Odisha Economy Discussion Series 2

Augmenting Agrarian Livelihoods in the Time of Crisis

A Baseline for KALIA

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Augmenting Agrarian Livelihoods in the Time of Crisis: A Baseline for KALIA

Sarthak Gaurav[1]

Abstract

Purpose – The recently launched KALIA scheme of the Government of Odisha is a massive direct benefit transfer (DBT) scheme aimed at improving the condition of around three million farm households along with that of landless cultivators, sharecroppers, agricultural labourers, and vulnerable households. However, evaluations of the impacts of the scheme are likely to face difficulties in the absence of an appropriate counterfactual. This study discusses how the policy changes could transmit into impacts for farm households and briefly presents the evidence on impact evaluation of conditional cash transfers programmes across the globe. Furthermore, this study offers a baseline for agricultural livelihoods in the state.

Design/methodology/approach – The study discusses frameworks for evaluation of the impact of direct benefit transfers such as KALIA. It uses the Agriculture Census 2015-16 to understand the patterns of operational holding in the state. In order to generate an estimate of the cultivation income relevant for a baseline of KALIA, and examine the scope of livelihood augmentation programmes, it uses unit level data from the NSS 70th Round Situation Assessment Survey of Agricultural Households, 2012-13.

Findings – Findings suggest that the preponderant small and marginal farmers in the state of Odisha receive abysmally low returns from cultivation. Financial assistance under KALIA though justifiable as a temporary relief may not suffice to create sustainable livelihood impacts unless structural problems in agricultural markets are fixed, and greater non-farm diversification opportunities are created in the state.

Originality/value – Despite the general state of agrarian crisis in the country and concerns about low agricultural incomes in the state of Odisha, there is no baseline for understanding how livelihood augmentation programmes such as KALIA could impact welfare of agricultural households. This study uses unit level data from NSSO and Agriculture Census data to construct such a baseline. In doing so, it highlights the low net returns to cultivation across size-class of land possessed and identifies potential policy implications. It also emphasizes the need for rigorous evaluation of impacts of public programmes such as KALIA.

Keywords: *Agrarian Crisis, Agriculture, Direct Benefit Transfer, Odisha.*

JEL Classification: H24, I138, O13, Q10. Q12, Q18

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1. INTRODUCTION

At a time when most state governments as well as the central government are dabbling with myriad farm loan and debt waivers along with schemes that range from addressing the chronic agrarian crisis (Reddy and Mishra, 2009) to 'doubling farmers' income' by 2022 (Singh, 2018), the Government of Odisha has recently launched a massive livelihood and income augmentation scheme that demands a careful scrutiny. The state government has earmarked Rs.10,180 crore (around 1.4 billion USD) for three years for the Krushak Assistance for Livelihood and Income Augmentation, whose acronym is KALIA.[2] The KALIA scheme is a direct benefit transfer (DBT henceforth) scheme that aims to benefit around 92% of farmers by augmenting livelihoods and eliminating poverty. It comprises provision of financial assistance, cultivation and livelihood support along with insurance facilities and interest subvention for wide group of eligible beneficiaries including small and marginal farmers, landless agricultural and non-agricultural households, sharecroppers, and vulnerable households unable to undertake economic activities.[3] There is a recently added component of scholarship for children of eligible families.

Given its scale and scope, KALIA offers an interesting opportunity for thinking about the causal mechanism of how the intended impacts may be achieved. However, in the absence of an appropriate baseline or the state government's acknowledgment of having relied on any before the scheme implementation, this paper attempts to develop a baseline for evaluation of impacts of KALIA in due course. The justification for a baseline as a methodological necessity for evaluating the scheme's impacts as and when they arise is critical. Surprisingly, despite the scale and scope of large scale public interventions such as KALIA, there seems to be an absence of deliberation on *ex ante* analyses as well as *ex post* designs on how these schemes may cause the intended impacts. How such cash transfer programmes influence labour supply decisions, farm and non-farm wages, cropping patterns, agricultural input usage, crop production, technology adoption, consumption, debt, and investment patterns have implications on households' welfare that go beyond the objectives of the schemes. In this context, *ex ante* reasoning behind implementation of such schemes

[2] The scheme has been launched without adequate fiscal provisioning. How the government finances it given political pressures in the state may have general equilibrium effects on agriculture in the future periods that need to be acknowledged in a rigorous programme evaluation framework.

