Analysing the effectiveness of targeting under AB PM-JAY in India

March 2022

national health authority
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आयुष्मान भारत
PM-JAY
Oxford Policy Management
World Health Organization
India

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ISBN: 978-92-9021-001-6

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Acknowledgements

This report presents key findings from a study carried out on 'Assessing the effectiveness of targeting mechanisms under PMJAY'. It provides a detailed analysis of potential inclusion and exclusion errors in two select states in India (Haryana and Uttarakhand) to inform National Health Authority's (NHA) policy and approach around beneficiary targeting.

The WHO study team would like to acknowledge Oxford Policy Management Ltd. for their contribution to the execution of this study. The study team are grateful to concerned officials/experts at the NHA and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) for their inputs at the inception phase of the project. Additionally, the study team would also like to thank NHA, State Health Agencies (SHAs), and Chief Medical Officials in the study districts for their support in carrying out the primary data collection.

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List of abbreviations

AAY	Antyodaya Anna Yojana
ADCD	Additional data collection drive
AI-Eligible 2021	Eligible by Asset Index in 2021
ASHA	Accredited Social Health Activist
BIS	benefit identification system
BPL	below poverty line
BW	basic weight
CE-Eligible 2021	Eligible by Consumption Expenditure in 2021
CHC	community health centre
CMO	chief medical officer
CS	civil surgeon
CSC	common service centre
EE	Exclusion Error due to Implementation
EHCP	empanelled healthcare provider
EP	Exclusion Error by Program Design
EPF	employees provident fund
FGD	focus group discussions
FPS	fair price shop
FW	final weight
IDI	in-depth interviews
IE	Inclusion Error due to Implementation
INR	Indian Rupee
IP	Inclusion Error by Program Design
KCC	Kissan credit card
KII	key informant interviews
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MIS	management information system

MPCE	monthly per capita expenditure
NFHS	National Family Health Survey
NFSA	National Food Security Act
NHA	National Health Authority
NSSO	National Sample Survey Organization
OBC	other backward class
ONORC	one nation-one ration card
OOP	out-of-pocket
OPM	Oxford Policy Management
PCA	principal component analysis
PDS	Public Distribution System
PE-Eligibility 2011	Eligible by Proxy Measures in 2011
PMAM	Pradhan Mantri Arogya Mitra
PMJAY	Ayushman Bharat Pradhan Mantri Jan Arogya Yojana
PMT	proxy means testing
PPS	probability proportional to size
PSU	primary sampling unit
RSBY	Rashtriya Swasthya Bima Yojana
SC	scheduled caste
SDG	Sustainable Development Goal
SECC	Socio-Economic Caste Census
SHA	State Health Authority
ST	scheduled tribe
UHC	universal health coverage
USHA	Urban Social Health Activist
UT	union territory
WHO	World Health Organization

Executive summary

Background

For social assistance programmes, it is important to identify and reach the intended population following the overall policy objective for efficient and effective utilization of the resources. The intended beneficiaries are identified by setting eligibility rules and then implementing them. Targeting can result in errors, either by not reaching the intended beneficiaries or by the inclusion of the un-intended beneficiaries. As a result, the first step towards successfully implementing social transfer programmes lies in identifying beneficiaries and effectively targeting them in practice.

Within this context, OPM has been commissioned by the World Health Organization (WHO) to undertake a study to assess the targeting effectiveness of the Government of India's Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (PMJAY) in the states of Haryana and Uttarakhand.

The PMJAY is a government-sponsored health insurance scheme launched in September 2018, which provides a health cover of INR 500,000 per family per year for secondary and tertiary healthcare. The programme intends to reach the bottom 40% of the all-India population-based on measures of economic well-being, as identified via the Socio-Economic Caste Census (SECC) 2011. In addition to the SECC 2011 eligibility database, the scheme includes the enrolled under the previous Rashtriya Swasthya Bima Yojana (RSBY). Further, many states and Union Territories (UTs) have horizontally expanded the eligibility criteria to cover additional beneficiaries either under PMJAY or under state-specific schemes. For the two states under this study, while Haryana uses only SECC 2011 data to identify the eligible for PMJAY, Uttarakhand has added National Food Security Act (NFSA) database, government employees and pensioners to the eligibility list, along with SECC 2011 data.

The project aims to assess the targeting effectiveness of PMJAY in terms of coverage. According to the targeting literature, targeting generates two types of errors: inclusion error and exclusion error. These errors can be further disaggregated into errors of design and errors of implementation, which results in four types of errors:

- **Inclusion error due to implementation** (IE) is the proportion of a programme's beneficiaries who do not meet the eligibility criteria but receive social transfers.
- **Exclusion error due to implementation** (EE) is the proportion of eligible individuals or households in a programme area who meet the eligibility criteria but do not receive social transfers.
- **Inclusion error by design** (IP) is the proportion of a programme's beneficiaries who meet the eligibility criteria but are not the intended beneficiaries (for example, the poor).
- **Exclusion error by design** (EP) is the proportion of individuals or households in a programme area who do not meet the eligibility criteria but are those who should have been the intended beneficiaries (for example, the poor).

With this background, this study aims to assess the following specific aspects of PMJAY:

- **Estimation of the design errors:** Is there under-coverage by PMJAY of the "eligible" (i.e. the bottom 40% of the all-India population at present but not eligible by SECC criteria as of the date of the survey? Is there coverage by PMJAY of the "non-eligible" (i.e. not bottom 40% population at present, but eligible by SECC criteria today (leakage)?
    * If so, what is the socio-economic profile of the households participating in the exclusion or inclusion errors or design?

    * What are the underlying contexts that led to the design error in PMJAY?
- **Estimation of proximate implementation errors:** Is there a gap between the "eligible" population, as identified by SECC and state-specific eligibility rules and recipient (registration) status under PMJAY?
    * If so, what is the socio-economic profile of such households?
    * What were the implementation challenges that may have resulted in not enrolling (enrolling) the "eligible" ("non-eligible") by the SECC list in PMJAY?

Methodology

Our research design used mixed methods, combining **quantitative** and **qualitative** analysis to answer the research objectives. While the quantitative data collection aimed to measure the tangible outputs against planned targets, the qualitative research was exploratory and designed to understand stakeholders' diverse experiences to probe context-specific information.

OPM conducted a primary survey (OPM PMJAY 2021) in Haryana and Uttarakhand to quantify the degree of design and implementation errors and understand their rationale. Under the quantitative workstream, OPM collected data from 2010 households (1050 in Haryana and 960 in Uttarakhand), while qualitative data collection covered a total of 31 interviews (combining key informant interviews (KIIs) and in-depth interviews (IDIs)) and 8 focus group discussions (FGDs).

To identify the bottom 40% of the population for the all-India standard (the target group under PMJAY), the study used two nationally representative thresholds: (i) the bottom 40% threshold level of the asset index estimated by the National Health and Family Survey (Round-4, 2015-16, which is the stock measure); and (ii) the bottom 40% threshold of the inflation-adjusted consumption level, estimated from the National Sample Survey unit-level data (Round 68th, 2011-12). This was then adjusted to today's (2021) price level using the All India Consumer Price Index for rural and urban areas, respectively.

The OPM PMJAY 2021 survey collected data on a range of inclusion and exclusion conditions used to identify the PMJAY beneficiaries following the eligibility criteria in the states. Moreover, the study collected data on comparable modules of NSSO consumption expenditure and NFHS asset details with the purpose of mapping to the national threshold level for the bottom 40% population. Finally, information was collected on household enrolment status in various other government schemes that were also targeted using the SECC 2011 list. Eligibility under OPM PMJAY 2021 survey cannot be matched with the actual SECC 2011 status because (i) households are unaware whether they are enlisted in the SECC 2011 database, and (ii) household-level SECC 2011 data was not accessible to the study team due to confidentiality clauses. As a result, access to other government schemes linked to SECC 2011 is taken as a proxy for SECC 2011 eligibility for PMJAY. Using all these variables, the study households were classified into 4 categories.

1. **CE-Eligible 2021:** Households identified as "eligible" based on the bottom 40% threshold of the consumption expenditure estimated from NSSO data in the OPM PMJAY 2021 survey (i.e. at present)
2. **AI-Eligible 2021:** Households under study identified as "eligible" based on the bottom 40% threshold of the asset index estimated from NFHS data in the OPM PMJAY 2021 survey (i.e. at present)
3. **Modified SECC-Eligible 2021 criteria:** Households under study identified as "eligible" based on the SECC eligibility criteria but observed in the OPM PMJAY 2021 survey (i.e. at present)
4. PE-Eligibility 2011: Household under study identified as "eligible" in SECC 2011 using proxy measures (enrolment status in other schemes using SECC 2011 to target eligible) in 2011[1]

Findings

Coverage of intended beneficiaries by PMJAY

During analysis, we first studied the overlap between intended beneficiaries' (bottom 40%) recipient status (registration under PMJAY). We find that in Haryana, about 38% of the households, who would be falling in the bottom 40% of the all-India population, had someone in the family registered under PMJAY. The corresponding Fig. for Uttarakhand was 59%. Amongst the top 60% of the households, 29% in Haryana had at-least one member in the household registered under PMJAY. In Uttarakhand, about

1 This method however can be biased by (i) errors in the way these schemes identified the potential beneficiaries using the SECC 2011 data; (ii) implementation process of these schemes; (iii) the quality of information received about these schemes, and (iv) errors of implementation in these set of programmes themselves. Hence, the results from the analysis of implementation error may not provide robust estimates of true implementation errors and must be interpreted with caution.

60% of the top 60% of households had at least one member in the family registered under PMJAY. Thus, preliminary evidence suggests that in Haryana and Uttarakhand, between 4 to 6 out of 10 households in the bottom 40% are registered under PMJAY.

In terms of comparison across states, it appears that a higher share of intended beneficiaries (bottom 40%) in Uttarakhand are registered under PMJAY than in Haryana. However, this is not surprising given that the state has expanded the eligibility rules to identify the bottom 40% population. A relatively higher coverage vis-à-vis Haryana here suggests that at least some of these additional eligibility rules work in identifying the intended beneficiaries. Simultaneously, however, within Uttarakhand, a similar share of both, the bottom 40% and top 60%, have someone in the household registered under the PMJAY. This would suggest that the cost of lower exclusion errors is in terms of higher inclusion errors.

Design errors

We first checked for the existence of design errors and quantified the magnitude of the same where they existed. These errors occur when there is a mismatch between the programme design to identify intended beneficiaries and the eligibility rules as per the modified SECC-Eligible 2021. Exclusion errors of design occur when the actual bottom 40% are deemed ineligible using the above eligibility rules. When the top 60% satisfy the eligibility rules as per the modified SECC-Eligible 2021 criteria, this constitutes a leakage which results in an inclusion error of design.

Estimates of exclusion errors using asset measures of economic wellbeing appear to be low for both states. This suggests that about 89% to 90% of the intended beneficiaries are, in fact, eligible as per the eligibility rules outlined under modified SECC-eligible 2021 criteria. Overall, this suggests that the exclusion errors of design for both states are low. Using the consumption measure, we find that the exclusion error of design is higher for Haryana than against Uttarakhand. However, we rely more on the asset-based measure as these are known to be more robust and reliable than consumption-based measures. Thus, this suggests that eligibility rules used from the SECC (modified SECC 2021) do a reasonably good job of identifying the intended beneficiaries.

We find that inclusion errors of design are higher for both states but more so for Uttarakhand (47-53% in Haryana and 77-75% in Uttarakhand). Juxtaposing both these errors, it appears that Uttarakhand has been able to keep exclusion errors in design low by expanding the eligibility criteria for identification of the bottom 40% by adding those households that are covered under the NFSA as well as those with government jobs to the existing conditions of SECC-2011 eligibility. However, an associated cost of expanding the eligibility criteria appears to have been incurred in the form of higher inclusion errors.

To verify if the expansion of eligibility rules in Uttarakhand was driving these results, further analysis shows that about 2 in 3 bottom 40% of households in Uttarakhand have access to NFSA. This would suggest that the inclusion of NFSA beneficiaries in the design decision has probably allowed the state to keep exclusion errors low. Overall, the findings showed that the odds of an intended beneficiary (bottom 40%) being a recipient of PMJAY is close to random, meaning low exclusion errors or design are countered by higher exclusion errors of implementation.

Implementation errors

Mismatched pairs in the former (PE-eligible 2011 and PMJAY recipient status) provide a proximate idea about the existing levels of implementation errors. The percentage of PE-eligible 2011 households that were not covered under PMJAY (exclusion errors of implementation) were about 53% and 38% for Haryana and Uttarakhand, respectively. Thus, unlike exclusion errors of design, which were low at around 10% to 11%, exclusion errors of implementation appear to be relatively higher. This would suggest that exclusion errors are more of an implementation challenge than a design problem.

Meanwhile, the percentage of PE-ineligible 2011 households that are covered under PMJAY (inclusion errors in implementation) stood at 24% and 53% for Haryana and Uttarakhand, respectively. Again, just as in the case of inclusion errors in design, inclusion errors in implementation were lower for Haryana than Uttarakhand.

Further analysis of quantitative and qualitative data revealed that most households were aware of the PMJAY programme. However, not being aware of their eligibility status was reported as the most vital reason for not being able to register under PMJAY. This holds true for both Haryana and Uttarakhand.

Profile of design errors

In both Haryana and Uttarakhand, the bottom 40% population (as compared to the top 60%) were characterized by: (i) a higher share of household heads with no formal education (in fact, none in the 40% of households were graduates); (ii) higher coverage by MGNREGA, old-age / widow / disabled pensions, (iii) higher dependency ratio, (iv) higher percentage of scheduled caste and scheduled tribe groups, (v) no or low ownership of motorized two / three / four wheeler vehicle. (vi) very limited ownership of irrigated lands. Additionally, in Uttarakhand, no household belonging to the bottom 40% had access to safety nets provided by regular salaried jobs like Employees Provident Fund (EPF) and Gratuity. Moreover, no economically poor households in the state reported having invested in financial instruments like fixed or recurring deposits.

In both the states, the comparison of those in the bottom 40% population that could not fulfil the eligibility rule **(exclusion error by design)** with the bottom 40% reveals that this subset has a higher share of households where (i) someone earns at-least INR 10,000 a month, (ii) ownership of some land other than homestead land (only in Haryana), (iii) access to clean cooking fuel, (iv) reside in urban areas. Thus, it is important that these characteristics are not used as part of the design rules to exclude the potential beneficiaries.

The comparison of the top 60% with those in the top 60% who satisfied the eligibility rules **(inclusion error by design)** shows that for the latter (i) a larger share of these households reports having Jan Dhan accounts (in both states), (ii) has a lower share of households owning land other than a homestead, (iii) lower access to clean cooking fuel, (iv) lower share with motorized two, three or four-wheeler vehicles or (v) a pucca house with at least three rooms.[2] Thus, it is likely that focusing on these correlates contributes to inclusion errors in design.

Profile of implementation error

While comparing PE-eligible 2011 with those that are PE-eligible 2011 but not registered under PMJAY **(exclusion error by the implementation)** in Haryana, the results show that a higher share of excluded households (i) owns land other than a homestead, (ii) have a pucca house with at-least three rooms and (iii) reside in urban areas, however with a lower share of these households reporting (i) having a Jan Dhan account (in both states), and (ii) belonging to SC/ST social groups.

The comparison between the households that are PE-ineligible in 2011 with those that are PE-ineligible but registered under PMJAY **(inclusion error by the implementation)** in Haryana shows that a higher share of households that are PE-ineligible but registered under PMJAY have (i) household heads with no formal education, (ii) access to Jan Dhan accounts and (iii) residing in urban areas; and a lower share of these households' report (i) owning land other than a homestead, (ii) living in pucca houses with at-least three rooms, (iii) having access to clean cooking fuel, (iv) own motorized two, three or four-wheeled vehicles, and (v) having access to KCC with the credit limit of at-least INR 50,000, which could be one vital condition that may be used to keep out PE-eligible households from PMJAY coverage. In the case of Uttarakhand, the PE-ineligible but registered under PMJAY had a higher share of (i) access to a ration card, (ii) pension benefits for the vulnerable, (iii) access to clean cooking fuel, ownership of land other than a homestead, (iv) pucca house with at-least three rooms and (v) appliances like refrigerator.

Conclusion

Overall, as far as getting intended beneficiaries registered under the PMJAY is concerned, we find that the exclusion of the intended beneficiaries through design appears to be low for both the study states. This suggests that the set of eligibility rules used from the SECC (modified SECC 2021) does a reasonably good job of identifying the intended beneficiaries. This would imply that the randomness in ensuring PMJAY registration for the intended beneficiaries comes from high implementation errors.

Additionally, we find that in the bottom 40% of the population from both states, no household head had (i) a graduate degree, (ii) a motorized two, three or four-wheeled vehicle or (iii) at least 2.5 acres of irrigated land with at least one irrigation equipment. These are some vital conditions that may be used to identify the potential beneficiaries of PMJAY. Moreover, for both Haryana and Uttarakhand, we find that a higher share of intended beneficiaries who are excluded by design have some member who earns at-least INR 10,000 a month or has access to clean cooking fuel. Thus, it is important that these conditions or other

2 Point (ii) – (v) are from Haryana only

variables that are strongly correlated with these variables are not used as part of the design rules to identify potential beneficiaries.

For inclusion errors of design, we find that these are on a higher side, especially in the case of Uttarakhand. Further analysis in Uttarakhand reveals that although access to NFSA does map to the bottom 40% population, there is almost no overlap between the eligible group of interest and someone in the household having a regular government job. Thus, excluding these households from the programme's purview would reduce the design's inclusion errors without adversely impacting the associated exclusion errors.

Regarding implementation, we find exclusion errors of implementation to be quite high compared to similar errors from design. Thus, exclusion errors are more of an implementation challenge than a design problem.

OPM's survey finds that a majority of the households in both states were familiar with the PMJAY programme. Still, most of them were unaware of their eligibility status. This often resulted in these households not being registered under PMJAY. Given the enormous costs of a census exercise, a public information campaign to inform the respective residents of the eligibility conditions, when juxtaposed with the ability to self-select and register into PMJAY conveniently, is likely to enable coverage for the intended beneficiaries. Additionally, a robust grievance redressal mechanism at the local level may further stem the implementation errors. To make the self-registration process streamlined concerning verification of eligibility, the system can be linked to the Aadhar numbers for a quick and resource-efficient process combined with a rigorous training session of the PMAMs and extensive awareness generation targeting the potential beneficiaries in both rural and urban areas.

1 Introduction

1.1 Background

For any programme and intervention supporting households or individuals, it is important to identify and reach people that are intended to be covered under the programme according to its policy objectives. For example, in programmes aimed at reducing poverty and vulnerability, such as most social assistance programmes, the intention is to reach poor and vulnerable people.

The intended beneficiaries are reached by setting eligibility rules and then implementing such rules. Targeting could result in either not reaching all the intended beneficiaries or including many non-intended beneficiaries influencing resources used for the programme. As a result, the first step towards the successful implementation of social transfer programmes lies in how to target and how effective the targeting is in practice.[3] Within this context, OPM has been commissioned by the World Health Organization (WHO) to undertake a study to assess the targeting effectiveness of the Government of India's Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (henceforth PMJAY) in the states of Haryana and Uttarakhand. To study this, OPM conducted a primary survey to study various aspects of PMJAY related to targeting and enrolment into the scheme. This survey is henceforth referred to as OPM PMJAY 2021 survey.

The PMJAY is a government-sponsored health insurance[4] scheme launched in September 2018 as part of the Indian government's larger agenda of achieving Universal Health Coverage (UHC).[5] The scheme provides a health cover of INR 500,000 per family per year for secondary and tertiary healthcare. Entitlements under PMJAY are portable (across India, irrespective of the state of residence), and therefore, beneficiaries can access healthcare from any empanelled public or private hospital in India through cashless insurance. The programme intends to reach the bottom 40% of the all-India population-based on measures of economic well-being, as identified via the Socio-Economic Caste Census 2011 (SECC). The scheme aspires to reduce out-of-pocket health expenses for secondary and tertiary care and is especially focussed on reducing catastrophic health expenditures.[6] Additionally, the scheme envisages improving the quality of healthcare through higher competition between public and private players in the healthcare market.

3 Sabates-Wheeler R, Hurrell A, Devereux S. (2015). Targeting Social Transfer Programmes: Comparing Design and Implementation Errors across Alternative Mechanisms. Journal of International Development, 27, 1521-1545.

4 The financing breakdown of PMJAY between the Centre and the States will be 60:40 for most states, with a 90:10 ratio for eight north-eastern and three Himalayan states.

5 PM launches Ayushman Bharat - PMJAY at Ranchi. http://pib.nic.in/newsite/PrintRelease.aspx?relid=183635. Accessed 14 January 2019.

6 As per the WHO, health expenditure is considered to be catastrophic whenever it accounts for at-least 40% of a household's capacity to pay. A more widely used measure is out of pocket health expenditure accounting for more than 10% of annual household expenditure (Pandey 2018).

1.2 Challenges with targeting the PMJAY

The SECC 2011 is the gateway for eligibility determination and enrolment under PMJAY. In rural areas, households meeting one of the six SECC deprivation criteria[7] or any of the five automatic inclusion criteria[8] are eligible for the scheme.[9] In urban areas, 11 broad categories of unorganized workers are entitled to the scheme. Households enrolled in the erstwhile Rashtriya Swasthya Bima Yojana (RSBY) are automatically eligible for the scheme. At least 10.74 crores (107.4 million) of poor and vulnerable families that form the bottom 40% of the Indian population[10] are expected to be eligible for insurance coverage. Further, many states and Union Territories (UTs) have horizontally expanded the eligibility criteria to cover additional beneficiaries either under PMJAY or under state-specific schemes.

To determine eligibility and enrol approved applicants, PMJAY relies on a Beneficiary Identification System (BIS) which accesses data from the SECC and RSBY databases. Pradhan Mantri Arogya Mitras (PMAM) - who are PMJAY-dedicated facilitators in empanelled hospitals - and Common Service Centres (CSCs) are the main frontline service providers who assist with validating beneficiaries and ascertaining if a household satisfies the eligibility criteria.

Before PMJAY, the erstwhile RSBY also suffered from errors in targeting due to reliance on outdated Below Poverty Line (BPL) lists (Fan 2013) and lack of adequate outreach (Karan 2017). In fact, targeting has been a central challenge across various schemes meant to cater to the poor and vulnerable. A detailed review of this in the context of India is provided in Annex A. Against the backdrop described above, it is important to understand the targeting effectiveness of PMJAY, which uses the SECC data to identify potential beneficiaries.

The use of SECC data for PMJAY coincides with the gradual transition toward social registries worldwide. Under this model, eligibility determination and enrolment phases of social protection programmes rely on data from a centralized registry rather than programme-specific Management Information Systems (MIS) (Leite 2017). In social registry systems, people are aware of the intended use of the data and provide their consent for the use of this information to fulfil the objective of the registry. For this, there are clear rules on who is eligible to be included in the database and how an individual can apply for the same. Although the SECC is not conceptualized as a social registry, its usage in PMJAY emulates a comparable approach to intake and registration. Whilst there are efficiency gains from using pre-existing data to this end, an integrated process for determining eligibility could pose certain challenges in terms of coverage:

- First, the SECC data dates to 2011and, Although the Additional Data Collection Drive (ADCD) was conducted pan-India in 2018, it updated data on a limited set of variables.[11] More importantly, it did not capture information on households which were not enumerated in 2011. Consequently, the eligibility formula may not accurately capture those in need or the national approach to determining eligibility does not adequately reflect local poverty profiles - a big challenge in large and diverse countries.[12] In an ideal setting, a system that allows households to opt-in and applies for registration based on a clear set of eligibility rules is needed for this system to work seamlessly.
- Second, several data quality factors affect the outcomes of the data validation process. For instance, OPM's previous work has shown non-trivial typographic errors at both the village level and individual levels[13] in the SECC dataset. The dataset also lacked unique geographical identifiers. Further, the dataset suffered from data management issues, containing swathes of blank fields. In addition to the completeness of the data collected, the data generation process should be dynamic so that households can verify the accuracy of their data and have this amended in case of discrepancies.

7 These are the following: Only one room with kuccha walls and kuccha roof, no adult member between age 16 to 59, female headed households with no adult member between age 16 to 59, disabled member and no able-bodied member, SCT/ST households, and landless households deriving a major part of their income from casual labor.

8 These include households without shelter, destitute/living on alms, manual scavenger families, primitive tribal groups, and legally released bonded labor.

9 Beneficiary identification guidelines. AB-PMJAY. https://www.pmjay.gov.in/sites/default/files/2018-07/GuidelinesonProcessofBeneficiaryIdentification_0.pdf.

