO 2.1** Stakeholders (including public & private extension), policy makers, extension services use decision tools, innovations & recommendations.	Farmers reached by TAFSSA decision tools and extension services,	People (gender)	Primary surveys of farmers, key informant surveys with policy makers,	Annual	Sub-national	n/a	n/a	1,000	2024

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
		disaggregated by gender		company records, governmental documents, training and workshop rosters						
Outcome	**IO2.2.** Public and private extension systems apply decision tools, innovations and service to support diversified production systems.	Public and private extension systems applying decision tools and extension services, disaggregated by gender	People (gender)	Primary surveys of farmers; secondary sub-national level data from governments	Annual	Sub-national	n/a	n/a	25	2024
Outcome	**IO2.3.** Farming services (including machinery) are made accessible, affordable, and socially inclusive	Farm service providers offering services	People (gender)	Primary surveys of farmers; secondary sub-national level data from governments, service provider informant interviews and records	Annual	Sub-national	n/a	n/a	2,000	2024
Work Package 3: Improving access and affordability to sustainably produced healthy foods through evidence and actions across the food system										
Output	**O3.1.** Evidence synthesis of viable output aggregation models to encourage diversification and sustainable production of nutritious foods by men, women, and marginal groups.	Information products/peer-reviewed papers/data sets	Number	Initiative monitoring database	Annual	Regional	n/a	n/a	1	2022

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
Output	**O3.2.** Smallholder aggregation models to encourage diversification, fallow intensification and landrace promotion	Innovations (business models)	Number	Initiative monitoring database; crowd sourcing	Annual	Sub-national	n/a	n/a	25 (5+10+10)	2024
Output	**O3.3.** Business models for Increased participation of marginal groups in local seed production for non-cereal crops.	Innovations (business models)	Number	Initiative monitoring database; crowd sourcing	Annual	Sub-national	n/a	n/a	4	2024
Output	**O3.4.** Value stream map of food supply chain	Information products/peer-reviewed papers/data sets	Number	Stakeholder survey; inventories	End line	Regional	n/a	n/a	9 (3+3+3)	2024
Output	**O3.5.** Geospatial maps of consumer (specifically poor people) access to food environments delivering healthy and nutritious food in urban and rural markets	Maps	number	Initiative monitoring database	Annual	Sub-national	n/a	n/a	3	2024
Output	**O3.6.** Tools for food retail design to increase consumer demand for sustainably produced and nutritious foods	Innovations (food retail tools)	Number	RCT	End line	National	n/a	n/a	1	2024
Output	**O3.7** Open-access peer-reviewed papers, reports, and datasets	Information products/peer-reviewed papers/data sets	Number	Initiative monitoring database	Annual	Regional	n/a	n/a	6	2024
Outcome	**IO 3.1.** Supply chain actors are aware about opportunity cost of food waste	Supply chain actors	Number	Supply chain survey	Annual	sub-national	n/a	n/a	3 supply chains	2024
Work Package 4: Behavioral determinants of sustainable healthy diets										
Output	**O4.1.** Primary research papers and maps on plate-to-farm	Information products (including	Number	Initiative monitoring database	Annual	National, subnational	n/a	n/a	5	2023

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
	studies of major food groups, including unhealthy foods	peer-reviewed papers and maps)								
Output	**O4.2.** Methods to support rapid analyses of dietary patterns & drivers	Methods	Number	Initiative monitoring database	Annual	National	n/a	n/a	3	2023
Output	**O4.3.** Evidence summaries on addressing consumption of unhealthy foods in behavior change programs	Information products (including peer-reviewed papers and maps)	Number	Initiative monitoring database	Annual	Regional	n/a	n/a	1	2023
Output	**O4.4.** Practice insights and RCT-based recommendations on behavior change on unhealthy diets.	Information products (including peer-reviewed papers and maps)	Number	Initiative monitoring database	Annual	Regional, national	n/a	n/a	2	2023 2024
Output	**O4.5.** Gender- and equity-focused methods, research papers, and insights on improving diets.	Information products (including peer-reviewed papers and maps)	Number	Initiative monitoring database	Annual	Regional	n/a	2022	4	2024
Output	**O4.6.** Tools, price indices and policy recommendations on addressing affordability of healthy diets	Information products (including peer-reviewed papers and indices) on affordability	Number	Initiative monitoring database	Annual	National, subnational	n/a	2022	4	2024
Out-comes	**IO4.1.** Engagement and awareness on healthy diets increased across sectors through regional, national and subnational learning networks.	Stakeholders engaged around plate-to-farm research	Number	Initiative monitoring database Stakeholder survey	Annual + end line	Regional, national, subnational	n/a	2022	1000	2024

