OVERVIEW OF IDINSIGHT’S RECOMMENDATIONS TO IMPROVE THE SHC SCHEME

On the basis of our findings, we developed an extensive list of recommendations to improve the scheme. Subsequently, in our discussions with key stakeholders, we assessed the feasibility and potential impact of each recommendation to identify three priority recommendations. These are as follows:

- Increase the cycle duration of the scheme, while simultaneously reducing the grid size
- Redesign the Soil Health Card
- Use technology to supplement in-person explanation of recommendations

BACKGROUND TO THE SHC SCHEME

The SHC scheme, launched in February 2015, has so far distributed over 150 million cards to farmers throughout India. Over two-year cycles, soil samples from farmers’ plots are tested across 12 parameters to identify the nutrient deficiencies of the soil and generate crop-specific fertiliser dosage recommendations. The expectation is that, by providing farmers with this information, the scheme can encourage judicious use of fertiliser to improve soil health and ultimately boost stagnating agricultural productivity.

BACKGROUND TO IDINSIGHT’S SHC STUDY

Over the past six months, under the guidance of NITI Aayog, the agriculture team at IDinsight’s AMAL unit conducted a process evaluation and diagnostic study of the SHC scheme, across eight districts in eight states in India (sampled districts are marked on the map on page 2).

The objectives of this study were the following.

- **Assess the current status of implementation** of the scheme, through each stage of the process (before and after soil testing)
- **Identify the most important reasons for non-adoption** of SHC recommendations at the farmer-level
- **Suggest actionable and high impact recommendations** to improve the scheme

These objectives were identified following extensive conversations with sector experts, a desk review of the SHC literature, and district-level scoping visits.
METHODOLOGY

Research Design: We developed a detailed Theory of Change of the SHC scheme, in order to identify our key research objectives and inform the design of our survey instruments. On the basis of this, we conducted a qualitative study using three types of survey instruments: in-person direct observations, in-depth one-on-one interviews with key informants (farmers, lab-in-charge(s), extension workers, DDAs*), and focus group discussions (FGDs) with farmers. In total, we interviewed 37 district-level officials and extension workers, and roughly 450 farmers*.

SAMPLE SELECTION

District: Six out of the eight districts selected are NITI Aayog focus ‘Aspirational Districts’, selected on the basis of a resource index score. This index was designed to estimate districts’ capacity to successfully implement the SHC scheme. Two additional high-performing districts were chosen to derive lessons learned and understand the district-level modifications that can be made to improve the scheme.

Tehsil: Four tehsils were selected within each district - three tehsils were chosen to cover variation in irrigation and landholding size, and one additional “best performing” tehsil was chosen to observe card use and derive lessons to improve adoption.

Village and Farmer: Selection was purposive in order to prioritise farmers who had received their cards.
FINDINGS
Given the design of this study, findings and recommendations (below) are divided into two parts: the process-side and the farmer-side.

PROCESS SIDE
On the process-side, we identify three major barriers to successful implementation of the SHC scheme:

MANPOWER AVAILABLE TO COLLECT SOIL SAMPLES IS INSUFFICIENT
There is a considerable shortage of manpower.
On average, 44% of sanctioned extension worker posts are vacant across our sampled districts. This has led to the overburdening of extension workers. Additionally, extension workers are under-trained and unaware of the steps that have to be followed while collecting soil specimens, specifically with respect to the creation of grids for sampling. Inaccurate grid creation can lead to farmers receiving recommendations that are not applicable to their plots.

RESOURCES AVAILABLE FOR SOIL SAMPLE TESTING ARE INADEQUATE
Soil sample testing suffers from a lack of resources.
There is a shortage of resources available for soil sample testing procedures – including infrastructure (e.g. electricity and water supply), machinery (such as fully-automated AAS machines) and manpower (with 49% of lab technician posts left vacant). This reduces the capacity of districts to meet the targets set for them on time.

Coordinated between extension workers and labs is poor.
There is a lack of coordination between extension workers and labs. This means that the supply of samples from the field is irregular. Labs are either overstretched when a large number of samples come in at once, or are functioning below capacity when samples fail to come in from the field. Since the cost for transporting these samples is borne by extension workers, they prefer making fewer trips to the lab while carrying more samples at once.