10 MoHFW (2020). Annual Report of Ayushman Bharat Pradhan Mantri Jan Arogya Yojana 2019-20. https://pmjay.gov.in/sites/default/files/2020-10/Annual-Report-Final_1.pdf

11 Name of the household head, Mobile number, Ration card number, Family Status, and Addition of a Family member (https://www.pmjay.gov.in/sites/default/files/2018-07/GuidelinesonProcessofBeneficiaryIdentification_0.pdf)

12 Barca, V. (2017). Integrating data and information management for social protection: social registries and integrated beneficiary registries. Canberra: Commonwealth of Australia, Department of Foreign Affairs and Trade. Retrieved from http://dfat.gov.au/about-us/publications/Documents/integrating-data-information-management-social-protection-full.pdf

13 An assignment for the World Bank by OPM, conducted in 2017 – confidential.

- Third, the Aadhaar penetration and biometric data quality are variable by demography, which could perpetuate errors of exclusion at implementation. This is an increased concern with the wider use of Aadhaar for service delivery.
- Finally, the extent to which eligible households are aware of the programme is unclear - although state governments have undertaken significant outreach efforts since 2019 to improve the generation of e-cards (National Health Authority 2019).

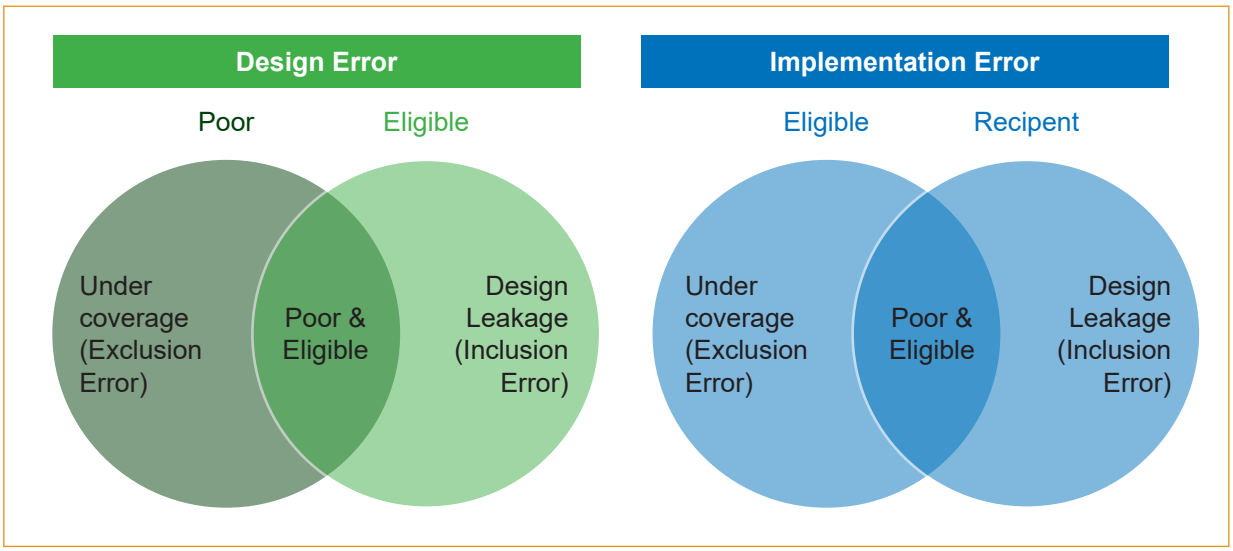
1.3 Conceptual framework

The project aims to assess the targeting effectiveness of PMJAY in terms of coverage. In this section, we present the conceptual framework that the research will draw on in measuring this.

According to the targeting literature, targeting generates two types of errors: inclusion error and exclusion error. These errors can be further disaggregated into errors of design and errors of implementation. Based on a conceptual framework by (Carraro 2007, Devereux 2017), this results in four types of errors that affect the effectiveness of social transfers.

- Inclusion error due to implementation (IE) is the proportion of a programme's beneficiaries who do not meet the eligibility criteria but receive social transfers.
- Exclusion error due to implementation) (EE) is the proportion of eligible individuals or households in a programme area who meet the eligibility criteria but do not receive social transfers.
- Inclusion error by design (IP) is the proportion of a programme's beneficiaries who meet the eligibility criteria but are not the intended beneficiaries (for example, the poor).
- Exclusion error by design) (EP) is the proportion of individuals or households in a programme area who do not meet the eligibility criteria but are those who should have been the intended beneficiaries (for example the poor).

Fig. 1: A proposed conceptual framework



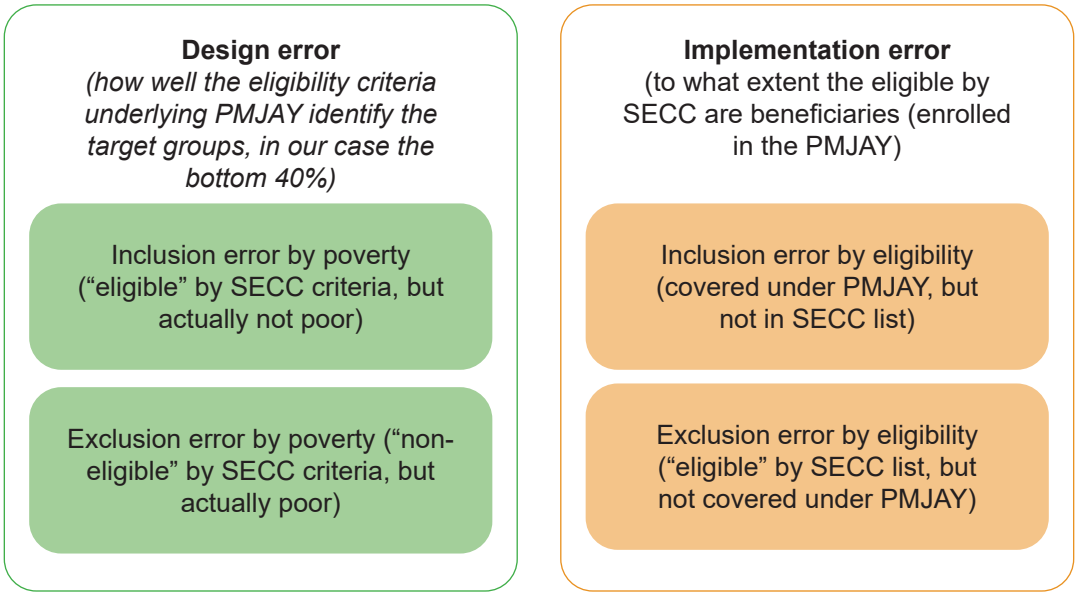
Note: Poor here refers to the bottom 40% of the all-India population who are the intended beneficiaries of PMJAY.

The reason to disentangle these errors in design and implementation allows for the possibility of minimizing both, thereby providing concrete solutions to the targeting problem.

1.3.1 Design and implementation errors in the context of PMJAY

The following Fig. outlines the inclusion and exclusion errors that can be caused due to programme design and implementation issues with respect to the PMJAY scheme, which uses SECC 2011 to target the beneficiaries.

Fig. 2: Design and implementation error for PMJAY



Note: Poor/Poverty here refers to the bottom 40% of the all-India population who are the intended beneficiaries of PMJAY.

Concerning PMJAY, it will be important to assess the design error, i.e. how well the SECC-based eligibility criteria and state-based eligibility criteria together identify the intended beneficiaries, i.e. the bottom 40% of the all-India population, as measured by an objective indicator (e.g. consumption poverty), and hence the enrolment status under the insurance scheme.

Implementation errors in PMJAY can happen due to the static nature of the SECC and coverage of households by the survey; data validation process, which included ADCD to assess changes in poverty and household dynamics, data integration on the BIS system; during the Registration process (based on registration infrastructure [internet access]), capacities of PMAMs and challenges with the registration processes, and due to the certification process (insurance companies/trust processes for certification and challenges faced). Additionally, there may be administrative errors due to which those identified as eligible (ineligible) are not registered (registered) under PMJAY.

1.4 Research question

This study has the following objectives, along with corresponding research questions:

- To measure design errors in the PMJAY coverage through assessment of the effectiveness of the eligibility rules (SECC and state government-based criteria) and how well they map with the bottom 40% of the all-India population. To understand the perceptions of key stakeholders on design errors, that is, how well the SECC has predicted poverty and the challenges and opportunities of leveraging SECC for targeting for PMJAY;
- To assess the proximate implementation error between those identified as eligible via the eligibility rules and their respective recipient status;[14]
- The perspectives of stakeholders and beneficiaries on design and implementation-related issues arising during targeting, data validation, registration and certification.

14 Given that the actual SECC 2011 eligibility status is unknown due to data protection guidelines, these are an approximation of implementation errors as we use proxy indicators of subscription to other schemes, which are also implemented using the SECC 2011

In particular, the analysis intends to answer the following research questions, to address the overall objective:

- **Estimation of the design errors:** Is there under-coverage by PMJAY of the "eligible" (i.e. the bottom 40% of the all-India population at present but not eligible by SECC criteria as of the date of the survey? Is there coverage by PMJAY of the "non-eligible" (i.e. not bottom 40% population at present, but eligible by SECC criteria today (leakage)?
    * If so, what is the socio-economic profile of the households participating in the exclusion or inclusion errors or design?
    * What are the underlying contexts that led to the design error in PMJAY?
- **Estimation of proximate implementation errors:** Is there a gap between the "eligible" population, as identified by SECC and state-specific eligibility rules and recipient (registration) status under PMJAY?[15]
    * If so, what is the socio-economic profile of such households?
    * What were the implementation challenges that may have resulted in not enrolling (enrolling) the "eligible" ("non-eligible") by the SECC list in PMJAY?

1.5 Structure of the report

The rest of the report is structured as follows:

- Section 2 Presents the methodology used to study the questions of interest for both the quantitative and qualitative components of the study. Specifically, this section presents the sampling design and an overview of the survey instruments. The section informs the reader on how the actual poverty status is measured and contrasted against the chosen eligibility criteria to identify the poor (Design component). We then provide a discussion on the implementation component and present how eligibility maps to actual service delivery (Implementation component). The section ends with details of how errors of inclusion and exclusion, for both design and implementation, are estimated.
- Section 3 Describes the findings from the quantitative and qualitative components.
- Section 4 provides policy recommendations based on these findings.

This draft has been internally peer-reviewed and will be updated to reflect comments received from the WHO.

15 As eligibility as per SECC 2011 and additional state-based criteria is measured using proxies and not from actual SECC list, this is only a proximate estimation of implementation error.

2 Methodology

Our research design used mixed methods, combining both **quantitative** and **qualitative** analysis to answer questions posed in Section 1.4. While the quantitative data collection aimed to measure the tangible outputs against planned targets, the qualitative research was exploratory and designed to understand stakeholders' diverse experiences to probe context-specific information.

As part of our background research, OPM conducted a desk review of the relevant literature on PMJAY to better comprehend its targeting mechanism (Annex A: The literature review on targeting effectiveness of social assistance in India). To estimate design and implementation errors under the programme, the desk search was primarily focused on the identification of the intended beneficiaries (bottom 40% of all India population), their identification via eligibility rules (SECC 2011 and expanded criteria used by respective state governments) and actual recipient status (registration under PMJAY). To validate these, we first conducted sample size and sampling weights calculations, which are available in Annex B: Workstream, sample size and survey weights calculations. In summary, under the quantitative workstream, we collected data from 2010 households (1050 in Haryana and 960 in Uttarakhand), while qualitative data collection covered a total of 31 interviews (combining key informant interviews (KIIs) and in-depth interviews (IDIs)) and 8 focus group discussions (FGDs).

We now turn to identifying the bottom 40% of the Indian population and estimating design and implementation errors.

2.1 Identification and categorization of vulnerable households

As mentioned earlier, PMJAY intends to cover the bottom 40% of the all-India population in terms of economic wellbeing. Economic wellbeing can be captured in a multitude of ways. Here, we resorted to two measures. First, we considered an asset index, which comprises the accumulation of assets over time that is measured at the time of the interview.[16] Second, we used monthly per capita consumption expenditure at the household level, which was computed over the past month of the interview.[17,18] Below 40% of the all-India population in our context refers to those in the bottom 40% of the all-India population as per the asset and consumption thresholds for the distribution of Indian households. For arriving at these nationally representative thresholds for the stock (asset) and flow (consumption) measures mentioned above, we used secondary data from the National Family Health Survey, round 4 (NFHS-4) (2015-2016) and 68th Consumption round from the National Sample Survey (NSSO) (2011-2012). To adjust the latter

16 Such variables that accumulate over long term with their stock being measured at one point of time are referred to as "stock" variables.
17 These variables which are recorded over a specific time period (past month in this case) are referred to as "flow" variables.
18 Asset Index is constructed using the NFHS-4 data from 2015-2016. Per capita monthly consumption expenditure is taken from the Consumption module of the 68th NSSO round, which was conducted in 2011-2012.

measure for inflation, all India General Index from the Consumer Price Index (CPI) is used for rural and urban areas, respectively.[19]

As both of these measures change over time and are difficult to monitor at the population level, different state administrations rely on eligibility rules that can map the bottom 40% of households as closely as possible. These measures are recorded and available for administrative use as per SECC 2011. Using certain SECC criteria (Table 1 and Table 2), eligibility rules across rural and urban areas are followed to identify the potential beneficiaries.[20]

For rural areas, households satisfying any of the six deprivation criteria are included as per these SECC eligibility rules. Additionally, rural households satisfying any of the five automatic inclusion criteria are also included (see Table 1).

Table 1: Eligibility criteria for rural

Deprivation Criteria	Automatic Inclusion Criteria
D1: Only one room with kutcha walls and kutcha roof D2: No adult member between the age of 16 to 59 D3: Female-headed households with no adult male member between ages 16 to 59 D4: Disabled member and no able-bodied adult member D5: SC/ST households D7: Landless households deriving a significant part of their income from manual casual labour	A1: Households without shelter A2: Destitute/living on alms A3: Manual scavenger families A4: Primitive tribal groups A5: Legally released bonded labour

In urban areas, eleven broad categories of unorganised workers are included in the eligibility rules (Table 2).

Table 2: Eligibility criteria for urban

Occupational Categories
• Rag picker • Beggar • Domestic worker • Street vendor/ Cobbler/hawker / Other service provider working on streets • Construction worker/ Plumber/ Mason/ Labor/ Painter/ Welder/ Security guard/*Coolie* and another head-load worker • Sweeper/ Sanitation worker / *Mali* • Home-based worker/ Artisan/ Handicrafts worker / Tailor • Transport worker/ Driver/ Conductor/ Helper to drivers and conductors/ Cart puller/ Rickshaw puller • Shop worker/ Assistant/ Peon in small establishment/ Helper/Delivery assistant / Attendant/ Waiter • Electrician/ Mechanic/ Assembler/ Repair worker • Washer-man/ *Chowkidar*

Additionally, previous RSBY enrolled households are also taken as an eligibility rule for PMJAY. Moreover, various state governments had the freedom to expand this set of eligibility rules further. For example, the state of Uttarakhand expanded the potential set of beneficiaries to include those eligible under National Food Security Act (NFSA) and well-government employees and pensioners.

Thus, the set of eligibility rules (SECC 2011 criteria in combination with other state-level eligibility conditions) provides an objectively verifiable set of indicators at the population level, which can then be used to identify those households that constitute the intended beneficiaries (bottom 40%) and eligible beneficiaries. In an ideal setting, all those from the bottom 40% of the all-India population in terms of economic well-being should also be identified as eligible by these set eligibility rules. A significant mismatch between the two, on the other hand, would imply errors of inclusion or exclusion of design.

To check for this potential mismatch in Haryana and Uttarakhand, OPM conducted a primary survey (OPM PMJAY 2021) in the states to quantify the degree of design and implementation errors. Here, in addition to questions on socio-economic, demographic and other variables, the survey also recorded information on a range of inclusion and exclusion conditions used to identify the PMJAY beneficiaries.

19 Taken from the Reserve Bank of India (RBI) https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/38TFB3780B637E6460F91F9EF7040A65EB3.PDF (last accessed January 25, 2022).

20 Eligibility conditions can be found at: https://www.pmjay.gov.in/sites/default/files/2018-07/GuidelinesonProcessofBeneficiaryIdentification_0.pdf (last accessed on January 25, 2022)

Moreover, because the study used all India threshold values to identify the bottom 40% population by asset and consumption expenditure, we used comparable modules from the NFHS-4 and NSSO's 68th round to obtain compatible estimates for asset and consumption levels in respective states. Finally, information was also collected on enrolment in various other government schemes that were also accessible via the SECC criteria in 2011. As eligibility under OPM PMJAY 2021 survey cannot be matched with the actual SECC 2011 status, which is confidential, access to these other government schemes is taken as a proxy for SECC 2011 eligibility for PMJAY. Using all these variables, households were classified into 4 categories.

1. **CE-Eligible 2021:** We collected information on the households' monthly per capita consumption expenditure (MPCE) as done in the last available National Computation round conducted by the NSSO in 2011-12. These estimates, after adjusting for inflation, were compared with national cut-off values for average MPCE that identify the bottom 40% of all Indian population.
2. **AI-Eligible 2021:** Along with the consumption expenditure, we utilized the asset index values for the bottom 40% of households from all-India NFHS-4 (2015-16) data.[21] Information on the same set of assets was collected from the households during the primary survey. The asset index was constructed following the same methodology outlined by NFHS-4 and was compared to identify the intended beneficiaries.
3. **Modified SECC-Eligible 2021 criteria:** The OPM PMJAY 2021 survey collected information on the same SECC indicators used as eligibility rules to identify the potential beneficiaries. This was done for both the rural and urban areas of each of the states of Haryana and Uttarakhand. Along with that, all other additional state-specific eligibility rules, as mentioned previously, were added here to identify the intended beneficiaries.[22]
4. **PE-Eligibility 2011:** Unfortunately, we do not observe the SECC 2011 status of respondents as households are not aware whether they are enlisted in SECC 2011 data or not. [23]To proxy for this, we use PE eligibility 2011, which was based on the household's enrolment status in other social security schemes implemented based on the SECC eligibility list. During the primary survey, we collected information on a household's enrolment status in other government schemes[24] that use the SECC criteria for targeting the poor and vulnerable. Enrolment under these is taken to be a proxy for SECC 2011 eligibility. This method, however, can still be biased by (i) errors in the way these schemes identified the potential beneficiaries using the SECC 2011 data; (ii) the implementation process of these schemes; (iii) the quality of the information received about these schemes, and (iv) errors of implementation in these set of programmes themselves. Hence, the results from the analysis of implementation errors may not provide robust estimates of true implementation errors and must be interpreted with caution. We now turn to how these errors, emerging from design and implementation, are calculated.

2.2 Estimation of errors

We now examine how inclusion and exclusion errors across design and implementation were measured. For this, we refer to the four variables mentioned in the previous section.

To estimate summary measures of these errors, we tabulated the following:

1. **Design errors:** CE/AI Eligible 2021 and Modified SECC eligible 2021
2. **Implementation errors:** PE-Eligible 2011 and current registration status under PMJAY for anyone in the household. Given that PE-eligible 2011 is only a proxy, we also compared Modified SECC eligible 2021 status with registration under PMJAY. This informs us how the eligibility rules map today to recipient status that was based on the same eligibility rules as observed in 2011.

Tabulating these after applying sampling weights, we obtained estimates of errors under design and implementation, respectively. From exclusion errors of design, we were able to gauge the degree of under-coverage of the actual bottom 40% as per the SECC eligibility criteria. This then allowed us to

21 We propose to utilize the NFHS-4 data as the findings from all the states and the unit level data of the latest NFHS-5 round (conducted in 2019-20) is not published yet.

22 Note that these conditions may not inform the actual eligibility status for PMJAY registration as eligibility rules in 2011 may have a different status of the household as against what is observed in 2021. This is covered under PE-Eligibility 2011, below

23 This information is also not available to us through administrative sources because of confidentiality of the data.

24 Like Pradhan Mantri Aawas Yojana-Gramin; Deendayal Antyodaya Yojana-National Rural Livelihood Mission; Pradhan Mantri Jan Arogya Yojana-Ayushman Bharat; Pradhan Mantri Sahaj Bijli Har Ghar Yojana; Pradhan Mantri Ujjwala Yojana; National Food Security Act (used by several state governments)

verify if the SECC eligibility criteria worked in the identification of the bottom 40%, as it was intended to. Inclusion errors of design, on the other hand, informed us about the resource leakages as it provides a measure of non-bottom 40% who were erroneously identified as poor and hence passed as eligible for benefits under the PMJAY. Identifying these errors can only go far in informing us of ways to rectify this problem. To do that, we analysed the socio-economic profile of those excluded and included via design errors and then relied on qualitative insights to understand the underlying context of these errors.

Our **qualitative analysis** primarily focussed on the sub-themes of the community (including FGD participants, village heads, and Accredited Social Health Activist (ASHAs) perspectives on coverage or under-coverage of the poor (or non-poor) by the PMJAY scheme, along with the viewpoint of the relevant stakeholders (including National Health Authority (NHA) / State Health Authority (SHA) officials, PMAMs) on the effectiveness of the eligibility criteria to cover the poor under the scheme (please see Annexe C for the detailed analytical framework for the qualitative data).

Next, as in the case of estimating design errors, we computed estimates of **implementation errors.** Moreover, we also looked at the socio-economic profile of those households who contributed to inclusion and exclusion errors of implementation. As discussed previously, we were more cautious in interpreting our findings here as we did not have access to the SECC 2011 status of respondent households from our primary survey. This was proxied for via other government schemes, which may have inclusion and exclusion errors of their own. Specifically, the government schemes that were used to proxy for 2011 SECC eligibility for PMJAY were as follows: (a) Pradhan Mantri Aawas Yojana-Gramin; (b) Deendayal Antyodaya Yojana-National Rural Livelihood Mission; (c) Pradhan Mantri Sahaj Bijli Har Ghar Yojana; (d) Pradhan Mantri Ujjwala Yojana; (e) National Food Security Act (used by the Uttarakhand government). Using quantitative and qualitative data, we then tried to identify the implementation challenges in PMJAY. The qualitative analysis aimed to understand the process and the various challenges that the PMJAY implementers faced while registering the listed beneficiaries, along with their perspective on the targeting mechanism of the scheme.

3 Findings

The OPM PMJAY survey 2021 seeks to study whether intended beneficiaries under the programme were able to gain registration under PMJAY. This comprises two vital pathways that inform the efficacy and areas of improvement for PMJAY. The first caters to design errors, which studies how the eligibility rules map the intended beneficiaries, which are the bottom 40% of all India population from the states of Haryana and Uttarakhand. The second studies the administrative implementation of these eligibility rules to gain recipient status under PMJAY. We now turn to each of these, starting with the overlap between the intended beneficiaries and their recipient status under PMJAY. We note that OPM PMJAY 2021 survey compares well with recent, nationally representative surveys like NFHS-4 (see Annex D: Comparison with representative surveys). Moreover, as we in this section are more concerned with state-wise results, the estimates presented use survey weights. A brief description of the overall sample is provided in Annex E.

3.1 Intended beneficiaries and PMJAY recipient status

During analysis, we first studied the overlap between intended beneficiaries' (bottom 40%) recipient status (registration under PMJAY). Here, out of our two measures of economic well-being, we used the consumption-based measure (CE-eligible, 2021) to identify households that are in the bottom 40% of all India's population. The broad results are comparable if we were to use the asset-based measure of poverty (AI-eligible, 2021) instead as well. We prefer the asset-based measures of poverty as these are preferred in the literature and are likely to be more sensitive to economic and health shocks.