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
Out-comes2	**IO4.2** Stakeholders are exposed to and use affordability-focused analyses in strategies to address nutritious diets	Stakeholders aware of affordability challenges	Number	Initiative monitoring database Stakeholder survey	Annual + end line	National	n/a	2022	400	2024
Work Package 5: Building resilience and mitigating environmental impact										
Output	**O5.1.** Scoping reviews on ecological boundaries and historical policy perspectives	Knowledge products and made publicly available	Number	Initiative monitoring database	Annual	India, Nepal, Bangladesh, Pakistan	n/a	n/a	2	2024
Output	**O.5.2.** Ecological footprint assessments and sustainable production scenarios for healthy diets	Methods and knowledge products completed and made publicly available	Number	Initiative monitoring database	Annual	India, Nepal, Bangladesh, Pakistan	n/a	n/a	2	2024
Output	**O5.3.** Open source, scientific papers, reports, and policy briefs informing energy solutions to address groundwater under and overuse	Knowledge products and made publicly available	Number	Initiative monitoring database	Annual	India, Nepal, Bangladesh, Pakistan	n/a	n/a	5	2024
Output	**O5.4.** Proof of concept for carbon sequestration / credits / trading for minimizing residue burning	Tools, methods and innovations completed and made publicly available	Number	Initiative monitoring database	Annual	India	1 (Happy Seeder survey)	2021	3	2024
Output	**O5.5.** Scaling strategies to increase gender-equitable farmers' use of dynamic weather-forecast based farm advisories.	Innovations and strategies developed and made publicly available	Number	Initiative monitoring database	Annual	Nepal, Bangladesh	n/a	n/a	3	2024
Output	**O5.6.** Options for design of improved flood and drought insurance products targeting	Innovations and strategies developed and	Number	Initiative monitoring database	Annual	India, Bangladesh	2	2022	4	2024

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
	farmers investing in diversified farming enterprises.	made publicly available								
Work Package Out-comes	**O5.7.** Governments and public-private partnerships/networks are reached by TAFSSA outputs	Stakeholders reached by TAFSSA outputs	Number	Initiative monitoring database; stakeholder interviews	Annual	India, Nepal, Bangladesh, Pakistan	n/a	n/a	50	2024
Work Package Out-comes	**O5.8.** Governments integrate insights in climate and farm advisories, sustainable water use, clean air and low-emission agriculture into core policies	Policies / budgets / strategies / regulations modified	Number	Document review, stakeholder interviews Initiative monitoring database	Annual	India, Nepal, Bangladesh, Pakistan	2	2022	6	2024
Work Package Out-comes	**O5.9.** Private sector integrates insights in climate and farm advisories, sustainable water use, clean air and low-emission agriculture into their business models and investment strategies	Policies / budgets / strategies / regulations modified	Number	Document review; stakeholder interviews, Initiative monitoring database	Annual	India, Nepal, Bangladesh, Pakistan	1	2022	20	2024
Innovation Packages and scaling readiness										
Output	**OS.1** Innovation Profile and Scaling Ambition Report (Light Track)	Core Innovations for which scaling ambition, vision of success and roadmap have been co-created, agreed-upon and documented	Number	Initiative reports	Once	India, Nepal, Bangladesh, Pakistan	n/a	2022	12	2022 (1 light track), 2023 (9 light + standard track), 2024 (2 light)

Result type	Result	Indicator	Unit	Data source	Frequency	Geographic scope	Baseline value & source	Baseline year	Target value	Target year
Output	**OS.2** Evidence-based Scaling Strategies (Standard Track)	Innovation Packages that have undergone evidence-based and quality controlled/ validated Scaling Readiness assessments informing innovation and scaling strategies	Number	Initiative reports	Once	India, Nepal, Bangladesh, Pakistan	n/a	2022	5	2022 (0), 2023 (5 innovat-ions that complete both light and standard track assess-ments, 2024 (0)

6.2 MELIA plan

6.2.1 Monitoring, evaluation, and learning

For **MEL**, we rely on two components:

1. **Proactive internal tracking/monitoring of activities and outcomes, external sharing, and strategic reviews**: We will maintain an internal database of activities, data, and evidence outputs and collaborations. This will allow us to track our progress internally and gather insights from collaborators on their progress. Our internal Initiative monitoring database will include information on activities and outputs led by CGIAR as well as on partner activities and outputs, including from scaling and reach databases maintained by partner organizations and government. Our updates will be disseminated as routine updates to core stakeholders and partners every six to eight weeks and to broad stakeholders via an external quarterly newsletter. Research-related surveys and other data sources from WPs on exposure to and uptake of innovations and tools by next-users will also be part of our Initiative monitoring database.