MANAGEMENT STRATEGIES TO IMPROVE IMPLEMENTATION IN RAJNANGAON, CHHATTISGARH
To improve implementation of the SHC scheme, other districts can learn from Rajnandgaon’s superior management strategies. The district was able to improve its monitoring framework by establishing cross-district quality control visits. Coordination between extension workers and lab capacity was improved by providing extension workers with daily, weekly and monthly soil sample collection targets.
FARMER SIDE

On the farmer-side, we identify **three major barriers** limiting farmers’ adoption of SHC recommendations.

**MOST FARMERS DO NOT UNDERSTAND THEIR SHC**

Across districts, farmers’ comprehension of the card is poor. Barriers to card comprehension prevent the vast majority of farmers from understanding how to apply the recommendations printed on their card. Farmers’ interpretation of SHC recommendations is constrained by: limited functional literacy; limited awareness of the conversion rate from hectares to local land units; limited functional numeracy to calculate fertiliser quantity per local land unit; poor understanding of scientific language; and poor understanding of the purpose of multiple columns as alternative fertiliser combinations.

Farmers’ confidence in their own ability to use their card is low. Low confidence in their ability to use the card was the most common reason why farmers reported not adopting the recommendations. Many farmers with low literacy also struggle to remember how to interpret the fertiliser dosage recommendations printed on their card, and emphasised the need for their cards to be explained multiple times.

**STREAMLINED CARD DESIGN IMPROVES FARMERS’ COMPREHENSION**

Across districts, we assessed farmers’ understanding of both the generic card, and a redesigned card used in Baran. Comprehension of the recommendations printed on the Baran card was noticeably higher. The volume of information presented on the Baran card is significantly reduced, formatting is clearer, and the font is more legible.
Extension workers’ communication of SHC recommendations is insufficient.
Overburdened extension services, the main channel of SHC information dissemination, contributes significantly to farmers’ poor understanding of the card. Extension workers often distribute cards centrally in a village, with farmers then redistributing individual cards amongst themselves. In these instances, farmers miss out on receiving an explanation of the card by the extension worker, essential for understanding where functional literacy and numeracy are limited.

MOST FARMERS DO NOT TRUST RECOMMENDATIONS UNLESS A SOIL SAMPLE FROM THEIR OWN PLOT WAS TESTED

Trust in recommendations based on a soil sample from another farmers’ plot is low.
Over three-quarters of farmers reported that they would be unwilling to trust SHC recommendations if they were based on a soil sample taken from another farmer’s plot. Those farmers who were willing to trust the recommendations, moreover, would do so only on the basis of certain similarities between their own plot and the source of the soil sample: e.g. soil type, fertilisers applied, crops grown, and distance. The lack of site-specificity of the test results also increased farmers’ uncertainty about the reliability of the recommendations printed on their cards.

Trust in recommendations based on a composite sample is low.
Roughly two-thirds of farmers were unwilling to trust SHC recommendations based on composite samples. Many farmers claimed that by mixing together soil from several different plots, the test results and recommendations would not be accurate. Jointly, these findings suggest that regardless of the scientific representativeness of grid-based and/or composite soil sampling, farmers’ deeply held beliefs about the inaccuracy of the recommendations limits adoption across districts.

SOME FARMERS DO NOT TRUST RECOMMENDATIONS WITHOUT SEEING A SHC DEMONSTRATION

Without seeing positive results of adoption, trust in recommendations is low.
Roughly a quarter of farmers were unwilling to trust SHC recommendations without seeing a demonstration of how to use the card in practice and the benefits of doing so. This result was stronger when landholding was small or if farmers’ own soil had not been tested. This suggests that information dissemination through multiple channels is required to build trust in the scheme and motivate farmers’ adoption of recommendations.
RECOMMENDATIONS
On the basis of our process-side and farmer-side findings, we developed a list of recommendations to improve the scheme (see figure below).

List of all Recommendations

<table>
<thead>
<tr>
<th>POLICY LEVEL</th>
<th>PROGRAM LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Increase cycle duration; decrease grid size</td>
<td>- Provide training for grid creation and sample selection by circulating a booklet</td>
</tr>
<tr>
<td>- Improve quality of labs existing machinery and manpower</td>
<td>- Improve coordination between lab and field staff</td>
</tr>
<tr>
<td>- Employ skilled data enterers</td>
<td>- Monitor the data entry process through software-based methods</td>
</tr>
<tr>
<td>- Redesign card (to improve Extension Workers’ understanding)</td>
<td>- Improve monitoring of Extension Workers’ card explanation</td>
</tr>
<tr>
<td>- Redesign card (to improve farmers’ understanding)</td>
<td>- Supplement in-person card explanation with tech-based explanation</td>
</tr>
<tr>
<td>- Improve transparency of soil testing</td>
<td>- Generate awareness about benefits of adopting card</td>
</tr>
<tr>
<td>- Reduce time lag in card distribution</td>
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</tbody>
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Soil specimen is appropriately collected
Soil specimen is appropriately tested
Fertiliser recommendations are generated
Fertiliser recommendations are disseminated
Farmers understand recommendations
Farmers trust recommendations
Farmers adopt recommendations