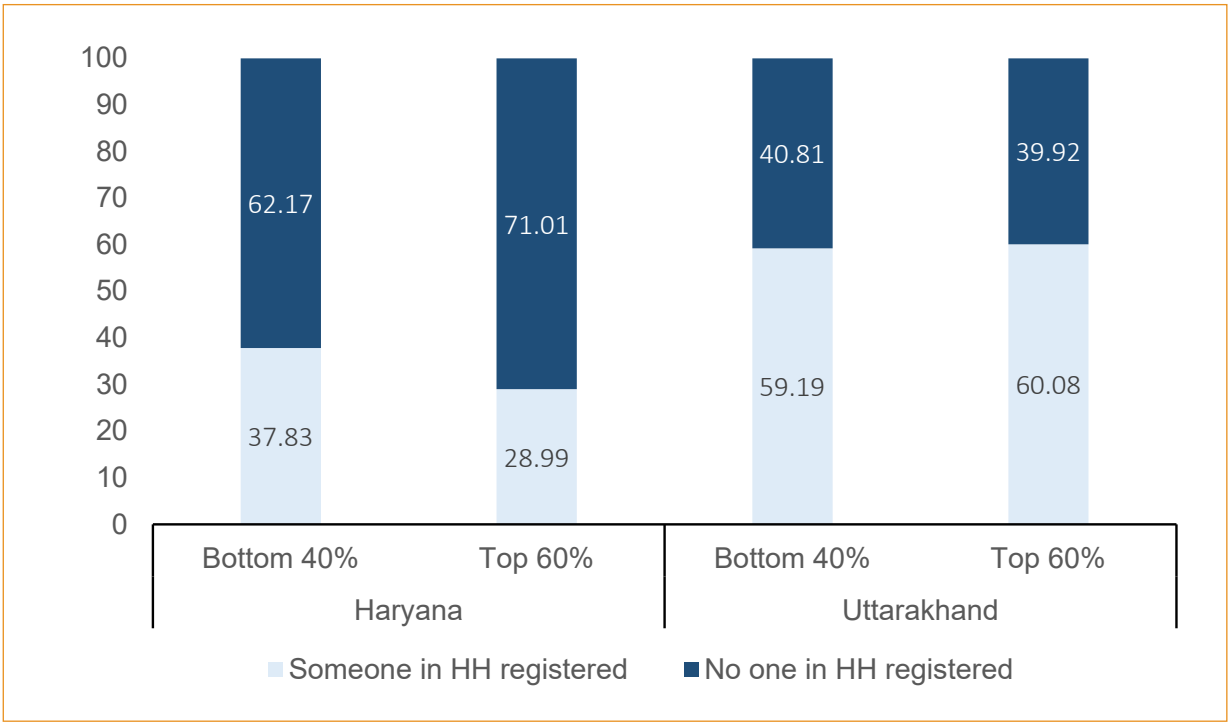
Using sampling weights derived at the household level, we found that in Haryana, about 38% of the households, who would be falling in the bottom 40% of the all-India population at present, had someone in the family registered under PMJAY. The corresponding Fig. for Uttarakhand was 59%. Amongst the top 60% of the households, 29% in Haryana had at-least one member in the household registered under PMJAY. In Uttarakhand, about 60% of the top 60% of households had at least one member in the family registered under PMJAY.

Thus, preliminary evidence suggests that in Haryana and Uttarakhand, 4 to 6 out of 10 households in the bottom 40% are registered under PMJAY. A weighted average of this across the two states is likely to be close to 50%, which would suggest that the odds of the intended beneficiary (bottom 40%) being a recipient of PMJAY is close to random (see Fig. 3).

In terms of comparison across states, it appears that a higher share of intended beneficiaries (bottom 40%) in Uttarakhand are registered under PMJAY than in Haryana. This is, however, not surprising given the fact that the state has expanded the eligibility rules to identify the bottom 40% population. A relatively higher coverage vis-à-vis Haryana suggests that at least some of these additional eligibility rules work in identifying the intended beneficiaries. Simultaneously, however, within Uttarakhand, a similar share of the bottom 40% and top 60% have someone in the household registered under the PMJAY. This would suggest that the cost of lower exclusion errors is in terms of higher inclusion errors. These results are

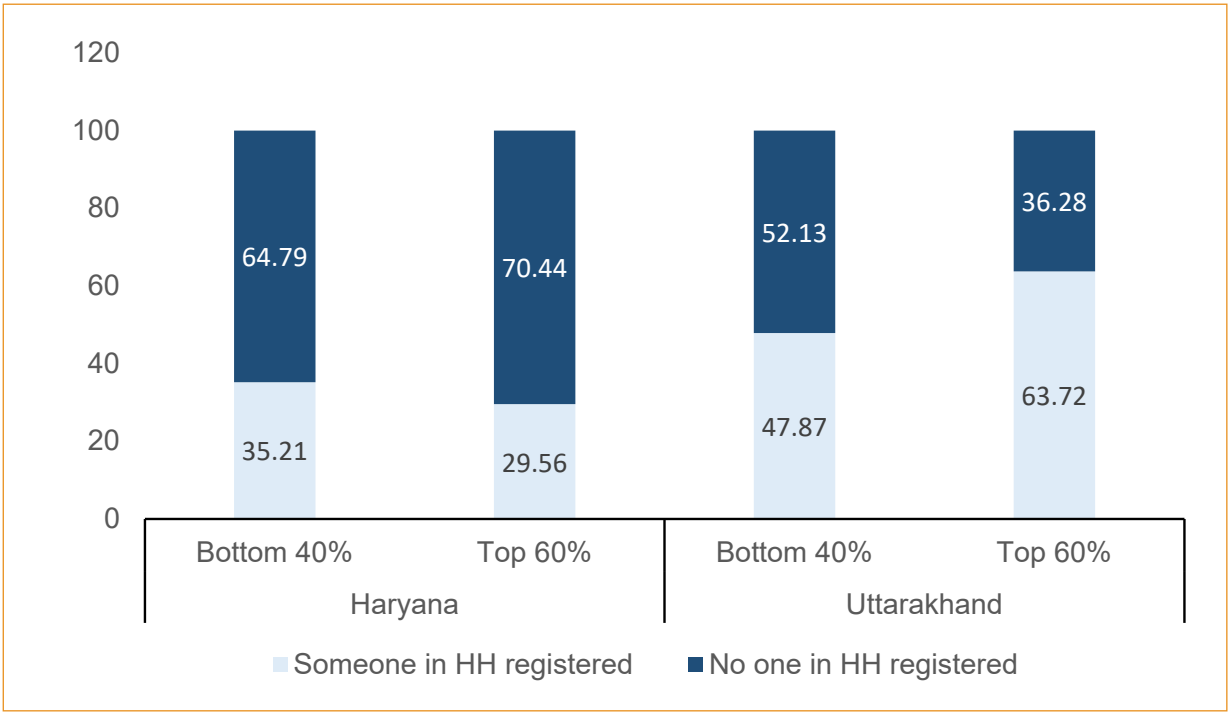
broadly similar if we use the asset-based measure of economic wellbeing (AI eligible, 2021) as against the consumption measure (CE-eligible, 2021).

Fig. 3: Coverage of bottom 40% and top 60% by consumption classification under PMJAY (%)



Source: OPM PMJAY survey, 2021
Note: The bottom 40% and top 60% are based on consumption thresholds that were taken in the form of monthly per capita consumption expenditure.

Fig. 4: Coverage of bottom 40% and top 60% by asset classification under PMJAY (%)



Source: OPM PMJAY survey, 2021
Note: The bottom 40% and top 60% are based on asset thresholds that were taken in the form of the asset index.

Our qualitative findings also corroborate these discrepancies. One of the ASHAs in Haryana mentioned the exclusion of vulnerable groups, like low-income earners, scheduled castes, the family headed by widows with no earning members, and domestic workers in their area. At the same time, a handful of people from well-to-families were enrolled in the PMJAY scheme. On the flip side, the respondents from Uttarakhand, which has expanded the list of eligible people by including NFSA and government employees, reported including economically better-off households in the scheme. One of the PMAMs in the state stated that "there are businessmen, rich farmers, people who stay in multi-storied buildings, who are registered to the scheme. Even though they can pay for treatment, they are getting it free in private hospitals."

One of the senior-level officials expressed that the eligibility criteria outlined through SECC are quite complex for the target population, who are often characterised by low levels of education as well, to understand. Additionally, the target households are unaware of their eligibility as per the SECC-2011 list. In his opinion, the criteria should be a simple one so that the targeted beneficiaries are informed about their eligibility and can themselves go and enrol in the schemes.

The qualitative respondents shared that lack of awareness among the poor and less-educated families is also one reason for exclusion. These vulnerable people, even if they belong to backward castes or have BPL cards, do not approach the relevant officials to check their eligibility. Often, the bottom 40% of households are unaware of their eligibility in the scheme, particularly given the criteria under the SECC (as shared by one village head).

These discrepancies between eligibility and coverage under PMJAY can potentially arise from two sources: (i) the eligibility rules used to identify the poor (Design), or (ii) the implementation of the programme that aims to provide access to those who have been identified as beneficiaries (Implementation).

For the implementation part, we noted that we do not have access to the actual SECC 2011 status of the respondents due to data protection guidelines. We thus proxy for this in two ways. First, we proxy SECC 2011 eligibility via eligibility as on the survey date (Modified SECC eligibility 2021). Second, we proxy this through registration in other government programmes, using SECC status to ascertain eligibility (PE-eligibility 2011). Both these variables of interest are summarized in Table 3 below. Note that for 2021 and 2011, a larger share of households in Uttarakhand appeared to be eligible for PMJAY, as against Haryana. A critical reason for this is that eligibility in Uttarakhand has been further expanded to include beneficiaries under NFSA or those who were government employees. We now focus on the magnitude of design and implementation errors. With this caveat in mind, we now turn to design and implementation errors.

Table 3: SECC eligibility for PMJAY (2021 and 2011)

States	Modified SECC Eligible 2021	PE Eligible 2011
Haryana (%)	51.95	25.35
Uttarakhand (%)	80.07	73.12

Note: For reasons stated in the text, implementation errors using both modified SECC eligible 2021 and PE eligible 2011 need to be interpreted with caution as an indirect approach has been used to proximate for eligibility in 2011. Uttarakhand expanded the scope of the scheme to include those registered under NFSA and those with government jobs.

3.2 Design and implementation errors

3.2.1 Design errors

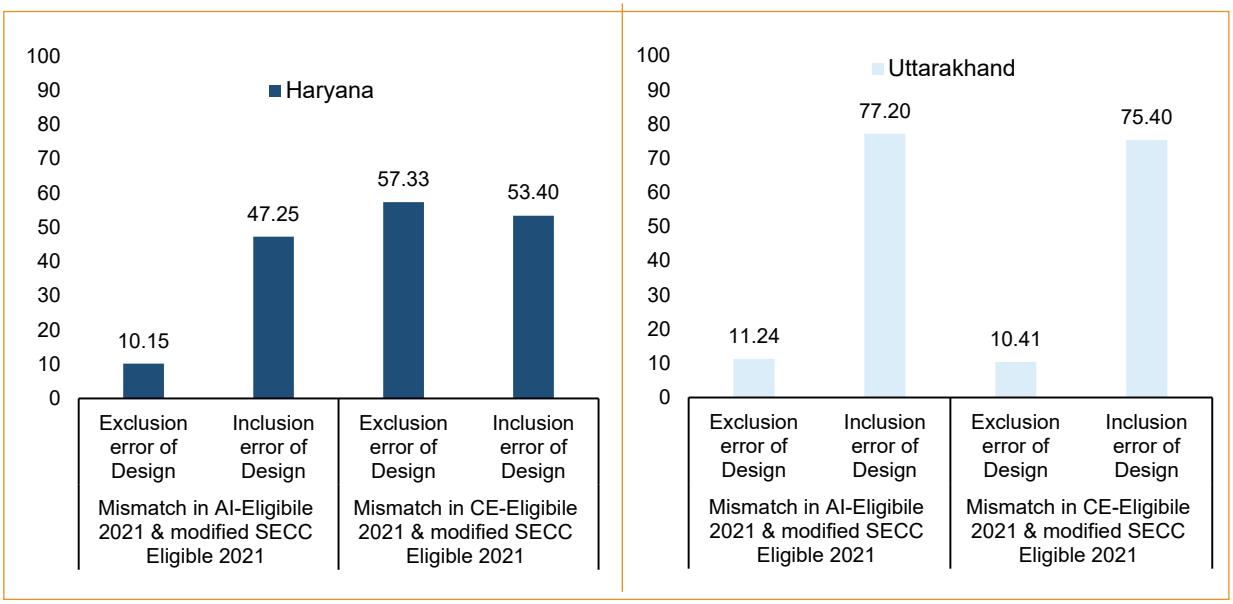
We first checked for the presence of design errors and quantified the magnitude of the same where they existed. These errors occur when there is a mismatch between the programme design to identify intended beneficiaries and the eligibility rules as per the modified SECC-Eligible 2021. Exclusion errors of design occur when the actual bottom 40% are deemed ineligible using the above eligibility rules. When the top 60% satisfy the eligibility rules as per the modified SECC-Eligible 2021 criteria, this constitutes a leakage which results in the inclusion error of design.

As mentioned previously, we used both assets and consumption-based measures to identify the households in the bottom 40% of the all-India population, as per the OPM PMJAY 2021 survey. We present the exclusion and inclusion errors using both of these measures below in Fig. 5. Estimates

of exclusion errors using asset measures of economic wellbeing appear to be low for both states.[25] This suggests that about 89% to 90% of the intended beneficiaries are eligible as per the eligibility rules outlined under modified SECC-eligible 2021 criteria. Existing literature on the identification of the poor suggests that asset-based measures are more reliable than income or consumption measures (Liverpool-Tasie 2011). Overall, this suggests that the exclusion errors of design for both states are low. Note that Uttarakhand uses an expanded set of eligibility rules, which in addition to the SECC 2011 criteria, also includes registration under NFSA and those with government jobs. If these rules were not used, exclusion errors of design in Uttarakhand are significantly higher at about 30% (as against 11%). In tandem, the inclusion error of design is lower at 39% (as against 77%) (See **Fig. 21** in supplementary figures and tables (Annex G)).

The results of this relative comparison reverse for inclusion errors, which are higher for both states, but more so for Uttarakhand. Juxtaposing both these errors, it appears that Uttarakhand has been able to keep exclusion errors in design low by expanding the eligibility criteria for identification of the bottom 40% by adding those households that are covered under the NFSA as well as those with government jobs to the existing conditions of SECC-2011 eligibility. However, an associated cost of expanding the eligibility criteria appears to have been incurred in the form of higher inclusion errors.

Fig. 5: Exclusion and inclusion errors in design (%)



Source: OPM PMJAY 2021 survey, OPM's calculations
Note: Exclusion error of design refers to % of poor (CE-eligible 2021/AI- eligible 2021) who are ineligible as per SECC-eligibility 2021 criteria. Meanwhile, inclusion error of design refers to % of non-poor (as per CE-eligible 2021/AI- eligible 2021) who satisfy SECC-eligibility 2021 criteria.

During qualitative interviews, the SHA officials in Uttarakhand shared that the state government took the decision to expand the selection criteria at the onset of the PMJAY scheme. The respondent shared that at the very beginning, it was realized by the relevant stakeholders that the SECC-2011 list would have covered the poor households in Uttarakhand partially. Based on this, the state government took the decision to include the NFSA, along with expanding coverage to the government employees under the PMJAY scheme. Until October 2021, the state was using NFSA 2014 database, and since then, is utilizing the NFSA 2021 list.

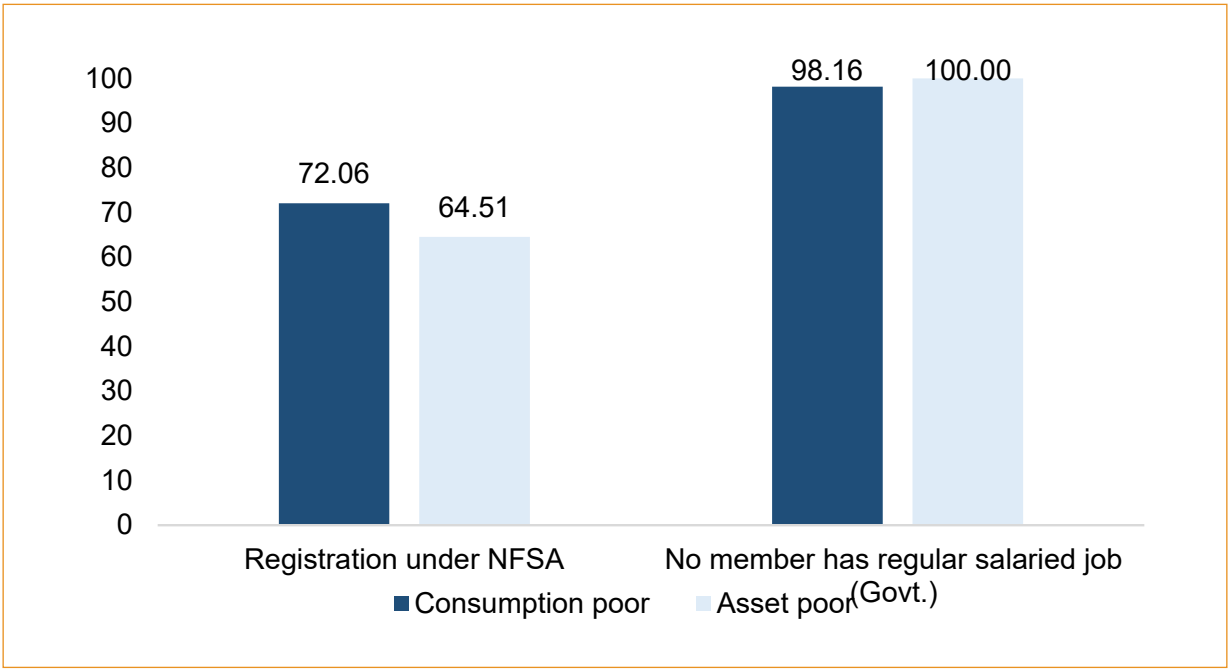
To verify if the expansion of eligibility rules in Uttarakhand were driving these results, we looked at the bottom 40% of households in Uttarakhand. We saw what share of these have access to NFSA and regular government job. As Fig. 6 shows, about 2 in 3 bottoms 40% of households in Uttarakhand have access to NFSA. This would suggest that the inclusion of NFSA beneficiaries in the design decisions has probably allowed the state to keep exclusion errors low. Simultaneously, the overlap between the bottom 40% and households where someone has a government job appears to be minimal. This then suggests that excluding households where someone has a government job is likely to reduce inclusion errors without

25 Note that for Haryana, the consumption measure suggests higher levels of exclusion errors. This can potentially happen due to differences in stock and flow measures of economic well-being. We take this result to be ambiguous as asset measures suggest low levels of exclusion errors.

adversely affecting exclusion errors. Thus, improved design decisions and eligibility rules to identify the intended beneficiaries may allow states to reduce inclusion errors while keeping the achievements of low exclusion errors intact.

However, we note that access to NFSA by itself maps to SECC eligibility status with only limited success. Only 47% of the SECC eligible households in Haryana have an NFSA card. The Fig. for Uttarakhand stands at 64%. Detailed contingency tables are presented in Table 20 in Supplementary Material.

Fig. 6: Share of bottom 40% with NFSA card and non-govt. jobs in Uttarakhand (%)

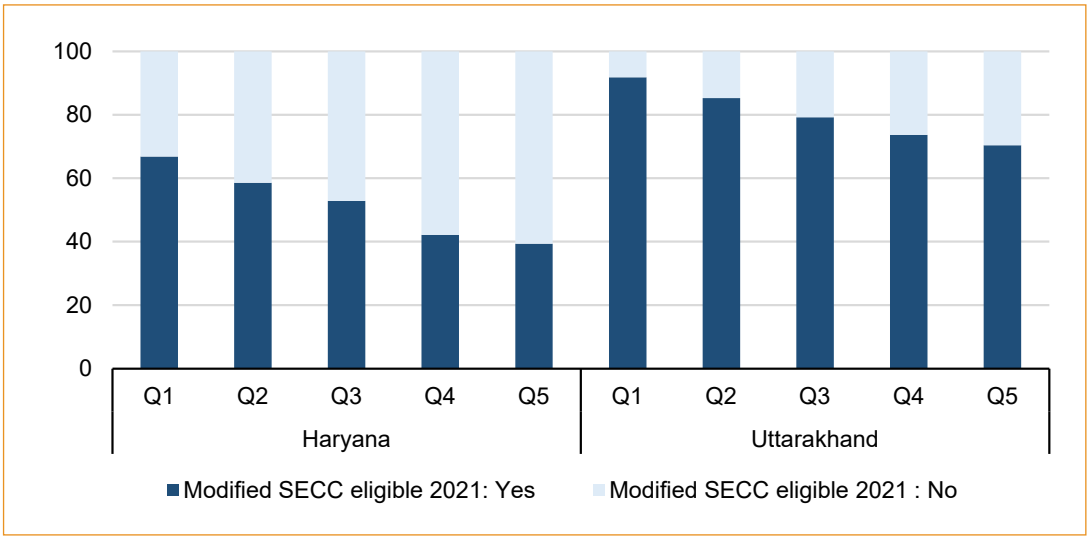


Source: OPM PMJAY 2021 survey, OPM's calculations
Note: Poor here refers to the bottom 40% of the all-India population, as identified by the asset and consumption measures of economic well-being.

Before discussing the socio-economic characteristics of households excluded or included by design, we note that these errors need not be a linear function of economic well-being. In other words, the design rule may result in different inclusion and exclusion errors for households occupying different rungs of the economic ladder. To check for this, we divided respondents from each state into quintiles, which are five equal-sized groups clustered on the basis of economic status. The economic status was ascertained via monthly per-capita consumption expenditure. In the figures below, Q1 represents the bottom 20% of the households (poorest), whereas Q5 represents the top 20% of the households (richest). For the bottom-most quintile (Q1), which constitutes the most vulnerable households, we found that about 67% and 92% of these were modified SECC-eligible (2021) in Haryana and Uttarakhand, respectively. Thus, Fig. 7 further reinforces our earlier point of Uttarakhand achieving lower exclusion errors of design by broadening the eligibility conditions. For the most well-off segment (Q5), 70% of these households were SECC eligible in Uttarakhand, as against 39% in Haryana. In fact, a larger share of households from Q5 in Uttarakhand (70%) were eligible as per the modified SECC-eligibility 2021 as against the households in Q1 from Haryana (67%). Given that the overall economic status in both these states is above India's average and that Uttarakhand does not lag behind Haryana by much,[26] these numbers are suggestive of higher inclusion errors in Uttarakhand. The broad trends are similar if we were to use asset-based quintiles instead (see Fig. 8).

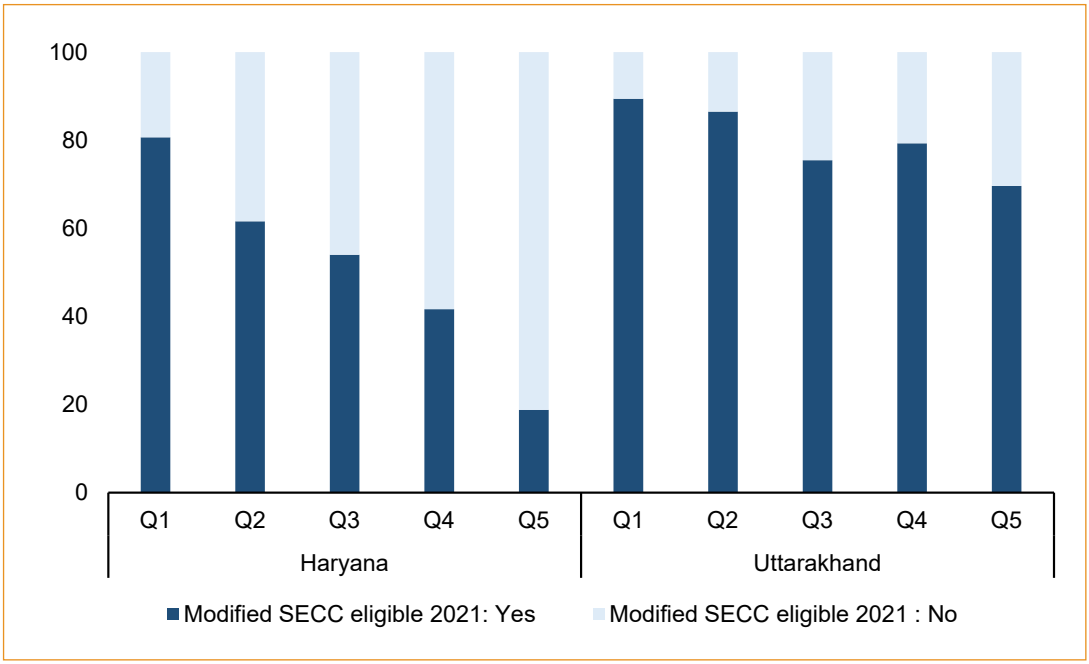
26 National State Domestic Product per capita in 2019-2020 was estimated to be Rs 272,844 and Rs 226,144 for Haryana and Uttarakhand, respectively. All India average for this stood at Rs 134,432.http://mospi.nic.in/sites/default/files/press_releases_statements/State_wise_SDP_15_03_2021.xls (Last accessed March 28, 2021).

Fig. 7: State-wise design errors for different consumption quintiles



Source: OPM PMJAY 2021 survey, OPM's calculations
Note: Quintiles are computed state-wise based on monthly per-capita consumption expenditure for the household.

Fig. 8: State-wise design errors for different asset quintiles



Source: OPM PMJAY 2021 survey, OPM's calculations
Note: Quintiles are computed state-wise based on a standardized asset index using Principal Component Analysis (PCA) for the household. The quintiles were computed using the distribution of the standardized asset index (0-100) for each state separately. Q1, Q2, Q3 and Q4 thresholds for Haryana (Uttarakhand) are 35.95 (23.77), 49.96 (39.37), 60.41 (52.62), 69.50 (64.50), respectively. Thus, at each quintile threshold, respondents in Uttarakhand are on average poorer than those in Haryana.