2. **Internal learning to support assessments of progress toward outputs and intermediate outcomes**: We will conduct a mid-term process assessment of progress toward outputs and intermediate outcomes, focusing on questions of relevance and reach of our outputs (data, evidence, and innovations) to next-users. The assessment will include meetings with partners and key food systems community members that are focused on listening to their inputs. It will also combine insights from listening engagements with internal monitoring data (above) to critically examine factors that either enabled or hindered **(a)** roll-out of collaborative activities and partnerships, **(b)** development of critical evidence and data outputs, and **(c)** engagement of agrifood system stakeholders in all our geographies. This focused mid-cycle learning assessment will be supported by an external facilitator and commence in Q2 of 2023 before culminating in Q3 2023 (in mid-2023), thus allowing for mid-program revisions, as needed.

   The process assessment will generate insights about common assumptions across work packages, and specific assumptions within work packages. For example, the ability to access data from multiple systems is a common assumption underpinning research across work streams, as is being able to mitigate pandemic-related data collection challenges. Similarly, being able to effectively engage government and private stakeholders around the entire demand-innovation-scaling spectrum are common assumptions, while engaging specific implementers around implementing behavior change innovations related to healthy diets is relevant only to WP4.

6.2.2 Impact assessment plans

For **impact assessment** we will conduct inte**rnal impact assessments of key tools and innovations as part of embedded research** in our Work Packages. These will include internal assessments on the use of data and evidence in our sub-geographies as part of our stakeholder and network monitoring in WP1. Specific assessments of the uptake of innovations and tools by direct end-users in the farming and value chain community in WP2 and 3 will rely on a range of methods, including primary surveys, remote-sensing information, governmental reports, and geo-spatial analysis to capture certain types of technology adoption assessments, targeting, and crop performance forecasting. The testing of innovations focused on unhealthy foods both in retail environments and with consumers in WP3 and WP4, as well

as proof-of-concept studies for air pollution measures in WP5, will use randomized experiments. We will also use *ex-post* impact and GHG simulation modeling to assess impacts on climate change and environmental indicators from WP2 and WP5.

For **external impact assessment of the overall Initiative, and contingent on adequate funding, we will commission an assessment by an external team, also supported by the CGIAR Evidence** team as needed. This Initiative-level impact assessment will focus on exposure to and use of data, tools/methods, innovations, and evidence for food systems transformation across a wide variety of actors. **This assessment will use our own baseline review of knowledge networks and stakeholder evidence use and needs, along with baseline surveys and other assessments that are done across WPs.** It will focus on the role of TAFSSA and its partners as both active members of the agrifood systems stakeholder community and change agents in a dynamic policy community[cxxvi].

6.3 Planned MELIA studies and activities

Type of MELIA study or activity	Result or indicator title that the MELIA study or activity will contribute to.	Anticipated year of completion	Co-delivery of planned MELIA study with other Initiatives	How the MELIA study or activity will inform management decisions and contribute to internal learning
MELIA				
Information product & innovation tracker & quarterly review meetings	All outputs	Quarterly	None*	Progress tracking and team reviews support internal reviews to strengthen processes, assess challenges and facilitators.
Event and uptake database & quarterly review meetings	All outputs	Quarterly	TBD*	Progress tracking and team review meetings will inform stakeholder engagement for demand creation and scaling
Mid-term process assessment inc. listening workshops	All outputs and all Work Package specific intermediate outcomes (IOs)	2023	TBD, likely with National Policies*	Mid-term process assessment will help shape research, demand-creation and scaling strategies
Scaling Readiness Assessment Study	OS1 and OS2 (please see the Results Framework, Section 6.1)	2023 (6) and 2024 (2)	Potential Innovation Package linkages found in Annex 4.1.	Scaling Readiness Assessments inform design, implementation & monitoring of innovation and scaling strategy. Scaling readiness metrics can support Initiative innovation portfolio management system.
Impact assessment				
Baseline stakeholder surveys/ interviews	All policy and program outcomes (Bangladesh, India, Nepal, Pakistan)	2022	TBD, likely with National Policies*	Inform development of WP1 learning platforms and overall engagement strategy for TAFSSA
End-line stakeholder surveys/interviews	All policy and program outcomes (Bangladesh, India, Nepal, Pakistan)	2024	TBD*	End-line impact assessment, sustainability of knowledge platforms, inform next phase of TAFSSA
Lean annual farmer surveys	Outcomes for WP2 and WP5 (Bangladesh, India, Nepal)	Annual	TBD, likely with EiA and SI-MFS, and GI Initiatives.*	Farmer surveys will inform WP2 and WP3 strategies on uptake of farming services and further scaling
Supply chain actor surveys	Outcomes for WP3 (Bangladesh, India)	2022; 2024	TBD, likely with Re-MVC	Supply chain actor surveys will shape strategies and inform scaling
Randomized experiments	Focused outcomes in WP3 and WP4 (Nepal, India) on unhealthy foods	2023, 2024	TBD, likely with SHiFT	Inform uptake and scaling potential for innovations focused on reducing consumption of unhealthy foods