[3] A small farmer is a cultivator owning between 2.5 acres to 5 acres of arable land whilst a marginal farmer is a cultivator owning less than 2.5 acres of arable land.

demands a holistic assessment of behavioural implications and the theory of change. *Ex post* evaluations on the other hand, have to grapple with choice of methodology for estimating potential causal impacts (Neyman, 1923; Rubin, 1974; Holland, 1986). Central to evaluating to causal impact is the idea of counterfactual –what would have happened to the households or any other unit who benefitted from the scheme had they not been covered under the scheme? Impact evaluation studies refer to the group that benefitted from a programme, 'treatment group' and that did not benefit from the programme, 'comparison' group.[4] However, a household or the unit in focus cannot be observed to have received and not received the benefits at the same point of time. Therefore, in the absence of an appropriate baseline or counterfactual for the treatment group, evaluating impacts of the scheme may be misplaced.[5] The need for a rigorous scientific evaluation is particularly justified in view of conclusive value judgments that have already been made by eminent economists within a few weeks of the scheme's launch.[6]

While there are concerns regarding evaluation of impacts of individual components within the multiple components of the scheme apart from how implementation challenges are overcome, any attempt at assessing the impacts of the scheme should not ignore the need for an appropriate baseline. In terms of data availability to construct a baseline of agricultural situation in the state before the programme implementation, two official sources are of particular interest. First is the latest Agriculture Census, Agriculture Census 2015-16 provides relevant statistics for the state of agriculture from an operational holding perspective. The second dataset is the unit level data from the NSS Situation Assessment Survey (SAS) of Agricultural Households 2012-13 which offers insights at an agricultural household level as it can be used to estimate the costs of cultivation, value of output, and net returns from cultivation for both kharif and rabi season. A detailed analysis of the patterns from the Agriculture Census as well as the SAS 2012-13 by size-class of land operated is

[4] In the clinical trials literature, that has motivated the impact evaluation literature, comparison groups are akin to 'control groups'. Attempts at constructing an appropriate comparison or control group try to ensure that observed characteristics as well as unobserved characteristics of the units are similar in expectations to those in the treatment group. The idea is that the only difference between the two groups is the intervention in question.

[5] It is also important to identify average treatment effects (ATE), local average treatment effect (LATE), average treatment effect on the treat (ATE), and intention to treat (ITT) effects which have been rigorously studied in the impact evaluation literature (Imbens and Angrist, 1994; Angrist and Pischke, 2010; Abadie and Gardeazabal, 2003).

[6]as The scheme has been commented as "the best conceived scheme for the distressed agriculture sector" to being the "lighthouse to guide the nation on the kind of agriculture policy we need in future for India's farmers", within a few weeks of its launch (Sahu, 2019).

likely to provide insights into the state of agriculture and agriculture based livelihoods before implementation of KALIA.

Results of the study show that the average size of land holding has fallen below one hectare – a level that raises serious doubts on the ability of well-intentioned public schemes to generate substantial and stable incomes without introducing risks or raising costs. The findings also depict a picture of extremely low returns from cultivation and vulnerability of small, marginal, and near-landless agricultural households in particular. Although the scheme includes non-agricultural households and other vulnerable households as target beneficiaries, examining the condition of agricultural households is useful as they comprise the majority among the beneficiary population.

Note that for evaluation of impacts at the household or individual level, verification of existing beneficiaries and identification of new beneficiaries would have to be based on population register and datasets such as Socio Economic Caste Census (SECC) along with relevant administrative databases. This study attempts to arrive at a more aggregate baseline with which changes in the situation in agriculture in the post-scheme completion period could be compared with. Furthermore, this analysis is not a commentary on political economy, design, fiscal, or implementation related issues, that are equally important. Rather, it is an attempt to construct a baseline that can be used as a reference for costs of cultivation and earnings from agriculture while acknowledging the importance of agricultural and non-agricultural earnings (including animal husbandry, wage earnings, salaries) and other off-farm incomes. In doing so, the study provides lower bounds of household incomes that the scheme aims to impact.