Overall, as against our findings in section 3.1, where we saw that the odds of an intended beneficiary (bottom 40%) being a recipient of PMJAY is close to random, the exclusion errors of the design appear to be quite low, especially in case of Uttarakhand. For Haryana, using the asset index as a measure of economic well-being, exclusion errors of design are again estimated at about 10%. Thus, this suggests that eligibility rules used from the SECC (modified SECC 2021) do a reasonably good job of identifying the intended beneficiaries. However, in comparison, estimated inclusion errors of the design appear to be on the higher side. For Haryana, these range from 47% to 53%, whereas for Uttarakhand, these are between 75% to 77%, depending on whether we use an asset or a consumption-based approach to identify the bottom 40% of all India's population. These findings suggest that there is room for efficiency gains through methods that could reduce inclusion errors in design. One potential approach to this

would be the identification of automatic exclusion conditions, which can keep the above 60% of the all-India population out of the eligible population but do not impinge on the identification of the bottom 40% population. We discuss some potential options in the policy recommendations section.

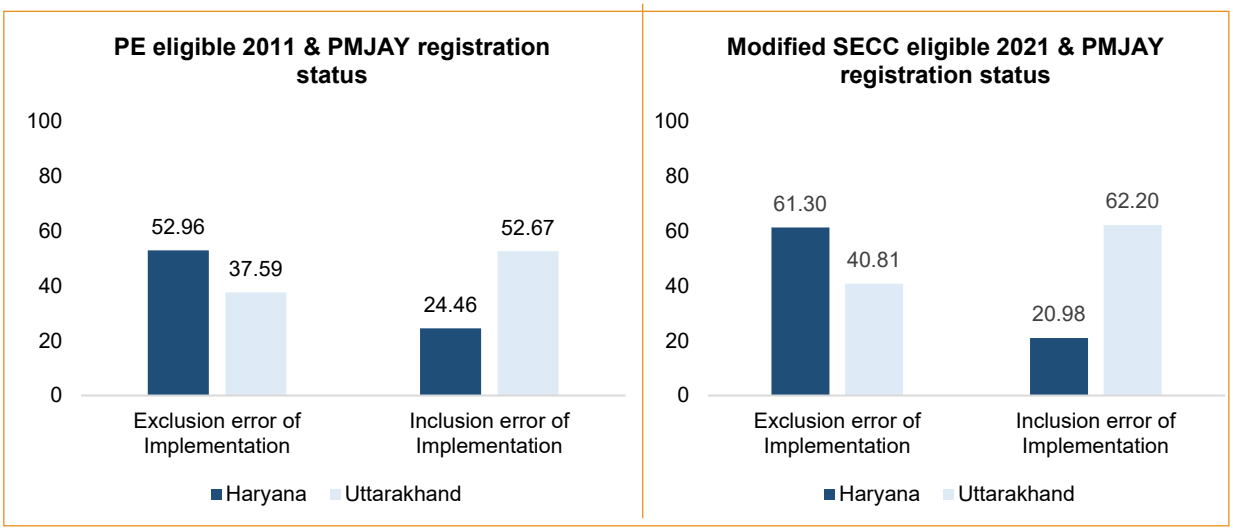
3.2.2 Implementation errors

The detailed registration process of the eligible enlisted person under the PMJAY scheme is provided in Annex F: Registration process under PMJAY. As we have mentioned earlier in sections 2.1 and 2.2, ascertaining the magnitude of implementation errors is complicated by the unavailability of the actual SECC eligibility status of households from 2011. However, a similar set of eligibility conditions from SECC-2011 was used to extend benefits under various other government programmes. These, in addition to other state-specific eligibility rules, as discussed previously, are assumed to proxy for the unobserved eligibility status (see PE-eligible 2011 in section 2.1). When juxtaposed with registration under PMJAY, we obtain estimates for implementation errors. Please note that the estimation of implementation error using this method is subject to bias that may emerge from erroneous recipient status under these other government schemes. Given the inherent weakness in this comparison, we also analysed how eligibility status today (2021) fares with PMJAY recipient status for the respondents. We know from the previous section that the existing set of eligibility rules under SECC criteria does a reasonable job of identifying the bottom 40% when analysed in the same period. Potential gaps in implementation today (PMJAY registration based on 2011 SECC criteria) and eligibility in 2021 would suggest that the set of eligibility conditions need to be updated more regularly for these to be effective in checking implementation errors. Let us now discuss each of these in turn.

Mismatched pairs[27] in the former (PE-eligible 2011 and PMJAY recipient status) provide a proximate idea about the existing levels of implementation errors. Fig. 9 suggests that the percentage of PE-eligible 2011 households that were not covered under PMJAY (exclusion errors of implementation) were about 53% and 38% for Haryana and Uttarakhand, respectively. Thus, unlike exclusion errors of design which were low at around 10% to 11%, exclusion errors of implementation appear to be relatively higher. This would suggest that exclusion errors are more of an implementation challenge than a design problem.

Meanwhile, the percentage of PE-ineligible 2011 households covered under PMJAY (inclusion errors in implementation) stood at 24% and 53% for Haryana and Uttarakhand, respectively (Fig. 9). Again, just as in the case of inclusion errors in design, inclusion errors in implementation were found to be lower for Haryana than Uttarakhand. Instead, if we compare modified SECC eligible 2021 with PMJAY recipient status, we again get a similar picture.

Fig. 9: Proximate implementation errors of exclusion and inclusion (%)



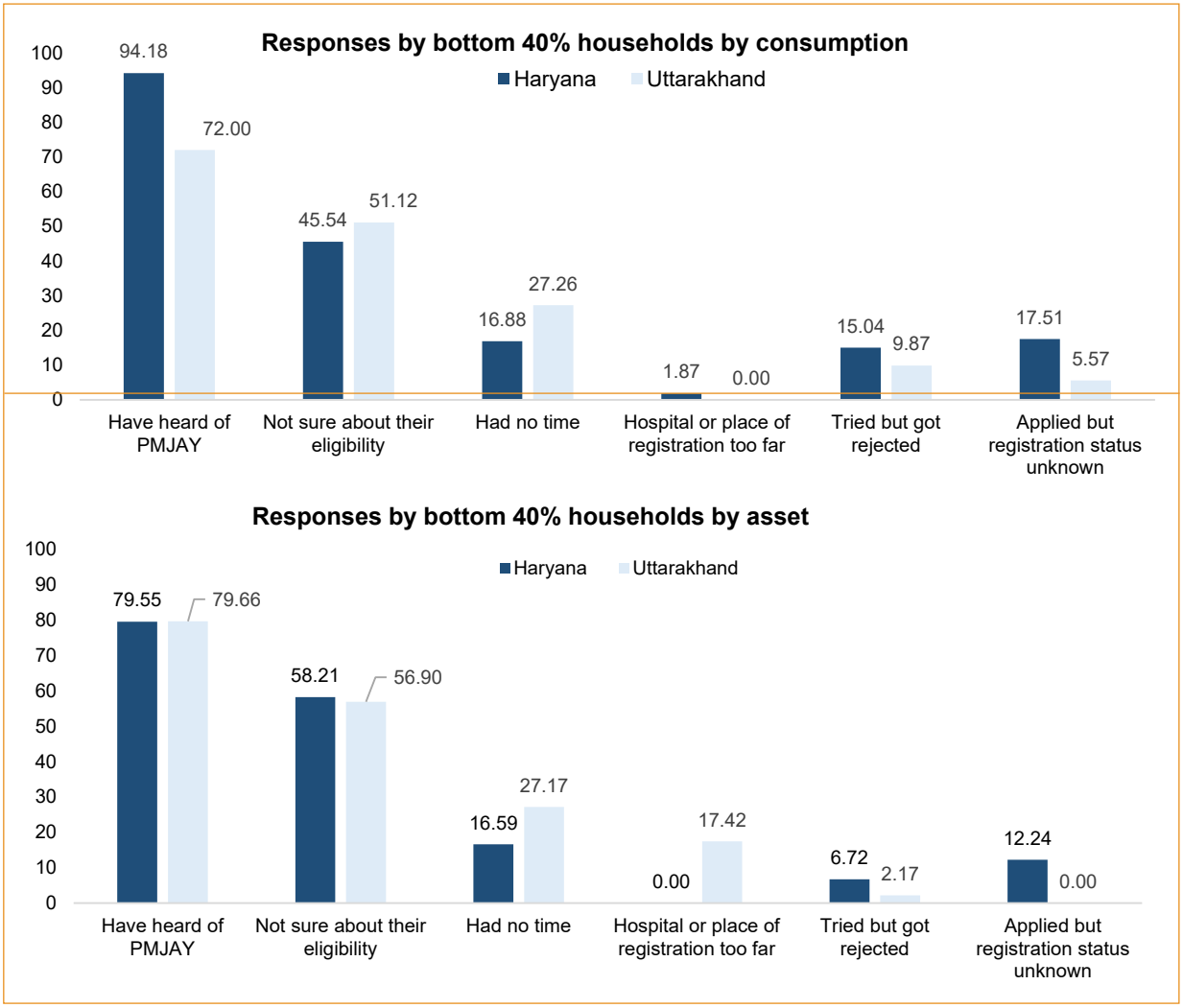
Source: OPM PMJAY 2021 survey, OPM's calculations

Additionally, in OPM-PMJAY 2021 survey, we also asked the respective household heads about the reasons for not being registered under PMJAY.[28] For the bottom 40% of the all-India population, using both consumption and asset-based methods, we find that most households were aware of the PMJAY

27 PE-eligible 2011 but not registered under PMJAY and PE-ineligible 2011 but registered under PMJAY.
28 This was reported only for households who were not registered under the PMJAY.

programme. However, not being aware of their eligibility status was reported as the most vital reason for not being able to register under PMJAY. This holds true for both Haryana and Uttarakhand (Fig. 10).

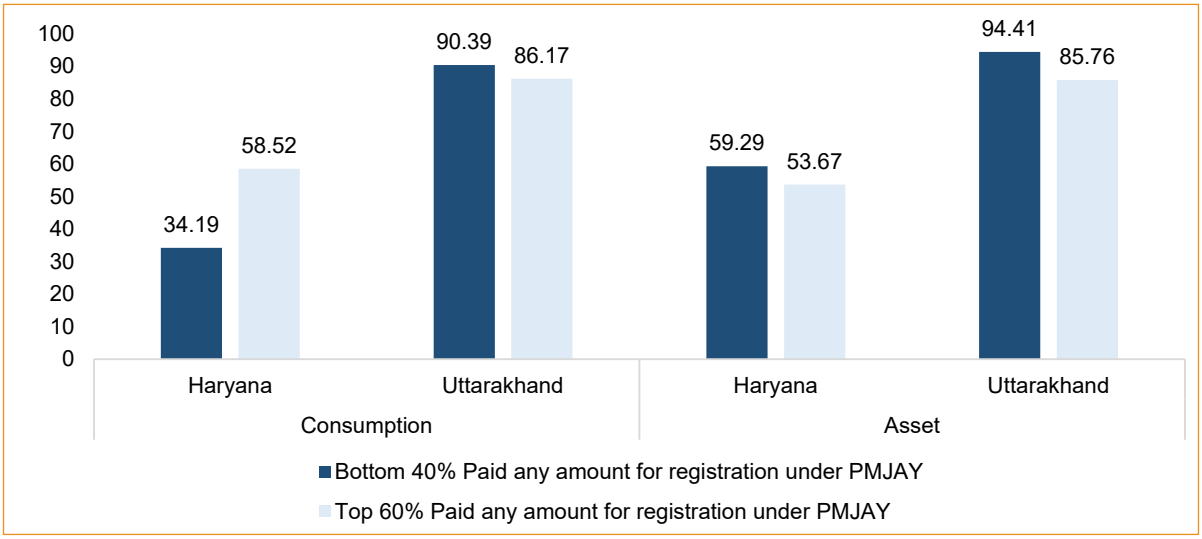
Fig. 10: Awareness about PMJAY and reasons for not being registered, as reported by heads of households in bottom 40%



Source: OPM PMJAY 2021 survey, OPM's calculations

Among those registered under PMJAY, we also asked if the household heads had to pay money to register themselves. We find no evidence of a differential share of households reporting they had to pay to register across the bottom 40% and top 60% of households (Fig. 11).

Fig. 11: Share of household heads who reported having to pay to get registered under PMJAY across bottom 40% and top 60% of the all India population (%)



Source: OPM PMJAY 2021 survey, OPM's calculations

During qualitative data collection, the village heads, ASHAs and PMAMs pointed out several challenges in enrolling people using the list of eligible people:

(i) The eligibility lists based on SECC-2011 data is, a decade-old data, leading to issues like changed address, migration to other places by eligible people, etc. This led to non-delivery of the PMJAY letters to the enlisted people

(ii) In many cases, there were spelling mismatches between the names in the PMJAY letter and the supporting documents that serve as proofs of identity (like Aadhar card etc.) or also in the fathers/guardian's name. Though in such cases, the eligible person can get it corrected by filing out additional forms and obtaining a court affidavit, often this was considered as time-consuming and an expensive process.

(iii) Even after receiving the PM letters or information dissemination about registration through camps/ hospitals / CSCs, the eligible people often do not go to get themselves registered as the process is considered time-consuming, leading to wage loss for the poor people.

(iv) In the case of Uttarakhand, PMAMs shared that given the hilly terrain, people living in remote areas find it difficult to reach the empanelled hospitals or CSCs to register themselves under the scheme.

(v) For both the states, mobility restrictions for aged and female to go to the registration centre were cited as reasons for exclusion.

(vi) In the case of Haryana, where only around one-fifth of the FGD respondents received the PMJAY letter, the qualitative findings show a lack of awareness among the poor people of the scheme. A large section of the enrolled people came to know about the scheme either through the letters or if they visited the hospitals for inpatient care (where the doctors or other medical professionals guided them to get registered for the scheme).

3.3 Socio-economic characteristics of design and implementation errors

In this section, we discuss the socio-economic characteristics of households who were excluded or included as part of the design or during implementation. As these characteristics are also likely to differ across states of interest, we provide a state-wise description of these variables.

Here, we focused on the design errors where eligibility rules were set to map the bottom 40% of the Indian population as closely as possible. Characteristics of the bottom 40% who were excluded due to the design rules were compared with those below 40% to identify points of contrasts. Second, we present the descriptive statistics of the top 60% of households who were mistakenly identified as eligible by the design rules. Again, to provide a comparative picture, we juxtapose these with characteristics of those who are in the top 60%. Third, we used the proxy for eligibility as per SECC 2011 (PE-eligibility 2011) to provide the characteristics of PE-eligible households who are not registered under PMJAY. Finally, we present socio-economic correlates of PE-ineligible 2011 households who were reported to be registered under PMJAY.

3.3.1 Profile of design errors in Haryana

Compared to the top 60% of the population (Column 3 in Table 4), the bottom 40% of the households (Column 1 in Table 4) in Haryana have a higher share of household heads without formal education, with no one with a graduate degree. Likewise, a higher share of households in the bottom 40% access schemes such as MGNREGA, pension schemes for the vulnerable (widow, old age, disabled), and report someone in the household having chronic ailment. Moreover, in comparison to the top 60%, the bottom 40% have a higher dependency ratio at the household level as well as a higher representation of the vulnerable social groups in the form of Scheduled Tribes (ST) and Scheduled Castes (SC). Importantly, in the bottom 40% of the household, no household head had a motorized two, three or four-wheeled vehicle or at least 2.5 acres of irrigated land with at least one irrigation equipment. Moreover, only 0.70%, or 7 in 1000 households in the bottom 40%, had access to a Kisan Credit Card (KCC) with a limit of at-least INR 50,000. These are some vital conditions that may be used to identify the potential beneficiaries of PMJAY (Table 4).

We further compared the bottom 40% with the bottom 40% who could not fulfil the eligibility rules (exclusion error) (Column (1) vs Column (2) in Table 4). This allowed us to identify any differences in correlates that makes the bottom 40% more likely to be excluded via design decisions. We find that this subset has a higher share of households where someone earns at-least INR 10,000 a month, has ownership of some land other than homestead land, and has access to clean cooking fuel. Also, the relatively higher share of the households that experience exclusion by design reside in urban areas and come from Other/General caste groups. Thus, it is important that these characteristics are not used as part of the design rules to identify the potential beneficiaries (Table 4).

Finally, we compare the top 60% with those in the top 60% who satisfied the eligibility rules (Column (3) to Column (4) in Table 4), thereby contributing to inclusion errors. As compared to the top 60% of households, a larger share of these households report having Jan Dhan accounts. Also, this group has a lower share of households owning land other than a homestead, access to clean cooking fuel, motorized two, three or four-wheeler vehicles, or a pucca house with at least three rooms. Thus, it is likely that focusing on these correlates contributes to inclusion errors or design (Table 4).

In this section, we use AI eligible 2021 (asset) to identify the bottom 40% of the population. Several studies have previously demonstrated that assets provide a more robust basis for identifying the poor as against measures such as income and consumption (Liverpool-Tasie 2011). Nonetheless, the same table using consumption instead of asset measure is provided in Table 4, Annex G: Supplementary figures and tables.

Table 4: Socio-economic profile for design errors (Haryana)

	Bottom 40%	The bottom 40% but excluded from eligibility	Top 60%	Top 60% but included in the eligibility
	(1)	(2)	(3)	(4)
HH head with no formal education	74.45	81.93	29.60	39.76
Head with at-least a bachelors' degree	0.00	0.00	7.07	1.95
At-least someone in HH earning >=INR 10,000 a month	17.77	55.22	55.15	45.96
Access to ration card	83.19	81.40	87.48	88.47
Access to MGNREGA	27.46	37.15	16.16	28.15
Access to Jan Dhan	50.06	36.67	47.49	56.20
HH accessing old age/widow/disabled pension	43.15	7.58	37.09	34.72
Access to EPF/Gratuity/Pvt Insurance/FD/RD	4.47	18.60	17.65	12.08
Own land other than homestead	7.60	18.07	27.38	10.81
Access to clean cooking fuel	20.80	44.76	60.71	51.10
Residing in urban areas	15.25	44.78	29.77	14.64
Someone in the HH has chronic ailments	36.79	18.07	28.22	27.02
Motorized 2/3/4 wheeler	0.00	0.00	34.64	26.56

	Bottom 40%	The bottom 40% but excluded from eligibility	Top 60%	Top 60% but included in the eligibility
Kisan Credit Card with limit >=50,000	0.70	0.00	6.50	2.51
Pucca house with at least 3 rooms	8.14	36.65	41.82	33.43
Refrigerator	10.72	18.07	77.32	69.23
At-least 2.5 acres of irrigated land with at-least 1 irrigation equipment	0.00	0.00	9.32	1.65
Scheduled Caste (SC)/Scheduled Tribe (ST)	56.19	18.60	37.81	65.97
Other Backward Class (OBC)	31.66	37.15	29.21	22.28
Others/General	12.14	44.25	32.98	11.75
Dependency ratio (0-100)	56.79	32.74	38.47	40.17
Average HH size	3.07	4.04	4.91	5.07
Distance from city centre (kms)	35.19	24.89	30.96	33.25
Average age of HH head (years)	56.37	52.27	50.30	49.59
Number of households (weighted)	603,197	61,224	4,867,577	2,300,110

Source: OPM PMJAY 2021 survey, OPM's calculations
Note: Poverty is defined using AI-eligible 2021 status. The estimates are computed using sampling weights. Also, as columns (2) and (4) are sub-sets of columns (1) and (3), respectively, these are not independent of each other, and hence the statistical significance of the differences is not presented.

3.3.2 Profile of design errors in Uttarakhand

In Uttarakhand, and as in Haryana, with respect to the top 60% of the population (Column (3) of Table 5), the bottom 40% of the households (Column (1) of Table 5) have a higher share of household heads without any formal education. Likewise, a higher share of households in the bottom 40% access schemes such as MGNREGA and pension schemes for the vulnerable (widow, old age, disabled). A lower share of such households has access to clean cooking fuel compared to the top 60%. Moreover, in comparison to the top 60%, the bottom 40% have a higher dependency ratio at the household level as well as a higher representation of the vulnerable social groups in the form of ST and SC. Importantly, as in the case of Haryana, in the bottom 40% of the household, no household head had a graduate degree, a motorized two, three or four-wheeled vehicle or at least 2.5 acres of irrigated land with at least one irrigation equipment. Moreover, the bottom 40% of household in Uttarakhand had access to safety nets provided by regular salaried jobs like Employees Provident Fund (EPF), and Gratuity. Moreover, no poor households reported having invested in financial instruments like fixed or recurring deposits. These are some important conditions that may be used to identify the potential beneficiaries of PMJAY in Uttarakhand (Table 5).

We further compared the bottom 40% (column (1) in Table 5) with the bottom 40% who could not fulfil the eligibility rules (exclusion error) (Column (2) of Table 5). As in the case of Haryana, we find that this subset has a higher share of households where someone earns at least 10,000 Rs a month, and has access to clean cooking fuel. However, unlike the case of Haryana, the excluded households from the bottom 40% in Uttarakhand have a lower share of households reporting ownership of some land other than homestead land. Also, the relatively higher share of the households that experience exclusion by design reside in urban areas and come from Other Backward Class (OBC) caste groups. Thus, it is important that these characteristics are not used as part of the design rules to identify the potential beneficiaries. Note that amongst those who are the potential beneficiaries but excluded by design rules, no households reported having a KCC with a limit of at least 50,000 Rs or owning a refrigerator (Table 5). Thus, these correlates could again be used to minimize exclusion errors of design.

Finally, we compared the top 60% (Column (3) in Table 5) with those in the top 60% who satisfied the eligibility rules (column (4) in Table 5), thereby contributing to inclusion errors. Compared to the top 60% of households, a larger share of these households report having Jan Dhan accounts. Thus, it is likely that focus on this correlate contributes to include errors or design (Table 5). The correlates using CE-eligibility 2021 (consumption) as against AI eligibility 2021 (asset) are presented in Table 5, Annex G. For this, the same set of caveats, as mentioned in the case of Haryana, apply.

Table 5: Socio-economic profile for design errors (Uttarakhand)

	Bottom 40%	The bottom 40% but excluded from eligibility	Top 60%	Top 60% but included in the eligibility
	(1)	(2)	(3)	(4)
HH head with no formal education	40.57	55.50	22.31	21.32
Head with at-least a bachelors' degree	0.00	0.00	14.13	13.91
At-least someone in HH earning >=INR 10,000 a month	10.92	22.78	66.36	63.72
Access to ration card	84.04	44.50	91.72	93.91
Access to MGNREGA	39.16	44.50	11.43	12.74
Access to Jan Dhan	33.82	44.50	39.14	43.14
HH accessing old age/widow/disabled pension	29.22	21.71	21.35	22.00
Access to EPF/Gratuity/Pvt Insurance/FD/RD	0.00	0.00	31.96	31.92
Own land other than homestead	34.11	21.71	41.54	39.48
Access to clean cooking fuel	34.16	44.50	73.64	70.83
Residing in urban areas	24.11	56.57	26.81	26.77
Someone in the HH has chronic ailments	26.40	0.00	23.40	24.18
Motorized 2/3/4 wheeler	0.00	0.00	35.58	34.15
Kisan credit card with limit >=50,000	8.58	0.00	7.12	7.60
Pucca house with at-least 3 rooms	6.24	0.00	45.81	44.02
Refrigerator	2.44	0.00	67.27	63.22
At-least 2.5 acres of irrigated land with at-least one irrigation equipment	0.00	0.00	2.33	2.02
Scheduled Caste (SC)/Scheduled Tribe (ST)	48.01	0.00	22.89	27.61
OBC	27.45	78.29	27.72	28.30
Others/General	24.54	21.71	49.39	44.09
Dependency ratio (0-100)	47.19	33.92	37.98	38.32
Average HH size	3.91	3.23	5.18	5.29
Distance from city centre (kms)	30.42	26.00	31.07	30.49
Average age of HH head (years)	48.67	36.48	51.99	51.67
Number of households (weighted)	591,871	66,533	1,794,569	1,385,392

Source: OPM PMJAY 2021 survey, OPM's calculations
Note: Poverty is defined using CE-eligible 2021 status. Also, as columns (2) and (4) are sub-sets of columns (1) and (3), respectively, these are not independent of each other, and hence the statistical significance of the differences is not presented.

3.3.3 Profile of implementation errors in Haryana

In this section, we first compare households that are PE-eligible 2011 (Column (1) of Table 6) with those that are PE-eligible 2011 households that are not registered under PMJAY (Column (2) of Table 6). This comparison informs us about the characteristics of the households that are proximately eligible as per SECC 2011 but are not registered under PMJAY (exclusion).[29] A higher share of PE-eligible 2011 households that are not registered under PMJAY report owning land other than a homestead, having a pucca house with at least three rooms and residing in urban areas. However, a lower share of PE-eligible 2011 households that are not registered under PMJAY have access to Jan Dhan accounts and belong to SC/ST social groups.