Stakeholder surveys with nutrition program implementers	Outcomes for WP4 (Bangladesh, India, Nepal, Pakistan)	2022; 2024	TBD, likely with SHiFT.*	Implementer surveys will inform current status (2022) and impact (2024) of integration of content on unhealthy foods and sustainable dietary practices
Policy analysis and document review	Outcomes for WP1, WP4 and WP5 (Bangladesh, India, Nepal, Pakistan)	2022; 2024	TBD, likely with National Policies*	Policy analysis will inform policy-focused scaling strategies and demand creation for all WPs

* To be determined (TBD) during the Initiatives' inception phase.

7 Management plan and risk assessment

7.1 Management plan

TAFSSA's management plan is built on three pillars and is grounded in three principles: **(i)** collective leadership and responsibility, **(ii)** mutual respect, and **(iii)** a learning mindset.

1. **A management structure for effective delivery**: TAFSSA will be led by two highly experienced senior scientists as Initiative co-leads, together with Work Package co-leads, creating a leadership circle that has complete technical expertise and regional experience across our portfolio. The team will ensure technical coherence, timely delivery of quality research, and grounded partner engagement. A management unit composed of project and finance management staff (with one lead project manager and sub-managers and financial staff in each TAFSSA country) will support work planning, progress tracking, and fiscal management. Given the importance of national engagement in TAFSSA's TOC, we will appoint internal "ambassadors" to ensure all four countries are well-supported.

2. **Efficient and agile management:** Effective portfolio delivery requires deep work and active connections across WPs and with other initiatives and partners. A schedule of routine within- and across-team engagements using technology communication platforms will create required connections. Our cadence of internal engagements will create time for annual work planning, as well as deep research and partner engagement. Project management staff will support routine internal meetings with relevant MELIA data, alongside other activity- and budget- tracking to ensure timely delivery of outputs.

3. **Internal learning:** We will integrate diverse forms of internal learning to enable effective performance along with a supportive people-centered Initiative team culture. Insights compiled from our MELIA processes and discussed at biannual internal learning workshops will review progress, assess internal and external conditions affecting activities, and devise strategies to overcome risks. Annual "deep listening" engagements with key stakeholders (national researchers, governments, private and non-government partners, civil society, and funders) and discussion of MELIA results will help take stock of TAFSSA's relevance, identify emerging priorities, and implement adaptive management.

7.2 Summary management plan

Start Date: Jan. 2022 **Work Packages (WPs)**	**Lead organization**	**Timelines**												**Key deliverables** (A complete summary management plan with detailed activities for each Work Package, MELIA, and overall project management can be found in Annex 7.2)
		2022				2023				2024				
		Q 1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q 4	
WP1: Main deliverables	CGIAR			**1**			**2**			**3**				1. Multistakeholder regional, national, and sub-national learning platforms strategy and launch, continuation 2. Agrifood Systems data gap map, integrated open-access database and associated knowledge products 3. Flagship conference and *State of food systems in South Asia: exemplar integrated and equity-focused datasets to support evidence-based decisions and actions*
WP2: Main deliverables	CGIAR WF					**1**		**2**			**3**			**1.** At least four public-private partnerships supporting farm services provision business models overcoming innovation bottlenecks to socially inclusive income generation **2.** Decision support tool kit supporting governments and communities in managing nutrition-sensitive landscapes **3.** Scientific evidence informing the development of extension recommendations and materials tailored and appropriate for men, women, and farmers from marginal groups to build profitable, nutritious, and equitable farming enterprises.
WP3: Main deliverables	CGIAR				**1**					**2**		**3**		**1.** Smallholder aggregation models (SFLF, FPOs, cooperatives, etc.) for diversification **2.** VSM of selected food supply chain in delivering healthy and nutritious food **3.** Tool kit for analyzing retail environment using photography/videography
WP4: Main deliverables	CGIAR					**1**			**2**			**3**		**1.** Papers on dietary patterns and plate-to-farm maps on key food groups **2.** Evidence summaries and practice insights on addressing consumption of unhealthy foods in nutrition programs