The rest of the paper is organized as follows. Section 2 presents some models for thinking through how DBTs such as KALIA could influence welfare of agricultural households and briefly reviews the evidence on evaluation of conditional cash transfers. Section 3 describes the components of the KALIA scheme and its implementation status. Section 4 presents findings from analysis of Agriculture Census 2015-16 and SAS 2013 in an attempt to develop a baseline for evaluating KALIA. Section 5 concludes with remarks on directions for future research and policy implications.

2. CONCEPTUAL FRAMEWORK: EFFECT OF DBTS ON PRODUCTIVE ACTIVITY AND LABOUR SUPPLY

In order to validate the logic behind the intervention and understanding the transmission challenge, a key question that arises is: why should a DBT programme for farm households such as KALIA have an impact in line with its objectives? It can be hypothesized that DBTs generate productive impacts at the household level via their on the decision making of agricultural households. In this context, two class of neo-classical models can be considered. The first class of models called agricultural household models (Singh et al., 1986) offer a framework where in farm households are considered as profit maximizing producers as well as utility maximizing consumers. Since the production and consumption decisions are linked, allocation of labour and agricultural inputs on the production side, and allocation of income from selling labour and farm profits on the consumption side are interdependent (Taylor and Adelman, 2003).[7] Assuming the existence of perfect input and output markets, and prices being determined exogenously, production and consumption decision can be considered 'separable', that is, the profit and utility maximization problem is solved recursively.[8] However, when there are missing markets or market failures exist, 'separability' breaks down. As a result, production and consumption decisions of households are jointly determined.[9] In such models, the household budget constraint is not fixed; rather it is endogenous as it depends farm profits arising out of production decisions of the household.

The solution to a typical agricultural household model comprises the endogenous variables: output, inputs, marketed surplus for household tradables or prices for household non-tradables as functions of exogenous variables. It is some of these exogenous variables that are influenced by policy (prices or non-price factors), and these models offer relevant comparative statics for policy analysis. In the case of DBTs for farm households, non-separability suggests that households are likely to overcome constraints including credit and

[7] Consumption includes consumption of own produced goods, purchased goods, and leisure. Farm profit includes implicit profit from goods produced and consumed by the farm household. The constraints in the model comprise production technology, income, family time, fixed-asset endowments, prices of inputs and outputs, and consumption goods that the household did not produce.

[8] In the case of household tradables with perfect markets, prices are fixed exogenously. In the case of household non-tradables and missing markets, internal 'shadow prices' determination condition is specified. The shadow price condition implies that demand for a good is equal to its output (de Janvry et al., 1991).

[9] DBTs can be predicted to have an effect on household's consumption but not production if markets function perfectly and agricultural investments are optimal. Production and leisure are decoupled if household can obtain perfect substitute for own labour and sell its own labour at given market wage in local labour markets. Under these circumstances, in response to a policy change, agricultural households can increase labour demand and leisure consumption at the same time.

liquidity constraints. The cash inflow on account of DBTs may enable adoption of riskier and more rewarding cropping patterns or farm investments. The wealth transfers could allow farmers to improve agricultural input purchase decisions. They also provide insurance against negative shocks to production, thereby weakening or overcoming failures of agricultural insurance markets. However, market imperfections and market failures may also render policy initiatives ineffective or dampen the potential impacts due to 'threshold effects' whereby household behaviour does not respond to policy changes until the changes are large enough (Lofgren and Robinson, 1999).

The second class of models follow Becker's (1965) time allocation models that account for the trade-off between leisure and work. These models predict that DBTs can lead to an income effect – negative incentives for paid work and positive incentives for unpaid domestic work/leisure (Parker and Skoufias, 2000). The effects are likely to be different for men and women: men may increase leisure while women withdraw from the labour market. In the case of CCTs that have a condition of increase school attendance of children, reduction in child labour can have a substitution effect whereby adult labour supply increases.