Next, we compare those households that are PE-ineligible 2011 (Column (3) in Table 6) with those that are PE-ineligible but registered under PMJAY (Column (4) in Table 6). This comparison provides a marker for inclusion errors of implementation. We find that a higher share of households that are PE-ineligible but registered under PMJAY have household heads with no formal education, access to Jan Dhan accounts and residing in urban areas. Meanwhile, a lower share of these households reports owning land other than a homestead, living in pucca houses with at-least three rooms, having access to clean cooking fuel and owning motorized two, three or four-wheeled vehicles. Importantly, only about 6 in 1000 such

29 Limitation of PE-eligibility 2011 to estimate SECC eligibility 2011 have been discussed previously and apply as before.

households have access to KCC with a credit limit of at-least INR 50,000, which could be one important condition to keep out PE-eligible households from PMJAY coverage.

Table 6: Socio-economic profile for implementation errors (Haryana)

	PE-eligible 2011	PE-eligible but not PMJAY registered	PE-ineligible 2011	PE-ineligible but PMJAY registered
	(1)	(2)	(3)	(4)
HH head with no formal education	42.78	41.45	31.75	42.14
Head with at-least a bachelors' degree	2.31	3.76	7.64	2.77
At-least someone in HH earning >=INR 10,000 a month	40.58	42.34	54.58	42.14
Access to ration card	97.39	97.88	83.47	92.89
Access to MGNREGA	32.68	33.73	12.21	19.07
Access to Jan Dhan	60.86	55.42	43.33	60.28
HH accessing old age/widow/disabled pension	40.66	37.65	36.77	37.87
Access to EPF/Gratuity/Pvt Insurance/FD/RD	11.59	11.95	17.76	16.84
Own land other than homestead	11.73	20.16	29.78	6.12
Access to clean cooking fuel	45.25	42.15	60.07	54.78
Residing in urban areas	16.38	21.11	32.17	40.69
Someone in the HH has chronic ailments	28.10	24.62	29.53	29.07
Motorized 2/3/4 wheeler	22.90	25.36	33.51	28.74
Kisan credit card with limit >=INR 50,000	4.36	7.35	6.37	0.59
Pucca house with at-least 3 rooms	25.91	34.05	42.25	28.44
Refrigerator	59.88	58.12	73.41	72.34
At-least 2.5 acres of irrigated land with at-least one irrigation equipment	2.14	3.60	10.38	1.21
Scheduled Caste (SC)/Scheduled Tribe (ST)	64.54	58.14	31.44	42.08
OBC	23.78	26.45	31.42	33.26
Others/General	11.68	15.41	37.13	24.66
Dependency ratio (0-100)	38.90	40.33	41.03	45.65
Average HH size	4.97	4.69	4.61	4.59
Distance from city centre (kms)	36.21	39.37	29.80	30.96
Average age of HH head (years)	51.54	50.02	50.77	52.35
Number of households (weighted)	1,386,971	734,547	4,083,803	998,956

Source: OPM PMJAY 2021 survey, OPM's calculations

Note: As columns (2) and (4) are sub-sets of columns (1) and (3), respectively, these are not independent of each other and hence the statistical significance of the differences is not presented.

3.3.4 Profile of implementation errors in Uttarakhand

We now repeat the same exercise for Uttarakhand. Our results suggest that a lower share of PE-eligible 2011 households (Column (1) in Table 7) that are not registered under PMJAY have access to Jan Dhan accounts, access to pension for the vulnerable (old age, widow, disabled) and access to clean cooking fuel as compared to PE-eligible households (Column (2) in Table 7).

The comparison of households that are PE-ineligible 2011 (Column (3) in Table 7) with those that are PE-ineligible but registered under PMJAY (Column (4) in Table 7) suggests that a higher share of the latter have access to a ration card, pension benefits for the vulnerable, access to clean cooking fuel, ownership of land other than a homestead, pucca house with at-least three rooms and appliances like refrigerator.

Table 7: Socio-economic profile for implementation errors (Uttarakhand)

	PE-eligible 2011	PE-eligible but not PMJAY registered	PE-ineligible 2011	PE-ineligible but PMJAY registered
	(1)	(2)	(3)	(4)
HH head with no formal education	25.02	26.77	31.78	35.54
Head with at-least a bachelors' degree	10.47	9.13	11.06	10.11
At-least someone in HH earning >=INR 10,000 a month	51.29	50.73	56.21	65.12
Access to ration card	95.50	89.60	74.34	92.74
Access to MGNREGA	21.42	24.99	9.84	7.63
Access to Jan Dhan	39.85	29.07	32.29	34.84
HH accessing old age/widow/disabled pension	25.04	18.24	18.56	31.60
Access to EPF/Gratuity/Pvt Insurance/FD/RD	24.23	20.88	23.48	23.63
Own land other than homestead	39.34	33.34	40.67	52.63
Access to clean cooking fuel	60.96	51.40	71.71	77.32
Residing in urban areas	24.18	20.50	31.45	23.74
Someone in the HH has chronic ailments	24.64	21.39	22.80	25.56
Motorized 2/3/4 wheeler	26.31	21.81	27.95	32.82
Kisan credit card with limit >=50,000	8.89	2.36	3.67	5.21
Pucca house with at-least 3 rooms	35.69	29.36	36.82	46.72
Refrigerator	49.77	44.50	55.06	72.89
At least 2.5 acres of irrigated land with at least one irrigation equipment	1.43	1.12	2.62	3.41
Scheduled Caste (SC)/ Scheduled Tribe (ST)	34.25	32.92	15.17	20.69
OBC	23.98	21.58	37.63	28.04
Others/General	41.77	45.50	47.20	51.26
Dependency ratio (0-100)	40.83	36.57	38.72	37.42
Average HH size	4.98	4.69	4.54	4.90
Distance from city centre (kms)	31.48	29.46	29.34	36.43
Average age of HH head (years)	52.15	49.30	48.49	53.24
Number of households (weighted)	1,744,871	655,979	641,569	337,890

Source: OPM PMJAY 2021 survey, OPM's calculations
Note: As columns (2) and (4) are sub-sets of columns (1) and (3), respectively, these are not independent of each other and hence the statistical significance of the differences is not presented.

4 Summary, Findings and Recommendations

In the last two decades, India has positioned itself as one of the fastest-growing economies in the world. Despite the associated improvement in per-capita incomes, the income distribution in India remains highly skewed, with a sizeable share of the population falling below the poverty line.[30] The livelihood of poor and vulnerable households in India is quite sensitive to health shocks, which can potentially keep them mired in poverty. These shocks have a dual effect of straining household resources from higher expenses on treatment and loss of productive days of employment. In this context, PMJAY can potentially make vulnerable households more resilient to such shocks. The flagship programme of the Government of India aims to provide annual coverage of INR 500,000 for secondary and tertiary care per household on an annual basis and envisages covering at least the poorest 40% of India's population. In 2021, OPM conducted a primary survey in the states of Haryana and Uttarakhand to study the design and implementation components of the programme, emphasis on understanding the inclusion and exclusion errors for coverage under PMJAY.

As is the case with most targeted schemes, PMJAY also remains open to inclusion and exclusion errors. In the context of the scheme itself, these errors can creep in either during the finalization of the identification rules for the intended beneficiaries (design) or at the stage of administrative implementation where the eligible beneficiaries, identified via the design rules, are provided registration under the programme. We now summarize the results and policy recommendations emerging from each of these themes.

Overall, as far as getting intended beneficiaries registered under the PMJAY is concerned, we find that odds of this are quite close to random. To verify what works and does not, we individually looked at the design and the implementation component for each exclusion and inclusion error. We find that the exclusion of the intended beneficiaries through design appears to be low for both the study states. This suggests that the set of eligibility rules used from the SECC (modified SECC 2021) does a reasonably good job of identifying the intended beneficiaries. This would imply that the randomness in ensuring PMJAY registration for the intended beneficiaries comes from implementation.

Additionally, we find that in the bottom 40% of the population from both states, no household head had a graduate degree, a motorized two, three or four-wheeled vehicle or at least 2.5 acres of irrigated land with at least one irrigation equipment. These vital conditions may be used to identify the potential beneficiaries of PMJAY. Moreover, for both Haryana and Uttarakhand, we find that a higher share of intended beneficiaries excluded by design have some member who earns at-least INR 10,000 a month or has access to clean cooking fuel. Thus, it is important that these conditions or other variables that are strongly correlated with these variables are not used as part of the design rules to identify potential beneficiaries.

30 https://www.theglobalstatistics.com/poverty-in-india-statistics-2021/. Last accessed February 9, 2022

For inclusion errors of design, we find that these are on a higher side, especially in the case of Uttarakhand. Thus, one can then infer that there is room for efficiency gains through methods that could reduce inclusion errors, which do not adversely impact the exclusion errors, which are already low in both states. Here, we analysed the additional eligibility rules incorporated into the design in Uttarakhand and found that although access to NFSA does map to the bottom 40% population, there is almost no overlap between this group of interest and someone in the household having a regular government job. Thus, excluding these households from the programme's purview would reduce the design's inclusion errors without adversely impacting the associated exclusion errors.

In this study, we cannot provide robust estimates of implementation errors as we do not observe the eligibility status under SECC 2011 due to the confidentiality of this data. However, we adopted two approaches to triangulate and estimate implementation errors. At first, we used registration under other government schemes tied to SECC status in 2011 and used these as a proxy for SECC eligibility for PMJAY in 2011. Second, we mapped eligibility status in OPM PMJAY 2011 survey, as per the eligibility rules, with PMJAY registration to identify potential mismatches. Using both these approaches, we find exclusion errors of implementation to be relatively high compared to similar errors from design. Thus, exclusion errors are more of an implementation challenge than a design problem. From our survey, we find that most households in both states were familiar with the PMJAY programme. Still, most of them were unaware of their eligibility status. This often resulted in these households not being registered under PMJAY. Given the enormous costs of a census exercise, a public information campaign to inform the respective residents of the eligibility conditions, when juxtaposed with the ability to self-select and register into PMJAY conveniently, is likely to enable coverage for the intended beneficiaries.

Additionally, a robust grievance redressal mechanism at the local level may further stem the implementation errors. To make the self-registration process streamlined with respect to the verification of eligibility, the system can be linked to the Aadhar numbers for a quick and resource-efficient process combined with rigorous training sessions of the PMAMs and extensive awareness generation targeting the potential beneficiaries in both rural and urban areas. A summary of the recommendations is also available as a box item below.

Box 1: Summary of recommendations based on the OPM-PMJAY 2021 survey

Recommendation 1: Design rules, as observed during the survey, perform well in the identification of the bottom 40% of households. Household-level eligibility to these rules needs to be updated regularly, especially as some of these conditions are likely to change over time and was last recorded in the SECC of 2011

Recommendation 2: As seen in Uttarakhand, additional design rules (such as NFSA registration) can help in further lowering exclusion errors of design. Thus, the active role of state governments (SHAs) is vital to account for state-specific realities and requirements. However, provisions need to be inbuilt as including NFSA can lead to high inclusion errors.

Recommendation 3: To reduce the inclusion errors of design, which were found to be higher than exclusion errors, it is vital to identify conditions that can allow the identification of in-eligible households. In the survey, we found that no household in the bottom 40% satisfied the following conditions, which could be used as exclusion conditions

1. Household head with a graduate degree;
2. A motorized two, three or four-wheeled vehicles;
3. At least 2.5 acres of irrigated land with at least one irrigation equipment

Recommendation 4: Some design rules, like access to government jobs in a household, is certain to increase inclusion errors without making any dent in reducing exclusion errors. In the survey, we found that all such to be in the top 60% of the population. Thus, from a financing point of view, the NHA and the SHAs need to be on the same page on the following:

1. Potential for expanding coverage and intended programme beneficiaries under the broader net;
2. Division of the financial burden for those households that are included in the top 60% of the population

Recommendation 5: Although a large majority of the households were familiar with the PMJAY scheme, most of them were not aware of their own eligibility status. Public information campaign to inform the respective residents of the eligibility conditions and simplify registration is likely to further improve access. With the recently launched “Aap ke Dwar Ayushman” campaign, more focus can be given to the eligibility criteria and enrolment processes to enable people to self-enroll in the scheme.

Recommendation 6: Given the budgetary costs associated with a Census exercise to identify potential beneficiaries, granting the ability to eligible households to self-select and register into PMJAY, when coupled with a robust verification process and grievance redressal mechanism, is one potential way to reduce implementation costs and reduce errors

Recommendation 7: Inability to access confidential administrative data prevents the accurate estimation of implementation error, which is suggestively high. National and state authorities may consider the review of its data sharing and privacy policies to ensure more accurate estimates of implementation errors and identifying the levers that are most strongly correlated with errors of implementation.

Bibliography

Carraro, Ludovico. 2007. Reforming cash-based social assistance in Serbia. Oxford : Oxford Policy Management (OPM).

Devereux, S., Masset, E., Sabates-Wheeler, R., Samson, M., Rivas, A. M., & te Lintelo, D. 2017. "The targeting effectiveness of social transfers." Journal of Development Effectiveness 9 (2): 162-211.

Fan, V. 2013. "The early success of India's health insurance for the poor, RSBY." Center for Global Development. Accessed February 10, 2022. https://www.cgdev.org/sites/default/files/archive/doc/full_text/CGDEssays/3120468/early-success-indias-health-insurance-rsby.html.

Government of India. 2020-2021. Economic Survey. New-Delhi: Government of India.

Karan, A., Yip, W., & Mahal, A. 2017. "Extending health insurance to the poor in India: An impact evaluation of Rashtriya Swasthya Bima Yojana on out of pocket spending for healthcare." Social Science & Medicine 181: 83-92.

Leite, P. G., George, T., Sun, C., Jones, T., & Lindert, K. A. 2017. Social registries for social assistance and beyond: a guidance note and assessment tool. The World Bank, 117971.

Liverpool-Tasie, L. S. O., & Winter-Nelson, A. 2011. "Asset versus consumption poverty and poverty dynamics in rural Ethiopia." Agricultural Economics 42 (2): 221-233.

Mason, J. 2017. Qualitative Researching. California: Sage.

National Health Authority. 2019. "Best practices and innovations – One Year of Implementation Across States 2018-2019." Accessed November 15, 2021. https://www.pmjay.gov.in/sites/default/files/2019-09/Best%20practices%20small%20version_1.pdf.

Pandey, A., Ploubidis, G. B., Clarke, L., & Dandona, L. 2018. "Trends in catastrophic health expenditure in India: 1993 to 2014." Bulletin of the World Health Organization 96 (1): 18.

Annexe A:
A literature review on targeting the effectiveness of social assistance in India

Several factors could affect the relationship between targeting performance and total impact on poverty, including aspects of program design, implementation, and the context in which a program operates. This literature review looks at such factors in general and in the context of specific poverty-targeted programmes in India.

According to the targeting literature, targeting generates two types of errors: inclusion error and exclusion error. These errors can be further delineated into design errors and implementation errors. Based on a conceptual framework by Devereux et al. (2017), this results in four types of errors that affect the effectiveness of social transfers – which will be measured by the study[31] and is reviewed in this section.

1. Background literature on errors in design: measuring who is poor

This section will look at different measures of poverty commonly used in India and outline on

(i) how they compare against measures of consumption/income poverty and

(ii) how they compare against measures of multi-dimensional poverty.

Most of the current welfare programmes in India rely on proxy-means tests (or some form of it)—based on directly verifiable and observable information on household assets or amenities (such as roof and wall material) rather than on self-reported incomes—to classify and target households. But the exact formula to select the parameters and calculate the eligibility is often kept secret because if it is known, households (perhaps in cooperation with better-informed agents) may strategically misreport or hide assets to make sure they fall under the cut-off.[32] Applying such formulae, however, robs the process of transparency and may invite charges of political favouritism.

The SECC 2011 captured data on individual particulars, housing, deprivation, employment, income, assets/amenities, and landownership for Proxy Means Testing (PMT) targeting. It then categorised rural households into three categories:

a) Automatically Excluded (First Stage): Households meeting exclusion criteria – any of 13 assets and income-based parameters[33] are automatically excluded from welfare benefits;

b) Automatically Included (Second Stage): Households satisfying inclusion criteria – any one of 5 acute social destitution parameters[34] are automatically included for welfare benefits;

c) Others (Third Stage): Remaining households are ranked based on seven indicators of deprivation[35] and would, resources permitting, be eligible for welfare benefits.

31 Devereux, S., Masset, E., Sabates-Wheeler, R., Samson, M., Rivas, A. M., & Te Lintelo, D. (2017). The targeting effectiveness of social transfers. Journal of Development Effectiveness, 9(2), 162-211.

32 Hanna, R., & Olken, B. A. (2018). Universal Basic Incomes versus Targeted Transfers: Anti-Poverty Programs in Developing Countries. Journal of Economic Perspectives, 32(4), 201–226. https://doi.org/10.1257/jep.32.4.201

33 Motorized vehicle/ fishing boat; mechanized three/ four-wheeler agricultural equipment; kisan credit card with credit limit of Rs 50,000 and above; Households with any member as a government employee; Households with non-agricultural enterprises registered with the government; any member of the family earning more than Rs.10,000 per month; paying income tax or professional tax; three or more rooms with all rooms having pucca walls and roof; own a refrigerator or a landline phone; own 2.5 acres or more of irrigated land with at least one piece of irrigation equipment; Five acres or more of irrigated land for two or more crop seasons; owning at least 7.5 acres of land or more with at least one piece of irrigation equipment.

34 Households without shelter; destitute and living on alms; manual scavengers; primitive tribal groups; legally released bonded labourers.

35 Households with only one room with no solid walls and roof; no adult male aged 15-59; female headed; differently abled members; no able-bodied members; SC/SCT with no literate member above 25 years; landless and deriving major portion of income through manual labor

Ten broad categories of unorganised workersare entitled to the scheme in urban areas.

Challenges with SECC 2011

P Sainath, a member of the Expert Group constituted to advise the Ministry of Rural Development on the methodology for conducting the Below Poverty Line (BPL) census for the 11th five-year plan, ended up not signing the report, which formed the basis of the SECC criteria. In his note attached to the report, he highlighted the problems with the methodology proposed, especially the "automatic exclusion" parameters. For instance, those having a pucca house were not included as BPL even if the house was constructed under Indira Gandhi Awas Yojana (now, Pradhan Mantri Awas Yojana (PMAY)), and they were poor in every other dimension. Migrant labourers were not accounted for in the SECC inclusion criteria. The "compulsory inclusion" list did not include all landless (the well-off among the landless would anyway be excluded) but required the landless to be manual labourers too. The scoring criteria for ranking deprivations are also contentious.[36] SECC did not assign "points" as the report suggested but gave equal weights to all indicators in the third stage, which is subjective too.

Other researchers show that relatively minor methodological differences lead to the identification of different sets of poor households.[37, 38] They found that the SECC's exclusion criteria excluded a much larger share of rural households than other methods. More than half of the excluded households would have been defined as poor by the other methods, such as multidimensional poverty, of which a significant share used traditional cooking fuel (91.6%), did not have improved sanitation (78.9%) and had at least one undernourished woman or child (76.9%). This implies that the SECC's first stage of exclusion criteria parameters needs careful consideration. Another research found relatively low consistency between SECC measures of poverty and estimates from the 2011 Indian Census and the National Family Health Survey 2015–16.[39] The definition of disability followed in the SECC also does not wholly match the identification according to the Persons with Disability Act, 1995.[40]

Poverty is dynamic and sensitive to the methodology

The traditional poverty line in India is based on the consumption expenditure of households – a poverty line basket. The last official estimate of poverty, released by the Planning Commission in 2011-12, was 21.9% (25.7% for rural, 13.7% for urban areas), which was estimated using the Tendulkar Committee approach. After that, no estimates have been officially released.[41]

How does this compare with multidimensional poverty? The incidence of multidimensional poverty was almost halved between 2005-06 and 2015-16, climbing from 55.1% to 27.9% in India.[42] The headcount ratio was 36.8% for rural and 9.2% for urban India. Multidimensional poverty captures acute deprivations in a person's health, education, and living standards beyond his/her monetary poverty (see Box 1 below).

Box 1: Indicators under multi-dimensional poverty index

Dimensions of poverty	Indicator	SDG Area	Deprived if	Weight
Health	Nutrition	SDG2	Any person under 70 years of age for whom there is nutritional information is undernourished	1/6
	Child Mortality	SDG3	Any child has died in the family in the five years preceding the survey	1/6
Education	Years of schooling	SDG 4	No household member aged ten years or older has completed six years of schooling.	1/6
	School attendance	SDG 4	Any school-aged child is not attending school up to the age at which he/she would complete class 8	1/6

36 Saxena, N. C. (2009, August). Report of the Expert Group to advise the Ministry of Rural Development on the methodology for conducting the BPL Census for 11th Five Year Plan. https://www.thehindu.com/migration_catalog/article16874628.ece/BINARY/Saxena%20Committee%20Report

37 Alkire, S., & Seth, S. (2012). Selecting a Targeting Method to Identify BPL Households in India. 29.

38 Alkire, S., & Seth, S. (2013). Identifying BPL Households. 2, 9.

39 Srinivas, A. (2019, May 8). The targeting challenge in India's welfare programs. Mint. https://www.livemint.com/politics/policy/the-targeting-challenge-in-india-s-welfare-programs-1557294982507.html

40 Bose, S. (2016, November). Report of the expert group on SECC 2011. https://rural.nic.in/sites/default/files/Report_of_the_expert_group_on_SECC_2011_0.pdf

41 Gaur, S., & Rao, N. S. (2020). POVERTY MEASUREMENT IN INDIA: A Status Update. 22.

42 UNDP & OPHI. (2020). Global Multidimensional Poverty Index 2020. http://hdr.undp.org/sites/default/files/2020_mpi_report_en.pdf

Living standards	Cooking fuel	SDG 7	A household cooks with dung, agricultural crop, shrubs, wood, charcoal or coal.	1/18
	Sanitation	SDG 11	The household's sanitation facility is not improved (according to SDG guidelines) or is improved but shared with other households.	1/18
	Drinking water	SDG 6	The household does not have access to improved drinking water (according to SDG guidelines), or safe drinking water is at least a 30-minute walk from home, roundtrip.	1/18
	Electricity	SDG 7	The household has no electricity.	1/18
	Housing	SDG 11	The household has inadequate housing: the floor is made of natural materials, or the roof or walls are of rudimentary materials.	1/18
	Assets	SDG 1	The household does not own more than one of these assets: radio, TV, telephone, computer, animal cart, bicycle, motorbike, or refrigerator, and does not own a car or truck.	1/18

Source: Oxford Poverty and Human Development Initiative (2018). Global Multidimensional Poverty Index 2018: The Most Detailed Picture to Date of the World's Poorest People, University of Oxford, UK.

Between 2011 and 2015, poverty is estimated to have declined from 21.6% to 13.4% at the international poverty line ($1.90 per person per day), lifting more than 90 million people out of extreme poverty.[43] However, half of India's population with consumption levels precariously close to the poverty line remains vulnerable to COVID-19 impacts and could fall back into poverty. These factors need to be accounted for when designing any welfare program. Several programs try to do this by combining different databases and methodologies.

For example, a few states, like Jharkhand and Rajasthan, have added the PDS database and SECC to target beneficiaries for PMJAY.[44] The Ujjwala LPG connection subsidies were made available to many recognized social categories based on data collected in the SECC: Scheduled Caste and Scheduled Tribe Households; forest dwellers; Most Backward Classes; Tea and ex-Tea Garden Tribes; and people residing in river islands (Ministry of Petroleum and Natural Gas, 2019). Households could also qualify if they were already beneficiaries of Pradhan Mantri Awas Yojana (PMAY), an affordable housing scheme, or Antyodaya Anna Yojana (AAY), a subsidized food scheme. In some cases, such as the state of Jharkhand, the lowest lifeline electricity tariff has been made contingent upon whether or not a household was previously a beneficiary of the Kutir Jyoti program, which subsidized an electricity connection and was in turn linked to categories such as BPL tribal families. For LPG, there has been no attempt to date to integrate poverty census data in the PAHAL consumption subsidies scheme, but income data from national tax authorities have been used to exclude people from availing of the subsidy.