Start Date: Jan. 2022	**Lead organization**	**Timelines**												**Key deliverables** (A complete summary management plan with detailed activities for each Work Package, MELIA, and overall project management can be found in Annex 7.2)
Work Packages (WPs)		2022				2023				2024				
		Q 1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q 4	
														3. Policy recommendations to support achievement of affordable nutritious diets
WP5: Main deliverables	CGIAR				**1**				**2**			**3**		**1.** Innovative low particulate and GHG emission agricultural practices and services provision. **2.** Analysis of social and ecological drivers, environmental impacts, and ecological boundaries of agrifood system and sustainable future pathways **3.** Logic and scaling assessment for climate services including dynamic weather-based advisories and insurance products for public and private partners.
Innovation Packages and Scaling Readiness	CGIAR						**1**						**2**	**1.** Eight documented scaling ambition, vision of success and roadmap for use of Scaling Readiness for selected 13 priority Core Innovations (Light Track). **2.** Five evidence-based Scaling Readiness assessment reports and related scaling strategies for Innovation Packages (Standard Track)
MELIA	CGIAR				**1**				**2**				**3**	**1**. Baseline stakeholder analyses **2**. Mid-term process assessment **3**. Impact assessment for end-of-Initiative outcomes
Project management	CGIAR	**1**	**2**		**3**	**2**			**3**	**2**			**3**	**1.** Inception period finalization, completion of detailed implementation work plan. **2.** Annual detailed implementation work plan completion. **3.** Annual financial and technical reporting.

[a.] A complete summary management plan with detailed activities for each Work Package, MELIA, and overall project management can be found in Annex 7.2.

7.3 Risk assessment

Top 5 risks to achieving impact	Description of risk	Likelihood (1–5)	Impact (1–5)	Risk	Opportunities (Risk mitigation mechanisms)
Initiative's dependency on legacy work such as valued elements developed through the CRPs (infrastructure, relationships, processes, tools, data and innovations) that are not carried forward (WP2).	Some of TAFSSA's work in India relies on the maintenance of long-term experiments by national partners. These trials help maintain relationships with influential scientists. Currently supported by CCAFS, a gap in support could undermine partners' collaboration and support for TAFSSA's policy recommendations.	2	2	4	As a risk reduction mechanism, TAFSSA's team members have been in discussion with key partners and have alerted them to the challenges associated with continuation of this work, and the need to keep land available for agronomic trials that will particularly affect WP2. Partners have been receptive; and as such, risk levels are low.
Unable to incentivize right behaviors by farmers, value chain actors, and policy makers needed for adoption (WPs 2, 3, 4, 5).	Each of TAFSSA's WPs interact to address critical issues across agrifood systems. Farmers, value chain actors, and policy makers however tend to act in isolation and without sufficient mutual objective-oriented coordination. Failure to align stakeholders and incentives may undermine project outcomes.	2	2	4	Some of the key risk-reduction mechanisms for the concern posed here are the activities articulated in WP1. Importantly, the multistakeholder platforms in WP1 were designed to account for and counter this risk by working to break-down silos between agrifood systems actors and to coordinate and align activities to achieve synergies and deliver significant impacts.
Business interruption or delays due to pandemic, war, natural disaster or other incident affecting the Initiative or key dependencies (All WPs).	Uncertainties compromising effective planning and travel complications resulting from COVID-19 constitute an important risk. Where scientists cannot travel or meet with stakeholders in person, challenges may be encountered in assuring cooperation and implementation of key activities.	3	2	6	This risk is reduced by mechanisms that have been put into place as the pandemic spread across South Asia: both CGIAR staff and partners are accustomed to remote work and maintenance of relationships. The challenge will be in working with new partners. TAFSSA will rely on on-the-ground CGIAR staff in aligned bilateral projects to assist partner coordination.
Initiative relies on assumption that increase in funding would result from One CGIAR transition (All WPs).	Although TAFSSA's design is ambitious, we have high confidence that we can deliver, based on our experience in previous projects (Annex 2.3). Considerable uncertainties remain regarding funding levels even during late-stage Initiative design. Lower funding will compromise impact.	3	3	9	Pro-actively hedging risks, TAFSSA's scientists have maintained donor relationships and have sought bilateral funding that can be aligned with TAFSSA: WP components are being included in bilateral proposal designs. Donor commitments for mapped bilateral funding in CSISA for 2022 have also been obtained, allowing supplementary inception funding.
Initiative relies on assumption of stable funding for 3 years (All WPs).	A three-year business cycle is extremely short; fluctuations in funding will compromise TAFSSA's ability to implement plans. Risk of funding variability and budget cuts between years could	2	2	4	The same risk mitigation strategy described in the above row is being applied to reduce the potential for year-to-year funding variability. In combination with efforts to maintain strong professional relationships with

	also affect staffing and granting to partners. This will reduce output and may strain CGIAR's relationships with crucial external partners.				partners, and provide them with information on changes in funding modalities, this risk can be partially mitigated.