Although evaluation of DBTs is limited, from an impact evaluation methodology perspective, there have been a wave of policy evaluations dominated by field experiments comprising randomized control trials (RCTs) (Duflo and Kremer, 2008) that have gained prominence following the evaluation of the conditional cash transfer (CCT) programmes such as PROGRESA in Mexico. Nevertheless, the idea of RCTs in as 'gold standard' in programme evaluations has been debated (Cartwright, 2007; Deaton, 2010). Several non-experimental methods for impact evaluation (Ashenfelter and Card, 1985; Angrist and Krueger, 1991; Card and Krueger, 1994; Angrist et al., 1996; Dehejia and Wahba, 1999; Bertrand et al., 2004; Angrist and Pischke, 2008) have also been widely used in the impact evaluation literature (see Athey and Imbens, 2017 for an excellent review).

3. COMPONENTS OF THE KALIA PACKAGE

3.1 Financial assistance, Interest Subvention, and Insurance

As per Census 2011, there were 4.1 million cultivators, 6.7 million agricultural labourers out of the 17.5 million workers in the state. KALIA targets over three million farmer households as 90% of farmers are small and marginal.[10] For small and marginal farm families, a financial aid of Rs.5,000 per farm family per season for a period of five seasons till 2021-2022 will be provided in order to enable them to purchase agricultural inputs such as seeds, fertilizers, pesticides, and for meeting labour wages to be paid.[11] This component of the scheme has come into effect from the ongoing (2018-19) Rabi season. For landless agricultural households, a financial assistance of Rs.12,500 per family per year will be provided for taking up non-land based allied activities such as goat rearing and bee-keeping, among other activities. Vulnerable households unable to undertake economic activities and landless agricultural labour households will receive financial assistance of Rs.10,000 per family per year to sustain their livelihood. Vulnerable households include those who are disadvantaged in the form of old age, disease, disability or vulnerable due to other reasons. This component targets half a million households every year. In addition to these benefits, an interest subvention on crop loan up to Rs.50,000 will be provided from the kharif season of 2019.

In Odisha, agriculture continues to employ over 60% of the unorganized workforce despite contributing 20% to the gross state domestic product (GSDP) (Government of Odisha, 2018, p.2). Moreover, poverty is largely confined to rural areas and the pace of decline in rural poverty has been slow compared to other states. Rural poverty is concentrated among the communities such as landless labourers, scheduled castes (SCs), and scheduled tribes (STs). By inclusion of such vulnerable communities under the gamut of KALIA, the state has taken a step in poverty reduction apart from livelihood augmentation per se, and these distinctions should be recognized while evaluating the scheme's impact owing to an inherent relationship between the two.

In addition to the financial assistance component and interest subvention, KALIA offers subsidies for insurance coverage. A life insurance coverage of Rs.2,00,000 at a

[10] By February 21, 2019 nearly 2.72 million small and marginal farmers and 3,20,000 landless had benefitted under the scheme.
[11] A farm family comprises a farmer and her or his spouse along with their children who depend on them.

nominal premium of Rs.330 per annum (of which the state government will bear Rs.165) to all savings bank account holders aged between 18-50 years. In addition, there is a subsidised personal accident cover of Rs.2,00,000 at a nominal premium of Rs.12 per annum (half borne by the state government) targeted at all savings bank account holders aged between 18-50 years. For beneficiaries in the age group of 51-70 years, the entire annual premium of Rs.12 will be borne by the state Government. Recently, a scholarship scheme covering fees, hostel fees, and mess fees in public educational institutes for children of beneficiaries has also been launched.

3.2 Scheme Implementation

Currently, the scheme is being implemented with full gusto. The entire state machinery including agricultural department and associated departments has harnessed all possible resources for successful roll-out of the scheme in multiple phases. The scheme also plans to integrate the growing mobile phone penetration in rural areas. All scheme related information would be sent to the farmer's mobile phone through SMS and voice calls in a timely manner. Although the scheme specifies that farmers will be automatically registered with the Government database, any farmer seeking information on the scheme has the provision to register by giving a missed call to a well-advertised telephone number.