2. Errors in implementation: errors due to implementation weaknesses

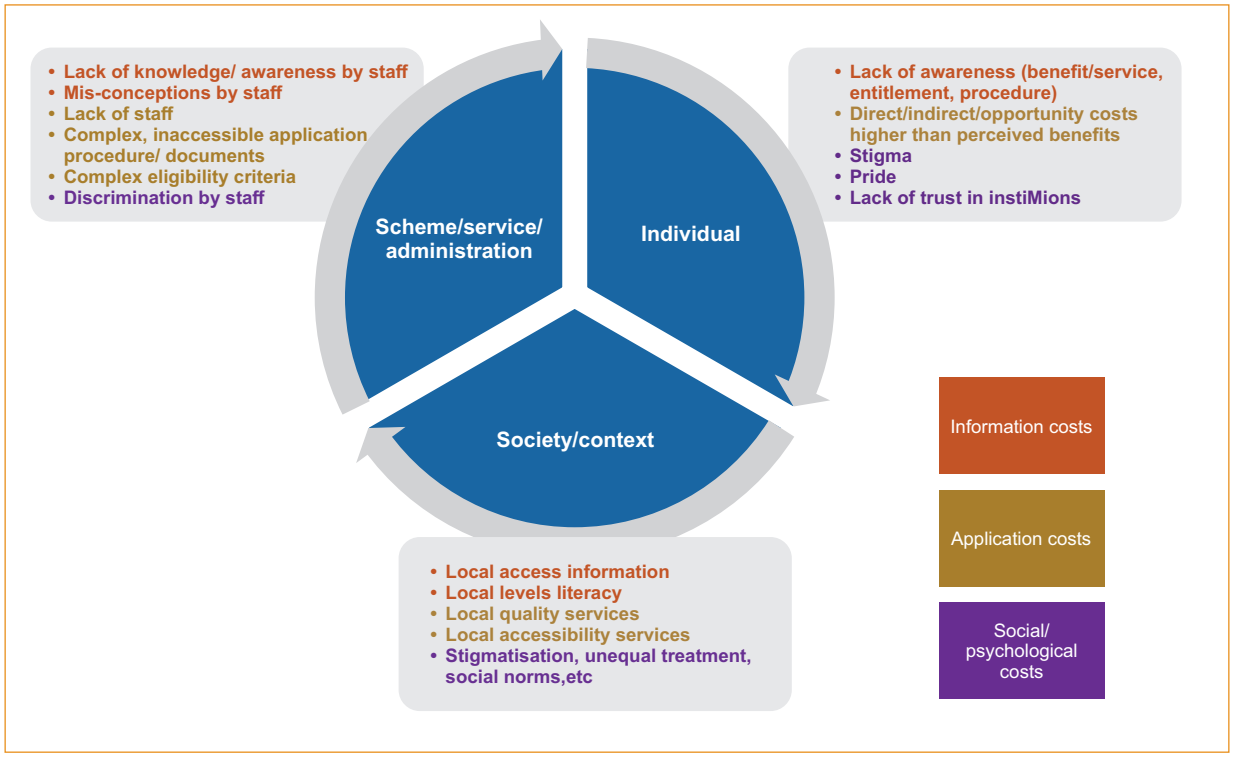
A well-designed targeting methodology is not enough to ensure that the programme ultimately reaches those whom it intends to target. There may be several implementation challenges at the administrative, individual and social levels, as shown in the Fig. below.

This framework is used to analyse the implementation errors in different schemes such as the RSBY, where lack of awareness and provider interest was a challenge, and the PDS, where logistical and administrative barriers exist, and some poverty-targeted subsidies are complex to administer.

43 World Bank. (2020, July). India Development Update. https://openknowledge.worldbank.org/bitstream/handle/10986/34367/India-Development-Update.pdf?sequence=1&isAllowed=y

44 https://pmjay.gov.in/states/states-glance

Fig. 12 Types of implementation errors



Source: OPM

Challenges related to RSBY and other state government insurance schemes

Evidence from RSBY, PMJAY's predecessor, illustrates implementation errors in targeting a government health insurance program in the Indian context. Rathi (2011)[45], in his evaluation of RSBY in Amravati, Maharashtra, found that the lack of information and late enrolment led to only 39% enrolment in the district. The tribal blocks of the district, which have the maximum number of poor households, saw the least enrolment. The study further suggests that beneficiaries were concentrated in certain areas and villages. RSBY had limited success in Maharashtra.[46] A paper on the implementation of the RSBY in Chhattisgarh in 2011 found that private hospitals did not show much interest in backward districts such as Dantewada, Kanker and Koriya. Thus, RSBY failed to reach many BPL households.[47] RSBY was universalised in Chhattisgarh in 2012. However, despite insurance coverage, the majority still incurred out-of-pocket (OOP) expenditures.[48] In Karnataka, six months after initiation in early 2010, 85% of eligible households in the sample were aware of the scheme, and 68% had been enrolled.[49] Enrolment was low as a large proportion of beneficiaries did not receive their cards, and many did not know how and where to obtain treatment under the scheme.

Moreover, hospitals were not ready to treat RSBY patients. In summary, RSBY was afflicted by inadequate coverage of intended beneficiaries and misalignment of incentives. There were wide variations in enrolment rates across villages, districts, regions and demographic groups.

In addition to PMJAY, most states have health insurance schemes with varying degrees of success (please see Table 8). The programmes in South India have a better performance record in terms of targeting and

45 Rathi, P. (2011). Evaluation of Rashtriya Swasthya Bima Yojana (RSBY): A Case Study of Amravati District. 26.
46 Thakur, H. (2016). Study of Awareness, Enrolment, and Utilization of Rashtriya Swasthya Bima Yojana (National Health Insurance Scheme) in Maharashtra, India. Frontiers in Public Health, 3. https://doi.org/10.3389/fpubh.2015.00282
47 Nandi, S., Nundy, M., Prasad, V., Kanungo, K., Khan, H., Haripriya, S., Mishra, T., & Garg, S. (2012). The Implementation of RSBY in Chhattisgarh, India: A study of the Durg district. Health, Culture and Society, 2(1), 40–70. https://doi.org/10.5195/hcs.2012.61
48 Nandi, Sulakshana, Schneider, H., & Dixit, P. (2017). Hospital utilization and out of pocket expenditure in public and private sectors under the universal government health insurance scheme in Chhattisgarh State, India: Lessons for universal health coverage. PLoS ONE, 12(11). https://doi.org/10.1371/journal.pone.0187904
49 Rajasekhar, D., Berg, E., Ghatak, M., Manjula, R., & Roy, S. (2011). Implementing Health Insurance: The Rollout of Rashtriya Swasthya Bima Yojana in Karnataka. 20, 8.

coverage of BPL families.[50, 51] Given the varied level of success in enrolling the target population under the state-specific schemes, this is also expected to affect the targeting process of PMJAY as a whole.

Table 8: State health insurance schemes

State/UT Name	Name of Scheme in the State/UT
Andaman and Nicobar Islands	Andaman and Nicobar Islands Scheme for health Insurance (ANISHI)
Andhra Pradesh	Dr YSR Arogyasri Healthcare Scheme
Arunachal Pradesh	Chief Minister Arogya Arunachal Yojana
Assam	Atal Amrit Abhiyan
Chhattisgarh	Dr. Khubchand Baghel Swasthya Bima Yojana
Goa	Deen Dayal Swasthaya Seva Yojana
Gujarat	Mukhyamantri Amrutam & Mukhyamantri Vatsalya
Haryana	Haryana Health Protection Mission
Himachal Pradesh	Himachal Health Care Scheme (HIMCARE)
Jharkhand	Mukhyamantri Swasthya Bima Yojana (MSBY)
Karnataka	Vajpayee Arogyasri (preceded by Yashasvini)
Kerala	Karunya Arogya Suraksha Paddhati (KASP)
Madhya Pradesh	Madhya Pradesh 'Niramayam' Yojana
Maharashtra	Mahatma Jyotiba Phule Jan Arogya Yojana (MPJAY)
Meghalaya	Megha Health Insurance Scheme (MHIS)
Odisha	Biju Swasthya Kalyan Yojana
Punjab	Ayushman Bharat Sarbat Sehat Bima Yojana
Rajasthan	Mahatma Gandhi Rajasthan Swasthya Bima Yojana
Tamil Nadu	Chief Minister's Comprehensive Health Insurance Scheme (CMCHIS)
Uttar Pradesh	Mukhiya Mantri Jan Arogya Abhiyan (MMJAA)
Uttarakhand	Atal Ayushman Uttarakhand Yojana

Challenges with the Public Distribution System (PDS)

Although the PDS has the most extensive coverage in India and has played a critical role in alleviating food insecurity and the vulnerability induced by shocks such as the pandemic, several system inadequacies remain.

The most fundamental criticism of the current PDS regime is the exclusion of eligible beneficiaries from the system.[52] This exclusion is layered, and its hierarchy can be explained in terms of the different sources responsible for the exclusion of beneficiaries at different levels. As shown in Fig. 13, the biggest cause of exclusion is the use of outdated 2011 population census figures to determine the extent of the scheme's coverage, which has resulted in the exclusion of more than 100 million people from the system.[53] The second layer of exclusion emanates from the mandate of linking Aadhaar with ration cards, which was envisioned as a panacea for weeding out ghost beneficiaries while simultaneously expanding the coverage through improved targeting.[54] However, evidence from Jharkhand suggests that its implementation came at the cost of exclusion of genuine households.[55]

50 Choudhury, M., Tripathi, S., & Dubey, J. D. (2019). Experiences with Government Sponsored Health Insurance Schemes in Indian States: A Fiscal Perspective.

51 Fan, V. Y., Karan, A., & Mahal, A. (2012). State health insurance and out-of-pocket health expenditures in Andhra Pradesh, India. International Journal of Health Care Finance and Economics, 12(3), 189–215. https://doi.org/10.1007/s10754-012-9110-5

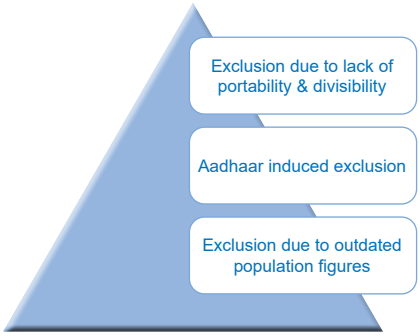
52 Khera, R., & Somanchi, A. (2020, August 19). A review of the coverage of PDS. Ideas For India. http://www.ideasforindia.in/topics/poverty-inequality/a-review-of-the-coverage-of-pds.html

53 IndiaSpend. (2020, April 16). 'More than 100mn excluded from PDS as govt uses outdated Census 2011 data'. https://www.indiaspend.com/more-than-100mn-excluded-from-pds-as-govt-uses-outdated-census-2011-data/

54 Planning Commission. (2010, June 24). Envisioning a role for Aadhaar in the Public Distribution System. https://www.prsindia.org/uploads/media/UID/Circulated_Aadhaar_PDS_Note.pdf

55 Muralidharan, K., Neihaus, P., & Sukhtankar, S. (2020, April 17). Balancing corruption and exclusion: Incorporating Aadhaar into PDS. Ideas For India. http://www.ideasforindia.in/topics/poverty-inequality/balancing-corruption-and-exclusion-incorporating-aadhaar-into-pds.html

Fig. 13: The PDS Exclusion Hierarchy



The final source of exclusion relates to the existing ration card holders. It has become all the more relevant in the wake of the pandemic: the issue of portability and divisibility of ration cards. The One Nation-One Ration Card (ONORC) scheme is an attempt to address the issue of portability. However, without accompanying it with divisibility, there is little that ONORC can offer.[56] As the ONORC does not address the previous two layers of exclusion, it is plagued by their associated drawbacks. Moreover, dealing with erratic connectivity in rural areas and meeting spatially dynamic demand will be additional challenges that ONORC is bound to face. The latter of the two will be a relatively challenging task for the existing Fair Price Shops (FPS) network, which already struggles to meet even its designated distribution quota.[57]

The distribution of PDS also varies across states. Apart from logistical issues, complete distribution depends on FPS dealers' reliability, as cases of beneficiaries receiving less than (or being denied) their entitlements are often reported.[58]

Challenges with other poverty-targeted subsidies

Other subsidies extended based on income or SECC criteria also face challenges in implementation in reaching the intended beneficiaries. These include connection and consumption subsidies for electricity (DBT-P, UDAY) and cooking fuel (DBT-L and Ujjwala Yojana). Since these policies are costly, efforts have been ongoing for years to reduce costs by better targeting these subsidies. The last distributional analysis of energy consumption subsidies-how benefits are shared across different income groups-is based on the 2011 census. The section below draws from a paper published by the International Institute for Sustainable Development.[59]

In India's federal structure, electricity consumption subsidies are complex, with each state determining its pricing policy. In all states, a degree of targeting already exists, as subsidized prices are usually provided only for certain consumers-typically, households and farmers-and the magnitude of the subsidy is often varied by geographic area (urban or rural) and for different consumption blocks. For example, in Jharkhand, urban consumption is split into four blocks, each of which has its subsidy: 0–200 kWh per month; 201–500 kWh per month; 501– 800 kWh per month; and above 800 kWh per month. The biggest subsidies are usually provided for the lowest consumption blocks, often called a "lifeline tariff." In addition to these cut-offs, some states require households to meet other eligibility criteria, such as ownership of a BPL card.

There are no good data available today on the effectiveness and efficiency of India's electricity consumption subsidies at a national level. The World Bank conducted the last comprehensive analysis of residential users in 2015, based on 2009–2010 National Sample Survey data on household consumption expenditure. This analysis found that the poorest quintile received only 14% of subsidy benefits, whereas the richest quintile received 31%.

Since 2014, consumers have purchased LPG cylinders at market prices and the subsidy is credited

56 Roy, D., & Pradhan, M. (2020, June 17). Improving India's Public Distribution System: What Can We Learn from COVID-19? https://a4nh.cgiar.org/2020/06/17/improving-indias-public-distribution-system-what-can-we-learn-from-covid-19/

57 Pal, S. (2020, April 2). COVID-19: Delhi PDS Shops Shut, Owners Say Lack of Supplies. NewsClick. https://www.newsclick.in/COVID-19-delhi-PDS-shops-shut-owners-lack-supplies-owners-state-lack-supplies

58 Muralidharan, K., Niehaus, P., & Sukhtankar, S. (2020). Identity Verification Standards in Welfare Programs: Experimental Evidence from India (No. w26744; p. w26744). National Bureau of Economic Research. https://doi.org/10.3386/w26744

59 Sharma, S., Jain, P., Moerenhout, T., & Beaton, C. (2019). How to Target Electricity and LPG Subsidies in India. The International Institute for Sustainable Development, 37.

directly to their bank accounts, reducing the effective price of the LPG cylinder after their sale, through the PAHAL (formerly DBTL) mechanism. In 2015, the government began encouraging higher-income households to voluntarily surrender their LPG subsidy under a program called 'Give It Up'. In 2016, income-based targeting was introduced to restrict eligibility to households with an annual income of less than INR 1 million by matching the PAHAL beneficiary registry with the government's income tax database. The net impact of these attempts at targeting has been limited, however. The 'Give It Up' initiative has excluded around 5% of active connections, and the income cut-off has restricted less than 1% of active connections.

As with electricity subsidies, there are no good distributional data available on the effectiveness and efficiency of India's LPG consumption subsidies at a national level. Data from 2012 suggested that 50% of the subsidy was consumed by the richest 30% of households in the country, while the poorest 30% of households received only 15% of the total. However, this was before the considerable effort was invested in increasing uptake among poor households through Ujjwala Yojana. The Ujjwala program subsidized only around half of a household's initial LPG start-up costs. The other half had to either be paid for by households or could be covered by taking a loan. If a household chose to take the loan, it had to be repaid by foregoing the PAHAL consumption subsidy on subsequent LPG refills. Numerous anecdotal sources have reported that this has made LPG unaffordable for many households. The policy also requires households to meet deprivation criteria from SECC or to be from a list of recognized vulnerable groups. Data suggest that the Ujjwala scheme was relatively successful in clustering its benefits on the poorest. A study in Chhattisgarh and Jharkhand found that 48% of Ujjwala beneficiaries were among the poorest 40% of households, based on self-reported income.

In summary, improved targeting and rationalisation of use-based subsidies could help to concentrate the subsidy on the poorest households. This can be supported by integrating existing social assistance schemes that simultaneously reduce the government's administrative burden.

3. Errors arising from the static nature of underlying data

The SECC is updated only once in 10 years. Using an old dataset for a rapidly transforming economy means that an SECC-type exercise must be repeated at frequent intervals to ensure that it aligns with current reality. Since 2011, it is expected that there has been significant movement into and out of poverty in India, though no official estimates have been released since 2011-12. Globally, COVID-19 is expected to push an additional 150 million people into extreme poverty, especially from South Asia and sub-Saharan Africa.[60] In India, it is estimated that poverty will double.[61, 62] This has major implications for the re-targeting of welfare programmes. Potential gaps in SECC data could be mitigated by using it in conjunction with other exclusion and inclusion criteria, as in the case of Ujjwala and PMAY-Grameen.

In 2019, Mint[63] conducted an analysis comparing the data from SECC 2011, Census 2011 and NFHS 2015-16. In the analysis, all districts were ranked in five quintiles according to the percentage of deprived households, as identified by the deprivation criteria laid down in the SECC. A similar ranking exercise was undertaken according to the asset ownership data from the Census and the percentage of households identified as poor based on the Multidimensional Poverty Index (MPI) based on the NFHS data.

Of all the districts classified as the most deprived by the MPI, 48% of them were found to be the most deprived according to the census. The overlap between these two databases - census and NFHS - was the strongest, although they were conducted five years apart. In contrast, there was a smaller overlap between the SECC and the census conducted in the same year. Merely 40% of the districts ranked as the most deprived according to the SECC rank most deprived when we use the census data. The match between the MPI and the SECC is only 25% for the most deprived districts (districts in the bottom quintiles), showing large discrepancies.

60 World Bank. (2020, October 7). COVID-19 to Add as Many as 150 Million Extreme Poor by 2021. World Bank. https://www.worldbank.org/en/news/press-release/2020/10/07/covid-19-to-add-as-many-as-150-million-extreme-poor-by-2021

61 Kharas, H. (2020, October 21). The impact of COVID-19 on global extreme poverty. Brookings. https://www.brookings.edu/blog/future-development/2020/10/21/the-impact-of-covid-19-on-global-extreme-poverty/

62 Saini, S. (2020, April 30). COVID-19 may double poverty in India. The Financial Express. https://www.financialexpress.com/opinion/covid-19-may-double-poverty-in-india/1943736/

63 Srinivas, A. (2019, May 8). The targeting challenge in India's welfare programs. Mint. https://www.livemint.com/politics/policy/the-targeting-challenge-in-india-s-welfare-programs-1557294982507.html

Chart 1

The overlap between the distribution of deprived districts according to the SECC, Census and MPI

% of districts present in other datasets (e.g. in the bottom quintile of districts identified by the MPI, 25% of these districts were identified by the SECC and 47.66% were identified by the Census).

MPI (NFHS 2015-16)	SECC (2011) Bottom quintile	Census(2011) Bottom quintile
Bottom quintile	25.00	47.66
Second quintile	22.66	25.00
Third quintile	28.91	21.09
Fourth quintile	12.50	6.25
Top quintile	9.38	0.00

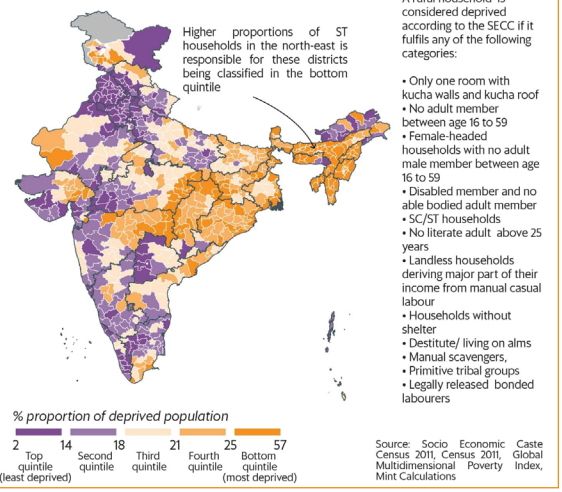
Source: Socio Economic Caste Census 2011, Census 2011, Oxford University's Global Multidimensional Poverty Index, Mint Calculations

However, the SECC and MPI data suggest that the most backward districts are concentrated in the eastern and north-eastern regions of the country, with the least backward districts in the south and the west. On the other hand, ranking the districts based on asset ownership according to the 2011 Census reveals a slightly different pattern of deprivation. The Census of India, which captures household ownership of major assets (like TVs and cars), shows that the poorest districts are concentrated in central and eastern India.

Chart 2a

SECC overestimates deprivation in areas with high tribal population

In SECC's definition of deprivation, a majority of the districts in the bottom quintile are in the north-east.

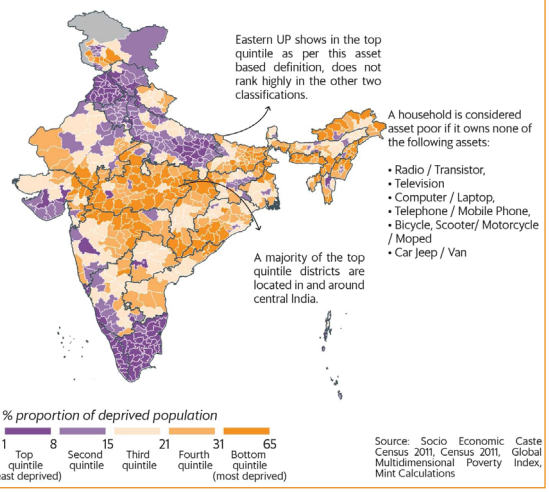


Source: Socio Economic Caste Census 2011, Census 2011, Global Multidimensional Poverty Index, Mint Calculations

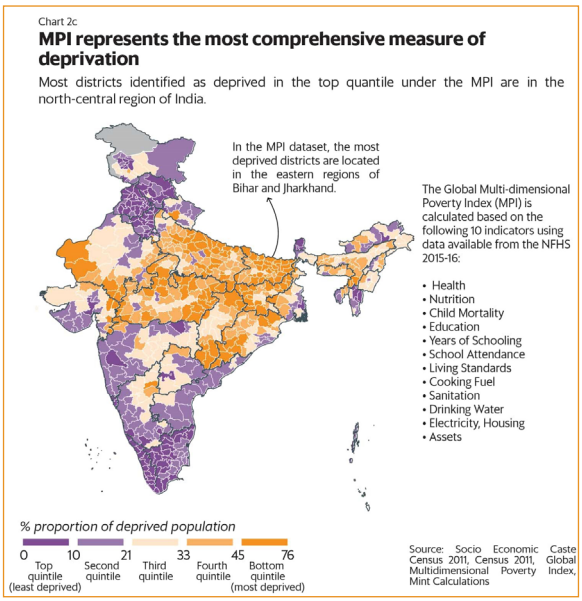
Chart 2b

An asset based definition from the Census underestimates incidence of deprivation

In Census' definition of deprivation, the bulk of the districts in the bottom quintile are in the central region.



Source: Socio Economic Caste Census 2011, Census 2011, Global Multidimensional Poverty Index, Mint Calculations



The reason for these differences lies in the different purposes of the surveys and the differing nature of the deprivation or asset criteria used. But though most economists consider the SECC database as an improvement compared to the old below-poverty-line lists, the differences with the other databases regarding the identification of the most deprived districts suggest that India's problem of accurately identifying beneficiaries, especially through PMT or geographical targeting, will persist.

Presently, the rural development ministry deliberations are on to rework the 25 existing parameters under SECC for the next round scheduled for 2021 (postponed indefinitely due to COVID-19). There are also plans to use Aadhaar as a single identifier of beneficiaries for all its social sector schemes while assessing the socio-economic status of all the beneficiaries under SECC 2021.[64]

64 Sharma, Y. (2020, March 17). Socio Economic Caste Census-2021 to define eligibility of rural household for benefits under government schemes. The Economic Times. https://economictimes.indiatimes.com/news/politics-and-nation/rejig-of-socio-economic-caste-census-criteria/articleshow/74663021.cms

Annexe B: Workstream, sample size and survey weights calculations

Workstreams

We undertook the following key activities to meet these objectives and answer the research questions:

Desk review of documents and literature to understand the targeting mechanism under PMJAY and other similar schemes. Understanding the identification mechanism under SECC 2011 and eligibility for other social security schemes was crucial. This review covered these eligibility conditions for registration under PMJAY, as taken from the SECC 2011. As mentioned previously, this discussion is provided in **Annex A.**

- For sample size calculations, we used the recent 76th round from the NSSO on drinking water, sanitation and hygiene, providing details on broad consumption levels.
- For analysis, to identify the nationally-representative thresholds for the poorest 40% of households, two approaches were undertaken encompassing stock and flow measures of economic wellbeing. These used National Family Health Survey (NFHS), Round-4 (2015-16) and National Sample Survey (NSSO) 68th consumption round data (2011-12), respectively and discussed in detail in section 2.1.
- Quantitative data collection in sampled states through household surveys and analysis to understand the exclusion and inclusion error based on the conceptual framework outlined in section 2.
- Qualitative interviews with key stakeholders to understand perceptions on how well the SECC has predicted poverty and challenges and opportunities with targeting processes.