8. Policy compliance, and oversight

8.1 Research governance, ethics compliance and oversight

Researchers involved in the implementation of this Initiative will comply with the procedures and policies determined by the System Board to be applicable to the delivery of research undertaken in furtherance of CGIAR's 2030 Research and Innovation Strategy, thereby ensuring that all research meets applicable legal, regulatory, and institutional requirements; appropriate ethical and scientific standards; and standards of quality, safety, privacy, risk management, and financial management. This includes CGIAR's CGIAR Research Ethics Code and the values, norms and behaviors in CGIAR's Ethics Framework and Framework for Gender, Diversity and Inclusion in CGIAR's workplaces.

8.2 Open and FAIR data assets

The researchers involved in the implementation of this Initiative shall adhere to the terms of the Open and FAIR Data Assets Policy. In addition, TAFSSA will work to align with the OFDA Policy's Open and FAIR requirements. These include the development of (i) rich metadata conforming to CGIAR Core Schema to maximize findability, including geolocation information where relevant and where it does not compromise privacy standards. For data collected by Initiative researchers, TAFSSA will work to prioritize accessibility to data by utilizing unrestrictive, standard licenses (e.g., Creative Commons for non-software assets; General Public Licenses (GPL))/Massachusetts Institute of Technology (MIT) licenses or similar permissions for software) and to deposit assets in open repositories.

This Initiative will attempt to make data collected by unfunded partners (e.g., government agencies or NGOs) conform to OFDA Policy's Open and FAIR requirements, though the Initiative will first honor the legal and data policies of the respective governmental or nongovernmental agencies, institutes, organizations, and/or companies that TAFSSA partners with. Broader access to data will be provided by deposition in open repositories such as DataVerse with appropriate translations requiring minimal data download options to address locations with limited internet connectivity. Where possible, TAFSSA will work to improve dataset interoperability by annotating dataset variables using standard ontologies. Importantly, the Initiative will honor the Adherence to Research Ethics Code (Section 4) relating to responsible data (through human subject consent, avoiding personally identifiable information in data assets, and other data-related risks to communities).

9. Human resources

9.1 Initiative team: 'Local research for global impact'

TAFSSA's HR plan prioritizes regionally-based scientists, communications and support staff, all brought together as a model One CGIAR team in South Asia.