Prioritised Recommendations
After incorporating input from key stakeholders, we assessed the feasibility and potential impact of each of our recommendations. Accordingly, our prioritised recommendations to improve the SHC scheme are:

INCREASE THE CYCLE DURATION OF THE SHC SCHEME, WHILE SIMULTANEOUSLY REDUCING THE GRID SIZE. Providing each farmer with a SHC every two years is a hugely resource intensive undertaking, which results in the overburdening of extension services. Given the slow rate of change in soil nutrient composition, providing farmers with recommendations at this frequency is unnecessary.

A sample from only one plot in a grid of 2.5 hectares (irrigated) or 10 hectares (unirrigated) is tested, with farmers across the grid receiving the same SHC recommendations. Irrespective of the scientific validity of the current grid-based sampling strategy, farmers are sceptical of the accuracy of recommendations extrapolated across the grid.

Operationally, this recommendation implies a higher volume of samples (due to a smaller grid) are collected at less frequent intervals. The Centre should determine the optimal combination of cycle duration and grid size to simultaneously alleviate the burden on extension services whilst maximising farmers’ trust in grid-based sampling.

We anticipate three potential benefits of implementing this recommendation:

- Lead to an improvement in the quality of soil sample collection and testing, given an increase in time per sample.
• Help build farmers’ trust in the accuracy of recommendations extrapolated across all plots in the grid.
• Reduce extension workers’ workload, thereby increasing their capacity to adequately explain the card to farmers.

REDESIGN AND SIMPLIFY THE SOIL HEALTH CARD
Cards should be redesigned such that the volume of information is streamlined, unnecessary scientific jargon is removed, and fertiliser quantities are printed in local land units. Additional formatting modifications to improve farmers’ card comprehension could utilise insights from other redesigned cards. This corroborates IFPRI’s findings on card redesign in Bihar.

While state governments have the autonomy to adopt a card of their choice, most states opt to use the generic SHC designed by the Centre. The Centre cannot scale a generic card that is too expensive to print. Further research is required to optimise card design within the constraints of financial feasibility.

We foresee two potential benefits of card redesign:

• Improve card comprehension, particularly for farmers who have some functional literacy to read the card, but are currently overwhelmed by the volume of information and scientific jargon.
• Improve extension workers’ understanding and ability to explain the card to farmers effectively.

SUPPLEMENT IN-PERSON EXPLANATION OF THE CARD BY THE EXTENSION WORKER WITH TECHNOLOGY-BASED EXPLANATION OF RECOMMENDATIONS
Existing research suggests that video and audio messaging are as effective as in-person extension at improving farmers’ understanding of SHC recommendations and eliciting trust in their validity. Potential channels for technology-based SHC messaging that do not rely on extension worker capacity include: SMS reminders; participatory videos; Interactive Voice Response calls; including a toll-free helpline on the card that farmers can call to receive a verbal explanation of their card. The impact on adoption, as well as the operational feasibility and cost-effectiveness of various technology-based mediums, however, requires further assessment.

Some potential mediums for technology-based SHC messaging include: participatory videos; Interactive Voice Response calls; adding a toll free helpline on the card that farmers can call to receive a verbal explanation of their recommendations; other ICT-based messaging. Technology-based reminders on how to use the card should be timely, by providing this information to farmers before the onset of sowing season.
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10.  The tehsil-level variation in landholding size and irrigation was assessed using data available on the
8.  Variables included in the district index score: number of blocks; number of farmers; number of
6.  Baran (Rajasthan), Nandurbar (Maharashtra), Damoh (Madhya Pradesh), Balrampur (Uttar
5.  ~330 farmers in Focus Group Discussions, 90 farmers in 1-1 vignette interviews, 30 farmers in 1-1
4.  Deputy Director Agriculture
2.  The AMAL (Action-focussed Measurement and Learning) Unit, set up by IDinsight, is supporting
1.  Soil samples are drawn from a 2.5ha grid (irrigated) and 10ha grid (rain-fed), using GPS devices
Dwivedi - Addl.Comm (INM) and the Bill and Melinda Gates Foundation for their continued support and
invaluable inputs on this study.