Sampling

Quantitative

Sampling method

In this section, we present the sampling design to illustrate the guiding principles based on which the data collection exercise was undertaken.

State Selection: Based on the discussions with NHA and WHO at the inception phase, Haryana and Uttarakhand were purposively selected for this study. In Haryana, deprivation criteria under the Socio-Economic and Caste Census 2011 (SECC) were used as the eligibility criteria. In contrast, Uttarakhand has expanded the criteria to include the National Food Security Act (NFSA) beneficiary list and the list of Government employees and pensioners, and the SECC 2011. The PMJAY aims to cover families comprising the bottom 40% of the Indian population. For sampling, we used data from the National Sample Survey Organization's (NSSO) 76th round, conducted in 2018, to identify broad per capita consumption expenditure levels for the bottom 40% all-India population. For analysis, we relied on the granular information on consumption expenditure from the last available NSSO consumption round (68th, 2011-2012) after adjusting for inflation.[65] The actual proportion of PMJAY eligible population in Uttarakhand is expected to be higher than 20.2% since, in addition to the SECC, Uttarakhand had also expanded targeting via the NFSA and Government employee/pensioners databases to target the vulnerable section.

District Selection: In the second stage, the districts of Haryana and Uttarakhand were categorized into

65 For reliable estimates, all calculations for consumption poverty were undertaken using the inflation adjusted data from the 68th round of the NSSO. This is the last representative survey that allows calculation of reliable estimates for per capita consumption expenditure at the household level. The last set of poverty estimates for India, as put forth by the Tendulkar Committee, were also based on this data. https://prsindia.org/theprsblog/more-privatisation-on-the-cards. Last accessed January 25, 2022.

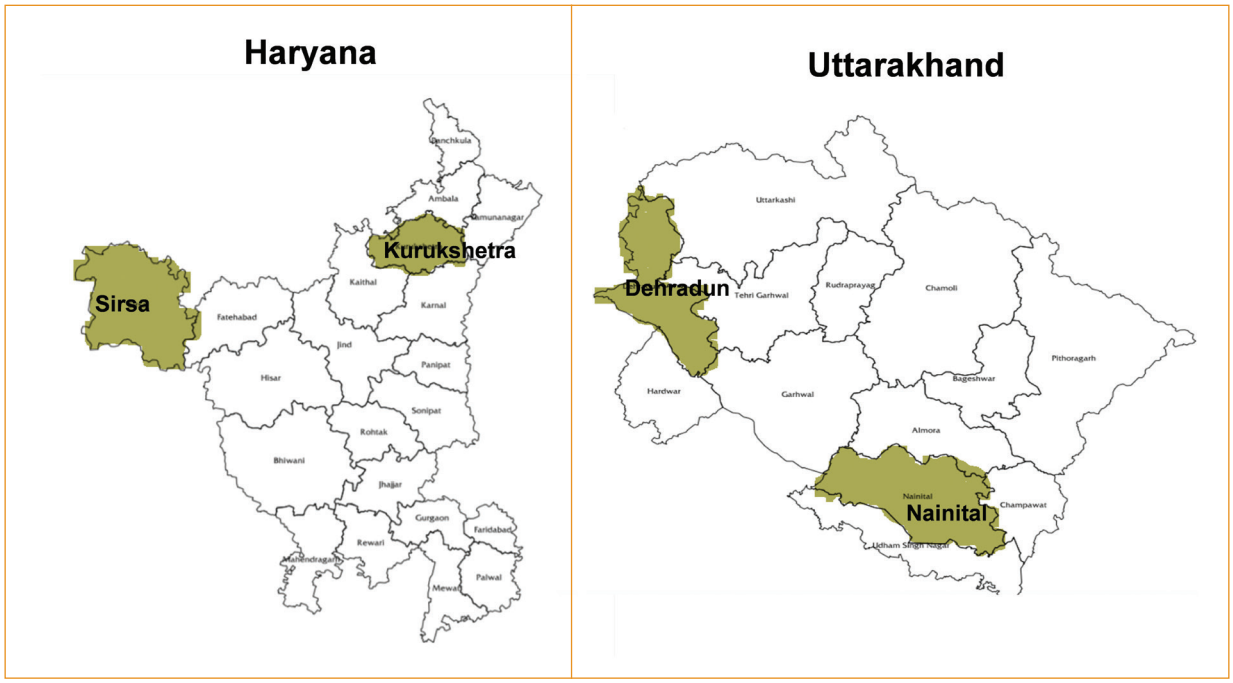
their respective NSSO regions, as classified under the latest social consumption surveys of the NSSO. As per the NSSO 2018 survey, Haryana has two NSSO regions (eastern and western). For Uttarakhand, there exists only one NSSO region. However, the state is divided into two geographical divisions: Garhwal and Kumaon. We selected one district from each of the NSSO and geographical regions for Haryana and Uttarakhand, respectively. This was done using Probability Proportional to Size (PPS) sampling method, which assigns a higher probability of selection to the more populated districts. The sampled districts were: (i) Haryana – Kurukshetra and Sirsa; (ii) Uttarakhand – Dehradun and Nainital (Table 9). This method of sampling for Districts has some benefits. One, these districts are more populated and hence are likely to experience greater pressures for service delivery. This allows our primary survey to capture sufficient variation in inclusion and exclusion errors of interest. Two, this selection was logistically feasible at the time of the survey, especially in the context of an impending third wave of COVID-19 infection in India. Given the objective of the study was to come close to the representativeness of these errors at the state level, we adjusted the weighing strategy to ensure compatibility with state-level population and poverty estimates. This is discussed in detail in the subsequent sections.

Table 9: Sample districts and blocks in Haryana and Uttarakhand

State	NSSO /Geographical region/	District	Block
Haryana	Eastern	Kurukshetra	Pehowa
Haryana	Eastern	Kurukshetra	Thanesar
Haryana	Western	Sirsa	Dabwali
Haryana	Western	Sirsa	Sirsa
Uttarakhand	Garhwal	Dehradun	Vikasnagar
Uttarakhand	Garhwal	Dehradun	Doiwala
Uttarakhand	Kumaon	Nainital	Bhimtal
Uttarakhand	Kumaon	Nainital	Haldwani

This strategy for district selection provides a credible way to account for variation in geographical proximity, which is evident in Fig. 14.

Fig. 14: Selected districts



Block selection: In the subsequent step to district selection, two blocks from the sampled districts were randomly selected using the PPS sampling method (see Table 15), covering eight blocks (strata).

Village / Ward selection: Villages and wards serve as the primary sampling units (PSU) in rural and

urban areas. PSUs (clusters) were selected randomly from the list of all villages and wards using the District Census Handbook of the 2011 census. The number of PSUs from each block was sampled based on PPS sampling after ensuring that the selection of households at the block level is equally probabilistic. This ensures households living in more populous and sparsely populated PSUs in a block have the same probability of being selected for the interview.

To facilitate the aforementioned strategy, a listing exercise was carried out prior to the main quantitative data collection to develop the sampling frame. Following that, 15 **households** were selected randomly from the list of total households in each PSU for the interview.[66]

Sample size estimation

The sample size determines the level of precision of estimates generated by the survey.[67] As the PMJAY targets to cover the bottom 40% of the population, we used the proportion of the population belonging to the 40% group concerning the national level of per capita consumption expenditure in Haryana and Uttarakhand. The monthly per capita consumption expenditure (MPCE) was estimated using the unit level data of the NSSO 2018 survey of Drinking Water, Sanitation, Hygiene and Housing Condition (76th round). As per the estimates, Section 2 Presents the estimated sample sizes for each of the two study states, which have been arrived at after calibrating various parameters to achieve the optimal balance between statistical desirability and logistical feasibility. We used a prevalence-based sampling estimate with a finite population, with a 95% confidence level and a 3% margin of error. The estimated total sample size across the two states is 1955 households (997 in Haryana and 958 in Uttarakhand). The formula used for sample size estimation is given below:

$$n' = \frac{NZ^2\,P(1-p)}{d^2\,(N-1) + Z^2\,P(1-p)}$$

Where *n'* = Sample size with finite population correction, *N*=population size,[68] *Z*= level of confidence (95%), *P* = is the expected prevalence rate (proportion of the bottom 40% population with respect to MPCE), and d is the margin of error.

Table 10: Sample size estimation

	Census Population Projection* 2021	Estimated number of households 2021#	Proportion of bottom 40% population wrt MPCE (NSSO 2018)	Margin of error	Number of sample households
Haryana	29,483,000	5,896,600	21.8	3.00	1,050
Uttarakhand	11,399,000	2,279,800	20.2	3.00	960
TOTAL					**2,010**

*Source: * https://nhm.gov.in/New_Updates_2018/Report_Population_Projection_2019.pdf*
Note: # Assuming the household size of 5, We assumed that the proportion of the population below 40% in these two states increased by 5% in 2021 following the Covid-19 situation.

The final inclusion and exclusion error analysis incorporated sampling weights that were computed using the listing data. Additionally, population and poverty weights were computed using estimated state-level population in 2021 and asset poverty as per NFHS-4, respectively. To further reduce the margin of error, an attempt was made to cover additional households to increase the sample size. Overall, 2121 households were interviewed in the study.

Survey weights

Sampling or survey weights are computed for each observation (household) interviewed in the survey to ensure that the estimates derived during analysis are representative of the population. Given that the target households to be covered in each PSU (cluster) were the same (15), the weights at the PSU level

66 In case of not obtaining consent of a household for participation, or if members of the household were not available for three repeated visits, they were replaced with the next households in the list of households that was randomly generated.

67 Margin of error of a sample statistic is the closeness with which it can be expected to approximate the population value. If the population prevalence of an indicator is, let's say 50%, a margin of error of 5 percentage points implies that the survey will estimate it between 45 and 55 percentage points. In general, all else being equal, higher the sample size, higher the precision.

68 Collected from the projected population size provided by the Census 2011 (https://nhm.gov.in/New_Updates_2018/Report_Population_Projection_2019.pdf).

must ensure that in each Block (strata), the probability of selection of a household was the same across clusters. Here, there were two challenges: one, the PPS-based sampling ensured that more populous clusters had a high probability of selection; two, as the same number of households were sampled from each cluster, households in the larger clusters had a lower probability of selection. The weighing scheme in such a setting needs to ensure that all households in these clusters (PSU) from strata (Block) had the same probability of being selected and hence necessitated an interaction of these two factors. A mathematical expression for this is provided in equation 1 below.

Let P_P be the weighted probability of each cluster is selected. Let P_h be the probability of each household being sampled from each cluster. Then, Basic Weight (BW) is the product of the reciprocal of the probability of these two forces and is given by:

$$BW = \frac{1}{(P_P * P_h)} \quad \text{..... (1)}$$

However, each block (strata) and a district together have a probability (P_B) of being selected. Thus, the overall weight (OW) is given by:

$$OW = \frac{1}{(P_B * P_P * P_i)} = (1/P_B) * BW \quad \text{..... (2)}$$

Finally, to further adjust for state-wise poverty and population figures, additional weights were computed at the state level to ensure that the weighted estimates informed the poverty levels (PW) in the respective states. All these weights together provided the final weights (FW) used for analysis (see equation 3, below).

$$FW = \text{OW} * \text{PW} \quad \text{..... (3)}$$

Qualitative

For the in-depth understanding of the targeting mechanism under PMJAY, through a qualitative study, we used maximal variation sampling to sample respondents, which involved purposefully picking a small number of units or cases that maximise the range of variation on dimensions of interest. This method of sampling helped us understand targeting effectiveness in a range of different contexts. As a result, selected cases[69] that represented the varying contexts, paying attention to the following criteria:

- Geographic area: Stakeholders from both rural and urban areas. Each of the respondents in Table 11 below was split evenly between rural and urban areas, where applicable.
- Facility type: PMAMs and hospital staff from government and private hospitals to understand whether the challenges differ by facility type.
- Gender balance: A mix of male and female respondents.

Respondents and sample size

The list of respondents for this study, and the size of our sample are provided in Table 11 below.

Table 11: Proposed respondents and sample size

Method	Respondent	Number of respondents/ State	Total
KII	National Health Authority officials	2*	2
KII	State Health Authority officials	2-3**	5
KII	District-level officials	1***	2
KII	PMAMs	4	8
KII	Insurance Trust	1****	2
KII	Frontline Workers (FLWs)-ASHA/USHA	4	8
KII	Community Leader/Local leader	2	4
FGD	Community members	4*****	8
	Total		31 interviews and 8 Focus Group Discussions

**at the national level*
*** This includes 2 KIIs and 3 KIIs, respectively, with Haryana and Uttarakhand SHA officials*
**** At the district level, conducted KIIs with district-level officials identified by CMO Uttarakhand and SHA Haryana, respectively.*

69 (Mason 2017)

***** Mode of implementation in both Haryana and Uttarakhand is a Trust hence no IA/ISA is involved. We conducted interviews with relevant SHA officials since Insurance Trust is not a separate entity in these states*
****** The number of FGD was increased to 8 and evenly split between PMJAY enrolled community members and non-enrolled members. Due to difficulty in identifying PMJAY non-enrolled community members for an FGD in the Doiwala block, the FGD guide was administered instead to two respondents.*

Sampling strategy

Selection of districts and blocks

For the qualitative component, we selected one district per state – Kurukshetra in Haryana and Dehradun in Uttarakhand. Among the sampled districts, these two have the highest number of empanelled hospitals, as seen in the table below (Table 17). Further, two blocks per district were sampled for the quantitative component, and the qualitative study was carried out in these selected blocks. These selected districts and blocks are provided in bold in Table 12.

Table 12: Sampled districts and blocks

State	District	No. of public hospitals	No. of private hospitals	Total	Blocks
Haryana[70]	Kurukshetra	12	44	56	Pehowa, Thanesar
	Sirsa	10	20	30	
Uttarakhand[71]	Dehradun	14	40	54	Vikasnagar, Doiwala
		15	11	25	

Selection of hospitals

A total of 8 hospitals (2 in each block; split evenly between rural-urban and public-private) were selected. We selected PMAMs from the list of public and private hospitals involved in the programme in the selected blocks.

Selection of NHA officials, SHA officials, and Chief Medical Officer (CMO) / Civil Surgeon (CS) were purposive, based on availability to speak to the study team.

Selection of villages and wards

In each block, we randomly chose one urban area (ward) and one rural area (village).

Community-level

We used data from the quantitative survey's listing exercise to identify individuals who were not covered under PMJAY to select people in villages/ wards with high variation.

Our focus groups included eight people and split the FGDs evenly, with 4 FGDs conducted with beneficiaries who had PMJAY cards and 4 with those who did not have PMJAY cards. We used this forum to understand perceptions about targeting, eligibility and those incorrectly targeted or left out. We were not able to assess the eligibility status of the group.

We also spoke to the Accredited Social Health Activist (ASHA) or Urban Social Health Activist (USHA) worker in that village or ward and local community leaders such as panchayat members in villages and municipality members inwards.

70 https://www.ayushmanbharatharyana.in/assets/pdfs/EMPHOSList/Hospital%20List_04May2021.pdf
71 https://sha.uk.gov.in/CMS/GetHospitalList

Tools

The table below provides a summary of the quantitative data collection tools.

Table 13: Description of tools and key themes covered in each tool

Sl. No	Survey Type	Sample Size	Purpose
1.	Listing of households	134 Villages / urban wards across 4 districts. 27,880 households listed under the exercise	(i) Preparation of sampling frame for the survey (ii) Obtain baseline numbers of penetration of PMJAY in the study locations and scheme utilization rate
2.	Household survey	2121 households	(i) Obtain estimates of inclusion and exclusion errors across design and implementation channels of PMJAY (ii) Identify correlates of registration under PMJAY (iii) Use stock (asset ownership) and flow (consumption expenditure) conceptualizations of economic well-being to check for coverage and targeting of the scheme.

The **qualitative** data collection used semi-structured interviews with key stakeholders, including the NHA, SHA, district officials at the CMO's office, PMAMs, Community Leaders and FLWs / ASHAs.

These KIIs were based on semi-structured tools containing open-ended questions that cover specific topics or themes with a loosely structured topic guide or checklist of topics. Some themes for the interview included perceptions of the processes related to targeting, the accuracy of the BIS system, and challenges with targeting and registration.

The Focus Group Discussions (FGDs) with community members were focused on understanding community-level perceptions regarding targeting effectiveness and acceptability. One important determinant of targeting effectiveness is how well community members are informed about the PMJAY, their participation eligibility, and the programme participation selection criteria. FGDs with them helped establish to what extent communities were aware of the PMJAY and explored themes such as perceptions of eligibility criteria, reasons for enrolment/non-enrollment and beneficiary experience of registration.

The **data collection** exercise was conducted between November 09 - December 05, 2021, including the training of the enumerators and a pilot survey.

Annexe C:
Qualitative analytical framework

Process of registration in the PMJAY scheme - experiences from community, individuals, ASHA, Arogya Mitra and officials across Uttarakhand and Haryana

- Knowledge and awareness of scheme and registration process - perceived vs facts/reality
  - how to, where available (camps organized etc.), what documents are required, what amount insured, which facilities are covered, coverage available for how many times, what diseases are covered etc. (any examples from community or officials)
- Eligibility criteria (refer design error - inclusion or exclusion errors) -
  - Reference to the SECC, beneficiary identification system (BIS), the discrepancy in data points - census vs NFSA data
  - duration for registration - actual vs perceived, misconceptions vs reality, cost of registration, if any, any discrepancies in the system (insert anecdotes of experiences)
- Registration and Allocation of PMJAY cards
  - verification and allocation - who does, what documentation is required, the process of registration (OTP required etc.), cost of registration, any misconceptions, discrepancies and bottlenecks (names not matching, family members missing), multiple review processes for ISA and KYC, add any stories/anecdotes
- Coordination with hospital systems
  - packages with hospitals, diseases covered, responding to complaints, payments and related challenges, add narratives from experiences

Access to the scheme - experiences in the hospital

- Process for availing of the benefits:
  - How coverage is accessed, what documentation is required, duration of hospitalization, experiences of availing the coverage and scheme - out-of-pocket expenses etc
- Systemic issues
  - coordination between departments, tests and pathology services included or not, reimbursement of cash expenses during or after admission,
- Operational issues - paperwork, facility response, human resource

Recommendations

- Design-related suggestions:
  - feasibility of eligibility corrections, inclusion criteria expansion, knowledge dissemination and IEC,
- Implementation-related suggestions -
  - coordination of systems and operations, human resource support (frontline workers' role, role of Panchayats/sarpanch, registration officials' remuneration and job satisfaction)
- Universalization of the scheme - refer Uttarakhand experience

Annexe D:
Comparison with representative surveys

We first discuss how the estimated number of households from our sample compared with the actual number of households residing in Haryana and Uttarakhand. The sampling weights in our calculations were designed to get us close to the actual population of Haryana and Uttarakhand. As Table 14 suggests, the estimated number of households in the study is quite close to the predicted number of households for each of the states in 2022.[72]

Table 14: Sample size and population estimates

	Haryana	Uttarakhand
Sample households	1,159	962
Estimated no. of households from the survey	5,470,774	2,386,440
Households (Census 2011)	4,783,295	2,058,427
Predicted households (2022)	5,452,956	2,387,775

Note: Average household size used in the prediction of the number of households in Census 2022 is taken from Census 2011. These numbers are 5.3 and 4.9 members per household in Haryana and Uttarakhand, respectively.

Next, using household-level data from the NFHS-4, we verified how our estimates on asset poverty compared with those from the NFHS-4 data itself. As mentioned earlier, in our primary survey, we enquired about household ownership of the same set of assets that were part of the NFHS-4 survey. Results in Table 15 suggest that our estimates for the states are comparable to asset poverty measures computed from the NFHS-4 survey.[73]

Table 15: Asset Poverty comparison with NFHS-4

	Haryana	Uttarakhand
% of asset-poor households in our survey	11.03	24.80
% of asset-poor households as per NFHS-4	11.64	25.21

Note: The standardized asset index in both cases is based on a set of 25 assets. For identifying the asset-poor households in our survey, the threshold that identifies the bottom 40% of asset-poor households at all India levels is taken from the NFHS-4.

We now turn to summary statistics of each of the variables of interest. In the all-India context, both Haryana and Uttarakhand are better performing states regarding economic well-being.[74] Due to their relatively better-off status than other states, both Haryana and Uttarakhand are expected to account for a lower poverty burden than all-India numbers.[75] This is confirmed in Table 16, which shows that only 11.30% and 24.80% of households from Haryana and Uttarakhand are below the all-India asset poverty threshold. The corresponding numbers for consumption poverty are 13.55% and 32.87%, respectively.

72 Figures on predicted population in 2022 taken from https://www.indiacensus.net/states/haryana, https://www.indiacensus.net/states/uttarakhand (Last accessed January 05, 2022)

73 We use unit level data from NFHS-4 for comparison as this is the most recent data available that is representative at the district level.

74 Ministry of Statistics and Programme Implementation (MOSPI), India http://mospi.nic.in/sites/default/files/press_releases_statements/State_wise_SDP_15_03_2021.xls (Last accessed March 28, 2021)

75 Assuming comparable levels of income inequality across states.

Table 16: Estimates of consumption and asset poverty by state (%)

	Consumption Poverty (CE-Eligible 2021)		Asset Poverty (AI-Eligible 2021)	
	Haryana	Uttarakhand	Haryana	Uttarakhand
Non-Poor (>40%)	86.45	67.13	88.97	75.20
Poor (<=40%)	13.55	32.87	11.03	24.80
Total	100.00	100.00	100.00	100.00

Source: OPM's calculations from OPM PMJAY 2021 survey
Note: Consumption poor households are those whose inflation-adjusted monthly per capita consumption expenditure is less than or equal to the thresholds that identify the bottom 40% of the households at the all-India level. Likewise, asset-poor households are those whose standardized asset index score, computed using Principal Component Analysis, is below the threshold that identifies the bottom 40% of asset-poor households at the all-India levels.

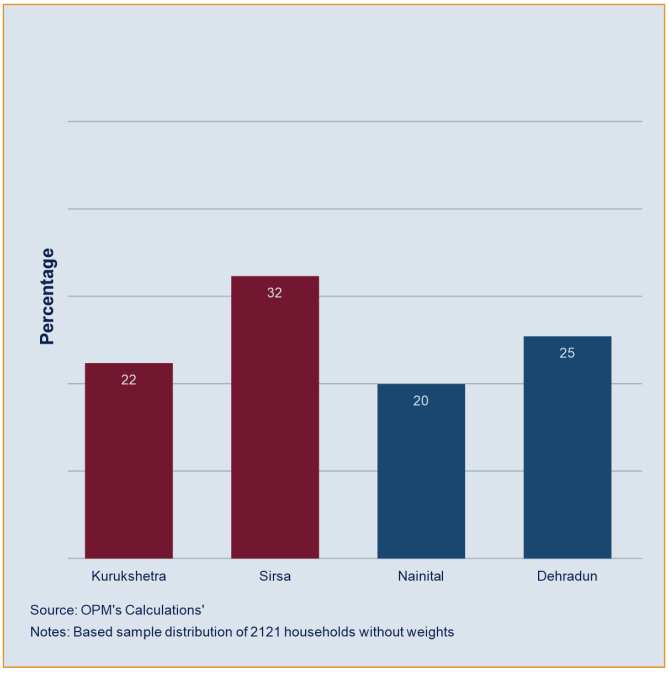
Annexe E: Analytical sample

Before discussing variables of interest, we present summary statistics for a sub-set of socio-economic variables for the respondent households.

In the study, the household survey was conducted across 134 PSUs across the states of Haryana (70) and Uttarakhand (64). The distribution across states was undertaken based on respective population weights. To improve the precision measures, we decided to cover more PSUs (clusters) with a lower number of households per cluster to increase variation in the data generation process. As a result, 15 households were interviewed in each PSU, which were selected via a random sequence from the listing data. In some PSUs, slightly more than 15 households were interviewed due to multiple teams being in the PSU simultaneously. This number stood at 111 additional households or about 5% of the target sample size.