Category	Expertise	Responsibilities & contributions to research questions (RQs)
Cross-work package management and implementation team		
Initiative technical leads	Agrifood systems & nutrition, partner engagement, CGIAR leadership	Initiative lead and co-leadership, assurance of full Initiative delivery
Management	Admin., financial management, reporting, large, multi-country projects	Admin, financial, reporting, and HR management and quality control
MELIA	Quantitative surveys, qualitative data, data mgt.	Reporting, MELIA, database mgt.
Communications	Multiple stakeholder communications, multiple media, website design	Reporting, multi-audience communication
Scaling Science	Innovation systems, extension, scaling science, market systems	Scaling Assessments, WP backstopping
GESI	Regional and agrifood systems GESI expertise	Lead and assure research and scaling in GESI across WPs
Work Package 1 research implementation and support team [a]		
Data science	Data mgt. & analysis; hyperlink & network analysis, data gap mappings	Assemble & analyze datasets, develop integrated databases (RQ 1)
Monitoring and data analytics	Data gap maps, indicator frameworks for integrated agrifood systems	Develop indicator framework, build and maintain databases (RQ 2)
Knowledge management, evidence uptake and scaling	Knowledge networks, decision support, partner engagement, learning platforms, evidence to policy and scaling processes	Develop data use cases, support policy and practice partners in evidence uptake and scaling partnerships (RQ1,2)
Work Package 2 research implementation and support team [a]		
Systems agronomy	Systems agronomy, experiments, participatory action research (PAR)	Design, implement trials, analysis of data, report, publish (all RQs)
Modeling, GIS, RS	Systems analysis, farming systems and landscape modeling, GIS	Farm and landscape-level modeling, reporting, publishing (RQ1,2)
Agricultural economics	Choice experiments, RCTs, multi-criteria and farming systems analysis	Design social experiments, advise on business models (RQ 1,2,3)
Landscape ecology, hydrology	Ecosystems services, landscape hydrology, PAR, partner engagement	Landscape-level research in WP2 (RQ2), contribution to WP5 (RQ1)
Innovation systems	Private sector development, innovation systems, business modeling	Business model development, assure PPPs, report, publish (RQ3)
Work Package 3 research implementation and support team [a]		
Economics	South Asian agrifood systems, food environments, market systems	Research design analysis of data, report, publish (RQs 1,2,3)
Value chains	Value chains and chain mapping, market systems development, GIS	Design & lead VSM research, partner mgt., report, publish (RQ 2)
Retail systems	Food retail environments, market systems, private sector engagement	Design & lead retain environment research, report, publish (RQ 3)
WP4 research implementation and support team [a]		
Nutrition	Dietary surveys and analysis of diet data, large dataset management	Analyses of data on current diets, plate-to-farm mapping (RQ 1)
Anthropology	Ethnography and qualitative methods, PAR	Design, implement, analyze, publish dietary determinants (RQ 1)
Behavioral science	Nutrition BCC research; evidence reviews; experimental evaluations;	Design and implement research on BCC interventions (RQ 2)
Economics	Economics, affordability of diets, modeling and econometric analysis	Support partner: cost of diet & other affordability analyses (RQ 1,3)
Work Package 5 research implementation and support team [a]		
Environmental geography	Scoping reviews, systematic reviews, ecological footprint modeling	Coordinate research reviews, ecological food print modeling (RQ 1)
Modeling, GIS, RS	Groundwater hydrology, farm-groundwater and landscape interactions	Assist ecological food print modeling (RQ 1), support WP 2 R Q2
Behavioral economics	Social and willingness to invest experiments, RCTs	Oversee, report and publish social experiments, RCTs (RQ 2,3,4)
Systems agronomy	Resource conserving agriculture, air pollution and GHG mitigation	Research co-design support, analysis, publishing (RQs 1,2,3,4)

[a.] Each work package will maintain a small research support team comprised of national staff to assist with research management, MELIA, comms, and GESI.

9.2 Gender, diversity, and inclusion in the workplace

Gender, diversity, and social inclusion is core to TAFSSA's research agenda and to the Initiative's day-to-day operational modality. TAFSSA is composed of individuals of diverse origins and backgrounds. Forty % of the Initiative's Work Package leads are women, and staffing plans across Work Packages have been developed to meet a minimum 40% target of women and inclusion of staff across all four focus South Asian countries in professional roles. Team formation for activities within work packages will create opportunities to empower and help junior and mid-level members of these groups grow towards in senior-level research, management, MELIA and communications roles. TAFSSA will be supported by a senior cross-WP Gender and Social Inclusion advisor and will include a near-full time scientist who will contribute to shaping the design and analysis of data from all research streams. TAFSSA's management principles and approach include capacity development efforts to ensure inclusion in the workplace. Our approach aims to create an environment where team members practice leadership and collaboration in ways that create opportunities to overcome conventional power differentials.

TAFSSA will tackle emerging concerns around 'decolonizing development' and 'helicopter research'[127] by prioritizing on-the-ground staffing and partnerships with regional scientists of South Asian origin — including for WP leads, co-leads, research support staff and partnerships. We center our Initiative around individuals with long-term residence and work experience in South Asia, our partnerships with national institutions or in some cases, local offices of global organizations. Over 85% of our core and extended design team members are of South Asian origin. Among those of non-South Asian origin, most have had more a decade of residence and work experience in TAFSSA countries. This strengthens cultural awareness and sensitivity and enables the TAFSSA team to work as culturally sensitive change agents with national peers.

9.3 Capacity development

TAFSSA's goals for capacity building focus on the team and on our wide network. Within the team, all members of the leadership circle and project management staff will complete training on inclusive leadership during the inception period (within three months of launch). Within six months, *all* Initiative team members (including those described above) and lead collaborators from funded partner organizations will participate and complete additional training in GESI and team-building. Training will focus on self-awareness and strengthening leadership practices that support women, young people and under-represented minorities in the workplace. Training will cover topics related to whistleblowing and confidential pathways to escalate concerns to appropriate authorities for review and potential corrective action. Crucially, we will also extend these training opportunities to external partners.

Group and individual training will be complemented by TAFSSA's mentorship programs, in which junior professionals will be paired with members of the leadership circle for professional mentoring and development. Opportunities for mentoring and the development of leadership skills among all staff will be explored through local and international opportunities.