Acknowledgements
IDinsight would like to thank Ms A. Neerja (Joint Secretary, Integrated Nutrient Management), Dr. Vandana
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invaluable inputs on this study.

Introduction to IDinsight’s AMAL UNIT
IDinsight’s AMAL Unit is supporting NITI Aayog on the Transforming Aspirational Districts of India
initiative, which aims to significantly improve socioeconomic outcomes in 115 of India’s poorest districts,
home to approximately 60 million people. The focus of the initiative is to promote an outcomes-based
management approach among states and districts. IDinsight’s work has two prongs:

Measurement: Tracking socioeconomic outcomes at the district level using an innovative field-data
infrastructure focused in 27 districts prioritised by NITI Aayog. This will facilitate healthy competition
between states and districts to improve outcomes (rather than inputs). We will follow 27,000 randomly
selected households across these districts over the next 1.5 years and assess changes in socioeconomic
outcomes approximately every quarter.

Learning: Diagnosing, experimenting and helping scale innovative and/or proven interventions to
improve outcomes in four key sectors: Agriculture, Financial Services for the Poor, Health & Nutrition,
and Sanitation. The goal is to support optimization of government flagship programs via evidence-driven
learning in the Aspirational Districts and beyond.

In particular, the AMAL Unit’s Agriculture team focuses on identifying strategies to increase and stabilise
agricultural incomes of farmers.

For any further information please contact Rupika Singh, rupika.singh@idinsight.org.

FOOTNOTES:
1. Soil samples are drawn from a 2.5ha grid (irrigated) and 10ha grid (rain-fed), using GPS devices
and revenue maps.
2. The AMAL, Action-focussed Measurement and Learning Unit, set up by IDinsight, is supporting
NITI Aayog on the “Transform Aspirational Districts” initiative. The AMAL Unit is supported by
the Bill and Melinda Gates Foundation.
3. Varied literature on the SHC documents low adoption amongst farmers, for instance: Ward et al.,
(2016), “Can information help reduce imbalanced application of fertilisers in India?” Experimental
evidence from Bihar”.
4. Deputy Director Agriculture
5. ~330 farmers in Focus Group Discussions, 90 farmers in 1-1 vignette interviews, 30 farmers in 1-1
in-depth interviews.
6. Baran (Rajasthan), Nandurbar (Maharashtra), Damoh (Madhya Pradesh), Bārāmpūr (Uttar
Pradesh), Pakur (Jharkhand), Dhubri (Assam)
7. As defined by NITI Aayog’s “Transform Aspirational Districts” initiative.
8. Variables included in the district index score: number of blocks; number of farmers; number of
soil testing labs per sample; number of lab technicians in district level lab; number of shifts in
soil testing lab; Atomic Absorption Spectrometry device (AAS) availability. Baran was chosen
purposively, given higher agricultural practice than Jhalsi district.
9. Hamirpur (Himachal Pradesh) and Rajnandgaon (Chattisgarh).
10. Tehsil-level variation in landholding size and irrigation was assessed using data available on the
Agricultural Census online portal.
11. “Best performing” defined according to card distribution and farmer adoption of
recommendations. This tehsil was purposively selected based in 100% card distribution and farmer
adoption of recommendations. This tehsil also had significantly better adoption in given districts. In some districts, the “best-performing”
tehsil overlapped with one of the three tehsils selected to cover variation in landholding and
irrigation.
12. 67/85 farmers, from 1-1 vignette interviews. This question was asked across all eight districts.
13. 34/60 farmers, from 1-1 vignette interviews. This question was asked across all eight districts.
This finding was also supported by farmers’ responses during Focus Group Discussions.
14. Composite soil samples combine multiple soil samples across the same grid.
15. 22/85 farmers, from 1-1 vignette interviews. This question was asked across all eight districts.
16. The appropriate cycle duration and grid size, however, is beyond the scope of this present study.
17. Singh and Ganguly, 2018, “Designing a better Soil Health Card for farmers in India”. We also found
that cards used in Rajasthan are simpler and more easily comprehended by extension workers
in other states.
18. Existing literature suggests that both video and audio messaging is as effective as in-person
explanation at improving farmers’ understanding of SHC recommendations and eliciting trust in
Agriculture”