Fig. 15 below shows the sampled households' distribution across districts in Haryana and Uttarakhand. Due to their higher population weights, Sirsa and Dehradun cover a larger sample in both states. These figures are provided for the sample and hence do not use the sampling weights, which will be covered subsequently.[76]

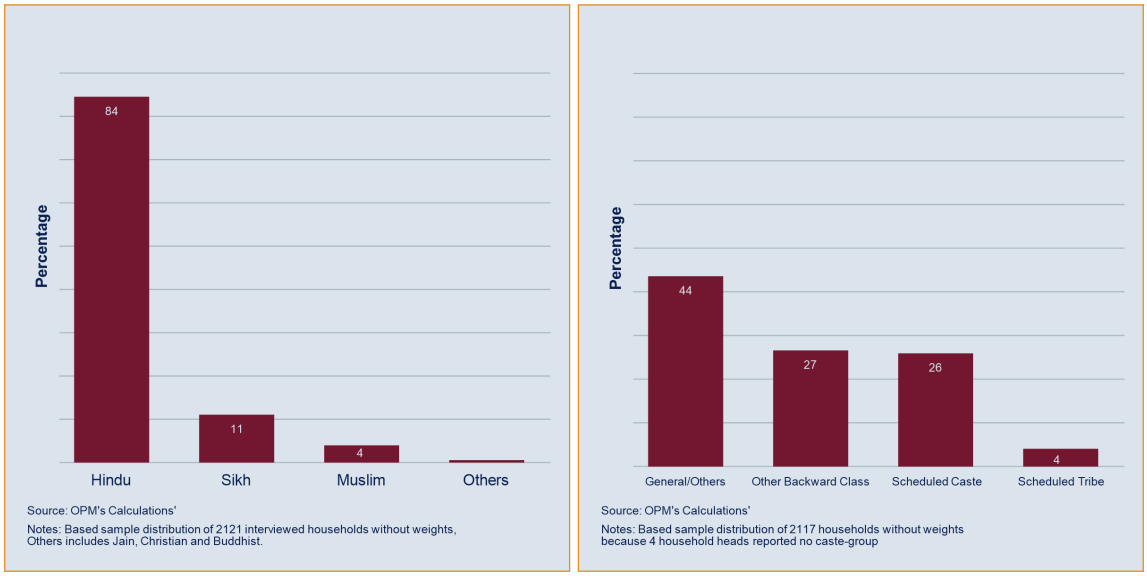
Fig. 15: Distribution of sample households across study districts (%)



Predominant households in the sample are Hindu (84%), with Sikhs (11%) and Muslims (4%) also represented. Across caste groups, Others/General (44%) and Scheduled Tribes (4%) constitute the largest and the smallest groups, respectively (Fig. 16).

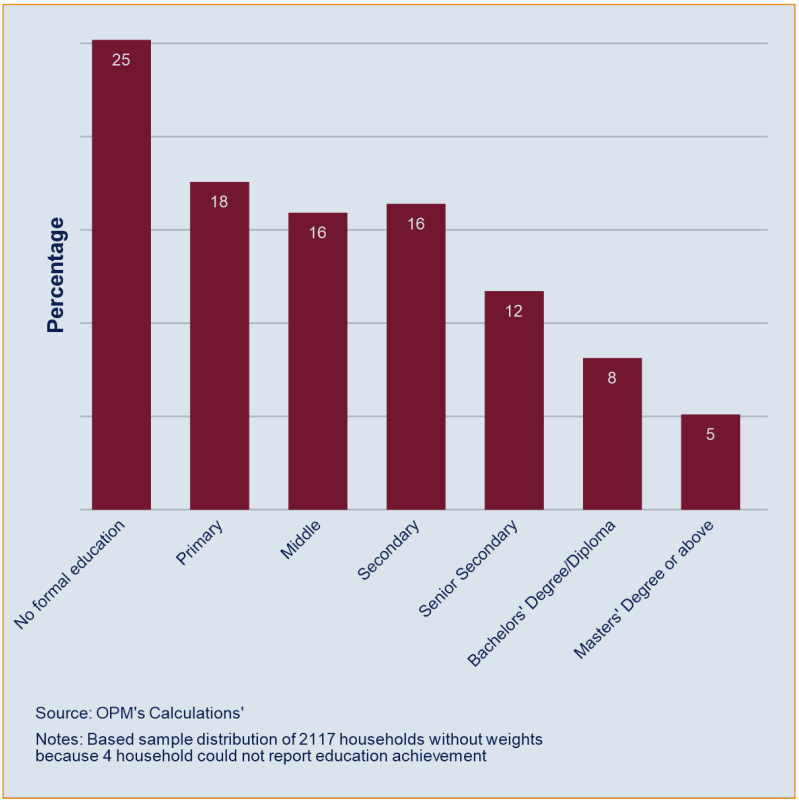
76 Block-wise details of the sample presented earlier in the Data Collection Report.

Fig. 16: Sample distribution across religious and caste-group affiliations



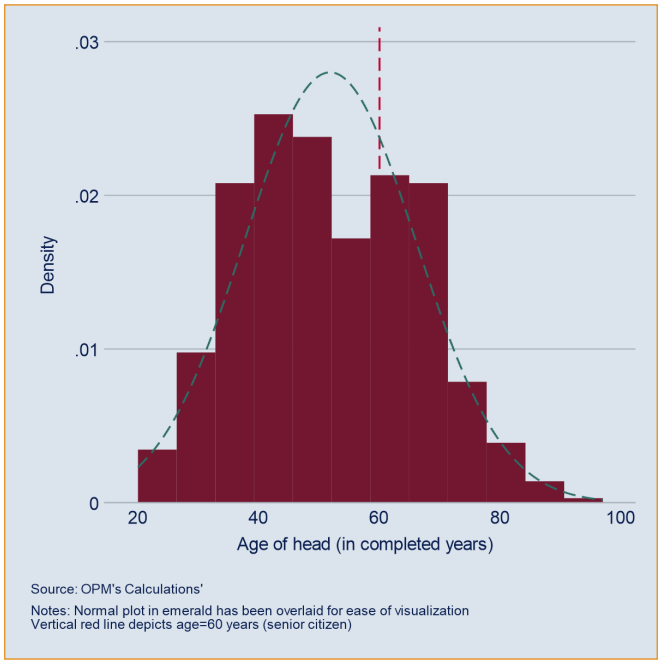
A glance at the educational outcomes of the head of the household shows that a quarter has no formal education. About 13% of the respondents are graduates or above (Fig. 17).

Fig. 17: Educational outcomes of the head of households in the sample



The household head's age distribution is provided via a histogram below (Fig. 18). The distribution is close symmetric, with median and means age close to about 51 years.

Fig. 18: Distribution of age of household head in the sample

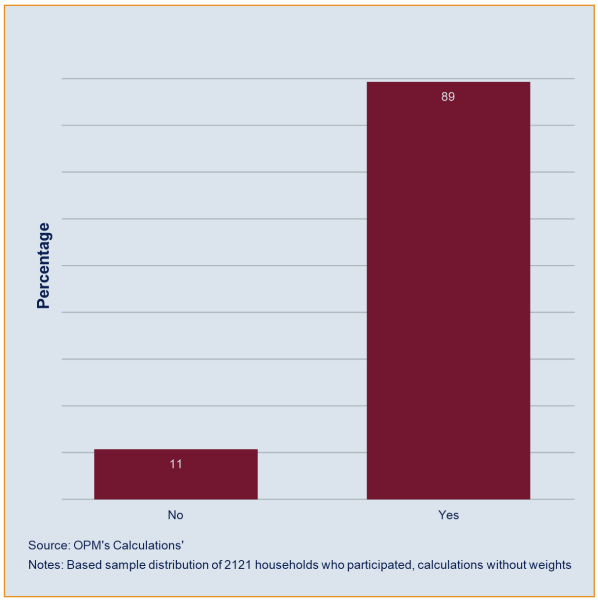


Source: OPM's Calculations'

Notes: Normal plot in emerald has been overlaid for ease of visualization
Vertical red line depicts age=60 years (senior citizen)

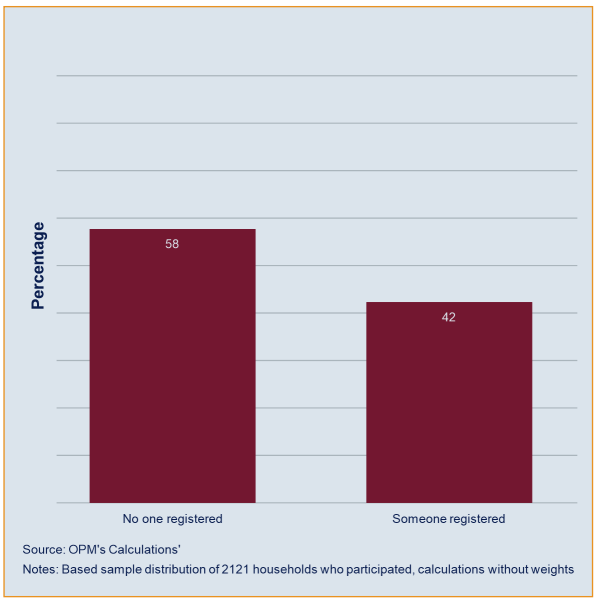
Awareness of PMJAY seems to be fairly high across the sample households, with 89% of the respondents aware of the programme (Fig. 19). However, only 42% of the households report someone in the family being registered under the programme.

Fig. 19: Awareness of and registration under PMJAY



Source: OPM's Calculations'

Notes: Based sample distribution of 2121 households who participated, calculations without weights



Source: OPM's Calculations'

Notes: Based sample distribution of 2121 households who participated, calculations without weights

Overall, the details of various other socio-economic variables for the sample across Haryana and Uttarakhand are presented below in Table 17.

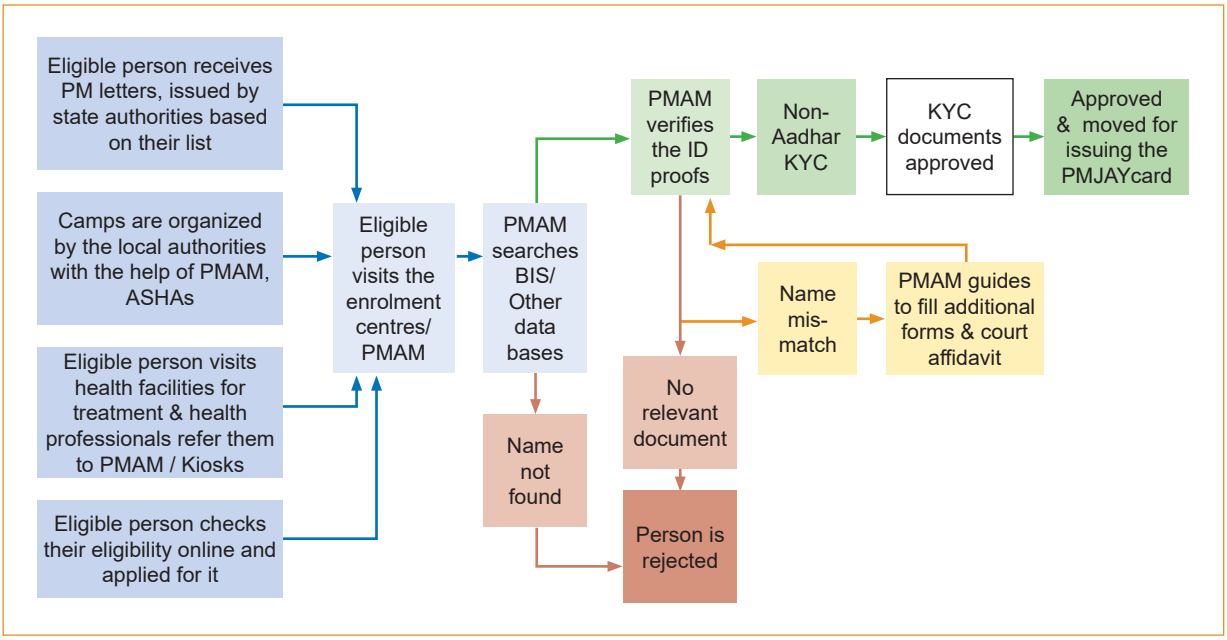
Table 17: Socio-economic characteristics across states (for sample, without weights)

	Haryana	Uttarakhand	Total
HH head with no formal education	30.80	18.30	25.13
Head with at least a bachelor's degree	7.51	20.06	13.20
At-least someone in HH earning >=10,000 Rs a month	56.86	71.52	63.51
Access to ration card	86.80	87.63	87.18
Access to MGNREGA	18.38	8.94	14.10
Access to Jan Dhan accounts	44.52	31.39	38.56
HH accessing old age/widow/disabled pension	38.05	20.06	29.89
Access to EPF/Gratuity/Pvt Insurance/FD/RD	18.64	39.29	28.01
Own land other than homestead	32.79	43.87	37.82
Access to clean cooking fuel	53.15	80.35	65.49
Residing in rural areas	73.68	84.51	78.59
Someone in the HH has chronic ailments	29.08	29.21	29.14
Some SC/ST members in HH	39.26	18.50	29.84
Share of Hindu HH	79.55	90.44	84.49
Dependency ratio (0-100)	38.29	35.65	37.09
Average HH size	4.78	4.77	4.77
Distance from city centre (kms)	29.18	28.04	28.66
Number of Households in the sample	**1159**	**962**	**2121**

Annexe F:
Registration process under PMJAY

The government guidelines suggest that the enlisted (whose names are on the list with the respective State Health Agencies following their state-specific eligibility criteria) users can get PMJAY e-card printed with the unique ID at empanelled healthcare providers, Common Service Centres (CSCs) and other such designated places by State Health Agency (SHA). All public facilities (including ESIS hospitals) with the capability of providing inpatient services (Community Health Centres (CHC)s level and above) are deemed empanelled. Empanelled healthcare providers (EHCPs) are required to hire a dedicated person (Pradhan Mantri) Arogya Mitra, or PMAM, to manage the help desk and facilitate the beneficiary enrolment utilizing the benefits under PMJAY. The following graph provides the enrolment process under PMJAY.

Fig. 20: Process map of enrolling in PMJAY



Similar to the guidelines, the key stakeholders from NHA, SHA, district and PMAM described the following process for enrolling beneficiaries adopted in both Uttarakhand and Haryana.

Through PMJAY Letters: During qualitative interviews with enrolled and non-enrolled respondents, community leaders shared that letters, commonly called “PM Letters” or “PMJAY Letters”, were issued to prospective beneficiaries of the scheme. This was based on the SECC 2011 and the Additional Data Collection Drive (ADCD), which was conducted in 2018 in Haryana. In Uttarakhand, it was based on the SECC 2011 data, along with the data from NFSA and Mukhyamantri Swasthya Bima Yojana (MSBY) and RSBY.[77] The district offices of the PMJAY, the Municipal Counsellors or Pradhans of the villages were intimated about the letter. These letters were then given to ASHAs to be distributed to the addressed people. The eligible households can then approach the nearest enrolment centre (either in the PMJAY kiosk empanelled hospitals, CSC, or Chief Medical Officer (CMO) office) with the letter along with their ID

77 Until October 2021, NFSA 2014 list was being used by Uttarakhand, post that they shifted to the updated NFSA 2021 list.

proofs. Upon verification with the data on Beneficiary Identification System (BIS) and the details on the ID cards (documents required for verification are Aadhar Card, Ration card / NFSA Card, and PM letter to initiate this process, the eligible person is enrolled and then the process of issuing the PMJAY card starts.

Through Camps: The qualitative respondents, including the Panchayat Pradhan and ASHAs, shared that, at times, the local governments, with the help of the PMAMs (of both the empanelled private and public hospitals in the catchment area), organized camps for the eligible people to get enrolled in the PMJAY. During these camps, eligible people from the neighbouring areas can come with their ID proofs. Following that, the PMAMs check if the households/person's name is in their list on the BIS system, and they verify and match the details of the ID proofs. If approved, they proceed to enrol the person and issue the PMJAY card.

Through Empanelled Hospitals/CSC: Any eligible person can approach the PMJAY kiosks anytime, which are located in the empanelled public and private hospitals, in the office of the Chief Medical Officer (CMO), followed by verification in the BIS and the ID document verification. The KII respondents shared that often eligible people know about the schemes before admission to hospitals for inpatient care through medical professionals. The PMAMs in the hospital kiosks guide them to the enrolment process.

Online process: The person has to log in to the official PM-JAY website and enter their mobile number, along with a few other details (like parent's name, state, district, area, Pincode) to check they are enlisted. After that, they can enrol by uploading the ID proofs and generating the household ID. However, the Municipal Counsellor and PMAM from Haryana shared that the online process is not common among the target population. This could primarily be due to the lack of digital access and/or adequate knowledge to navigate the online process.

For issuing the PMJAY card, the FGD participants reported paying INR 30 per member to obtain the card. However, this has been waived off recently.

Annexe G: Supplementary figures and tables

Table 18: Socio-economic profile for design errors using consumption and not asset to identify the bottom 40% (Haryana)

	Bottom 40%	The bottom 40% but excluded from eligibility	Top 60%	Top 60% but included in the eligibility
HH head with no formal education	34.53	35.77	34.55	47.88
Head with at-least a bachelors' degree	1.25	1.09	7.08	1.59
At-least someone in HH earning >=10,000 Rs a month	26.16	19.17	54.93	40.30
Access to ration card	81.13	89.37	87.92	89.69
Access to MGNREGA	15.98	8.03	17.63	27.96
Access to Jan Dhan	59.17	58.76	45.99	54.77
HH accessing old age/widow/disabled pension	28.56	31.30	39.20	38.62
Access to EPF/Gratuity/Pvt Insurance/FD/RD	8.88	14.40	17.35	11.44
Own land other than homestead	0.00	0.00	29.15	11.23
Access to clean cooking fuel	61.13	74.24	55.56	44.97
Residing in urban areas	72.56	91.97	21.20	10.06
Someone in the HH has chronic ailments	19.73	14.39	30.64	29.59
Motorized 2/3/4 wheeler	29.39	29.08	31.05	20.46
Kisan credit card with limit >=50,000	0.00	0.00	6.78	2.45
Pucca house with at-least 3 rooms	20.56	25.76	40.86	29.79
Refrigerator	59.70	64.76	71.59	58.54
At-least 2.5 acres of irrigated land with at-least one irrigation equipment	0.00	0.00	9.60	1.50
Scheduled Caste (SC)/Scheduled Tribe (ST)	43.60	32.01	39.25	65.64
OBC	32.19	31.51	29.06	22.81
Others/General	24.21	36.47	31.69	11.56
Dependency ratio (0-100)	46.20	45.27	39.60	43.41
Average HH size	5.61	5.16	4.56	4.48
Distance from city centre (kms)	25.10	25.11	32.42	34.94
Average age of HH head (years)	44.25	46.95	52.02	52.27
Number of households (weighted)	741,474	425,068	4,729,300	2,525,677

Source: OPM PMJAY 2021 survey, OPM's calculations
Note: Poverty is defined using CE-eligible 2021 status. The estimates are computed using sampling weights. As columns (2) and (4) are subsets of (1) and (3), respectively, these are not independent, and hence the statistical significance of the differences is not presented.

Table 19: Socio-economic profile for design errors using consumption and not assets to identify the bottom 40% (Uttarakhand)

	Bottom 40%	The bottom 40% but excluded from eligibility	Top 60%	Top 60% but included in the eligibility
HH head with no formal education	36.79	56.46	21.96	21.20
Head with at-least a bachelors' degree	7.36	0.00	12.22	11.17
At-least someone in HH earning >=10,000 Rs a month	53.79	74.15	52.03	47.26
Access to ration card	93.17	87.08	88.17	91.82
Access to MGNREGA	13.31	0.00	20.76	22.70
Access to Jan Dhan	48.59	43.54	32.54	34.99
HH accessing old age/widow/disabled pension	23.34	30.61	23.28	25.26
Access to EPF/Gratuity/Pvt Insurance/FD/RD	16.40	12.92	27.77	26.84
Own land other than homestead	31.52	43.54	43.70	43.27
Access to clean cooking fuel	63.08	100.00	64.23	61.32
Residing in urban areas	41.59	64.62	18.57	16.76
Someone in the HH has chronic ailments	16.29	12.92	27.99	30.97
Motorized 2/3/4 wheeler	29.03	43.54	25.64	23.25
Kisan credit card with limit >=50,000	3.68	0.00	9.35	10.53
Pucca house with at-least 3 rooms	27.62	30.61	40.09	37.67
Refrigerator	48.32	100.00	52.60	49.09
At-least 2.5 acres of irrigated land with at-least one irrigation equipment	0.00	0.00	2.61	2.32
Scheduled Caste (SC)/Scheduled Tribe (ST)	34.04	25.85	26.72	34.83
OBC	36.33	30.61	23.40	20.08
Others/General	29.63	43.54	49.88	45.10
Dependency ratio (0-100)	45.74	53.82	37.58	39.13
Average HH size	5.85	5.90	4.38	4.40
Distance from city centre (kms)	30.32	40.53	31.20	31.50
Average age of HH head (years)	49.50	56.90	51.98	52.80
Number of households (weighted)	784,455	81,674	1,601,985	1,207,949

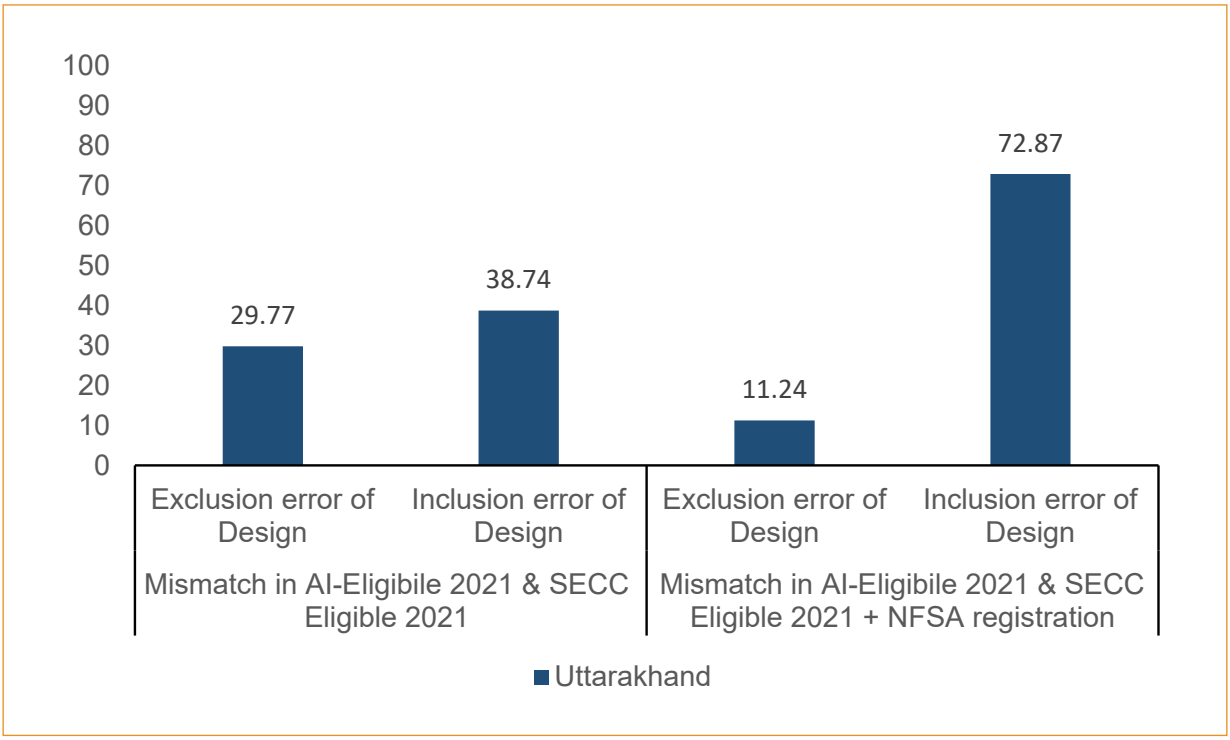
Source: OPM PMJAY 2021 survey, OPM's calculations
Note: Poverty is defined using CE-eligible 2021 status. The estimates are computed using sampling weights. As columns (2) and (4) are subsets of (1) and (3) respectively, these are not independent, and hence the statistical significance of the differences is not presented.

Table 20: Contingency table for SECC eligibility and access to NFSA cards (%)

	Haryana	
	NFSA card: No	NFSA card: Yes
SECC eligible: No	62.13	37.87
SECC eligible: Yes	53.22	46.78
	Uttarakhand	
	NFSA card: No	NFSA card: Yes
SECC eligible: No	43.38	56.62
SECC eligible: Yes	36.25	63.75

Source: OPM PMJAY 2021 survey, OPM's calculations
Note: rows sum to 100 (%) and reflect what % of those who are SECC eligible/in-eligible have/do not have access to NFSA cards

Fig. 21: Exclusion and inclusion errors in design for Uttarakhand with different design rules (%)



Source: OPM PMJAY 2021 survey, OPM's calculations
Note: Exclusion error of design refers to % of poor (AI- eligible 2021) who are ineligible as per SECC-eligibility 2021 criteria. Meanwhile, inclusion error of design refers to % of non-poor (AI- eligible 2021) who satisfy SECC-eligibility 2021 criteria. In the Fig. above, we present these errors with (a) just the original set of design rules from SECC 2011 and; (b) adding just the NFSA registration status to (a)

List of tables and figures

Tables

Figures

This study assesses the effectiveness of targeting of beneficiaries under the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PM-JAY) in the states of Haryana and Uttarakhand.