TAFSSA will begin in January 2022. A kick-off event in February or March for internal staff and key collaborators will include sessions on GESI considerations and research ethics processes. It will also focus on CGIAR's values, code of conduct, and the range of available learning and capacity development opportunities on GESI within CGIAR.

Last, but not least, Work Package 1's learning platforms and knowledge networks offer tremendous opportunities for scientists at all levels, policymakers, practitioners, public and private sector partners to build common capacity and knowledge about critical agrifood systems issues, data, innovations, and scaling. Supporting knowledge communities to come to common 'tipping points' through WP1 is a key TAFSSA strategy for capacity development that advances and supports policies.

10 Financial resources

10.1 Budget

TAFFSA's approach to budget preparation is based on a bottom-up annual activity-based costing of all anticipated activities in each Work Package, cross-cutting management, scaling assessment, and support activities. Our budget preparation process centered around ensuring adequate within-region staffing from across CGIAR presences in South Asia and ample funding to national partners in Bangladesh, India, Nepal and Pakistan. To support equitable partnership and co-learning with national partners, our budget directs minimal funding to non-South Asian partners. Anticipated funded national partnerships include the national agriculture and extension system organizations in Bangladesh, India, Nepal and Pakistan.

Additional key funded partnerships are likely to include the following: (1) **Bangladesh:** BRAC Institute for Governance and Development, DATA, Ltd, Bangladesh Agricultural Research Institute (BARC) line agencies and the Department of Agricultural Extension (DAE); (2) **India:** National Institute of Nutrition, IDInsight, Public Health Foundation of India, and the Indian Council for Agricultural Research; (3) **Nepal:** New Era Research, IIDS, and the Nepal Agricultural Research Council; (4) **Pakistan**: Collective for Social Science Research, Aga Khan University, and the Pakistan Agricultural Research Council. Lightly funded non-South Asian partnerships are likely to include Cornell University, Wageningen University, the Commonwealth Scientific and Industrial Research Organisation is an Australian Government (CSIRO) University of South Carolina (Drivers of Food Choice), and Tufts university (Food Prices for Nutrition).

Table 10.1. Budget summary

10.1.1: Activity breakdown [a]

USD	2022	2023	2024	Total
Crosscutting across Work Packages	875,967	919,135	964,462	2,759,564
Work Package 1	1,831,903	2,553,221	3,387,820	7,772,944
Work Package 2	2,359,307	2,959,058	3,120,422	8,438,787
Work Package 3	2,276,371	2,321,396	2,508,992	7,106,759
Work Package 4	2,235,795	2,530,695	1,902,462	6,668,952
Work Package 5	1,652,135	2,504,638	2,579,621	6,736,394
				0
Innovation packages & Scaling Readiness	151,200	315,000	50,400	516,600
Total	**11,382,678**	**14,103,143**	**14,514,179**	**40,000,000**

[a.] Year 2 budget is marginally higher than the Year 3 budget to account for higher field research costs in Year 2.

10.1.2: Geography breakdown [a]

USD	2022	2023	2024	Total
India	4,780,237	6,143,302	6,019,776	16,943,315
Bangladesh	3,087,053	3,570,453	4,207,731	10,865,237
Nepal	2,368,782	3,070,028	3,042,958	8,481,768
Pakistan	1,146,607	1,319,360	1,243,713	3,709,680
Total	**11,382,679**	**14,103,143**	**14,514,178**	**40,000,000**

[a.] Year 2 budget is marginally higher than the Year 3 budget to account for higher field research costs in Year 2.

11 Online annexes and references

11.1. Online annexes

All additional online Annexes for TAFSSA are available in a Dropbox folder, linked here. Individual annexes are listed and accessible via individual hyperlinks below:

1. Annex 1: List of acronyms
2. Annex 2.1. Supporting evidence for challenge statement
3. Annex 2.3 Ongoing and recently completed cross-CGIAR bilateral portfolio of projects TAFSSA will build upon
4. Annex 2.4. Priority setting
5. Annex 2.6. Participatory design process
6. Annex 2.6.1. Letters of support
7. Annex 3.2.2. Work Package partnerships
8. Annex 4.1. Innovation Packages
9. Annex 5.1. Impact Area 1 partners
10. Annex 5.2. Impact Area 2 partners
11. Annex 5.3. Impact Area 3 partners
12. Annex 5.4. Impact Area 4 partners
13. Annex 5.5. Impact Area 5 partners
14. Annex 7.2. Detailed management and work plan

11.2. References

All references in this document are listed below as endnotes.

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