The KALIA scheme has been designed for implementation in phases. In the first phase, the stipulated financial assistance to beneficiaries is being credited to the bank accounts of nearly three million farmers who have transactions with the concerned state department. For impact evaluation enthusiasts, the staggered roll-out or phased-in nature of the scheme's implementation could also be exploited for identification of how specific elements of the package impact livelihoods of the beneficiaries.[12]

In order to improve participation in the scheme, there is widespread campaigning to reach out to all farmers.[13] Central to the timely implementation of the scheme is a robust verification process that cross-verifies across multiple administrative datasets based on the proof of identity and land records and other relevant documentation submitted while

[12] See, for example, Miguel and Kremer (2004). Phased-in designs are often limited in evaluating long-term effects. However, if cohorts are well-defined this may be overcome. Spill-over effects may also be interest in the context of KALIA. Alternative methodologies for evaluating causal effects of the intervention such as regression discontinuity (Imbens and Lemieux, 2008) could also be employed to exploit the neighbourhoods of the land based cut off for eligibility in the scheme.

[13] A point in case is the ubiquitous and larger than life sized posters of KALIA being put up at public spaces including airports and railway stations that advertise different scheme components.

applying.[14] It is noteworthy that the Government has ensured high level of transparency and accountability in the scheme implementation. Detailed list of beneficiaries are put up on the official website. Information for small and marginal farmers as well as landless agricultural labourers is easily available in the bilingual website. Standard operational guidelines along with several communication material and updated news on the scheme have also been put on the website. An innovation in the scheme is the availability of 'green form' and 'red form' for applicants. The green form is for potential beneficiaries to apply for benefits whereas the red form is provided to report complaints about ineligible individuals being included as a beneficiary or self-reporting of having wrongfully received benefits when one was not eligible to receive the benefits.

4. STATE OF AGRICULTURE BEFORE IMPLEMENTATION OF KALIA

4.1 Insights from Agricultural Census 2015-16

Agriculture in the state is primarily the story of livelihoods of small and marginal land holders. As per the Agriculture Census 2015-16, there has been an increase in the number of operational holdings from 4.619 million in the 2010-11 Agriculture Census to 4.866 million but the total area of operational holdings has fallen by around 5% during the same period: from 4.852 million hectares to 4.619 hectares (Agriculture Census 2018, p.16).[15] As shown in Table 1, there has been an increase in marginalisation of operational holdings.

Around 93% of operational holdings in the state are marginal (less than one hectare) and six per cent are small (between one and two hectare). In terms of share of area operated, the share of area operated by small and marginal size-class has increased to nearly three-fourth of total area operated; the increase being dominated by the increase in the marginal operational holding category. Operational holding based size-classes having over two hectare of land still operated a quarter of the area operated despite having a little over one per cent share in the number of operational holdings.

[14] Digitization of land records alongside high quality MIS data pertaining to government projects and schemes are likely to have improved the efficiency of the verification process. Field based verifications are also integral to establishing authenticity of the applications and vetting claims of eligibility at the Gram Panchayat level.

[15] 'Operational holding' is defined as land which is used wholly or partly for agricultural production and is operated as one technical unit by one person alone or with others without regard to the title, legal form, size or location. By 'technical unit', the Agriculture Census refers to a unit of land which is under the same management and has the same means of production such as labour force, machinery and draft animals. Therefore, operational holdings and ownership of a holding whilst related, are not similar.

Table 1: Percentage Distribution of Number and Area of Operational Holdings: Agricultural Census 2010 and 2015

	Share of operational holding (%)		Share of area operated (%)	
	2010 Census	2015 Census	2010 Census	2015 Census
Marginal (<1 ha)	72.17	74.74	39.61	44.53
Small (1-2 ha)	19.68	18.23	30.87	30.40
Semi-medium (2-4 ha)	6.67	5.89	18.94	17.06
Medium (4-10 ha)	1.35	1.05	7.86	6.15
Large (>10 ha)	0.12	0.08	2.72	1.87
Total	100	100	100	100

Note: ha denotes hectare. 1 hectare = 2.47 acre.

Source: Figures for number of operational holdings are from Agriculture Census 2018 (p.35). Figures for share of operated area are from *ibid* (p.37).

As presented in Figure 1, the average size of operational holding has fallen in 2015 in comparison to 2010 Census. For the first time in the history of the state, it has fallen below one hectare. The decline in average operational holding area has been higher in the large size-class, followed by the medium and semi-medium size-class.

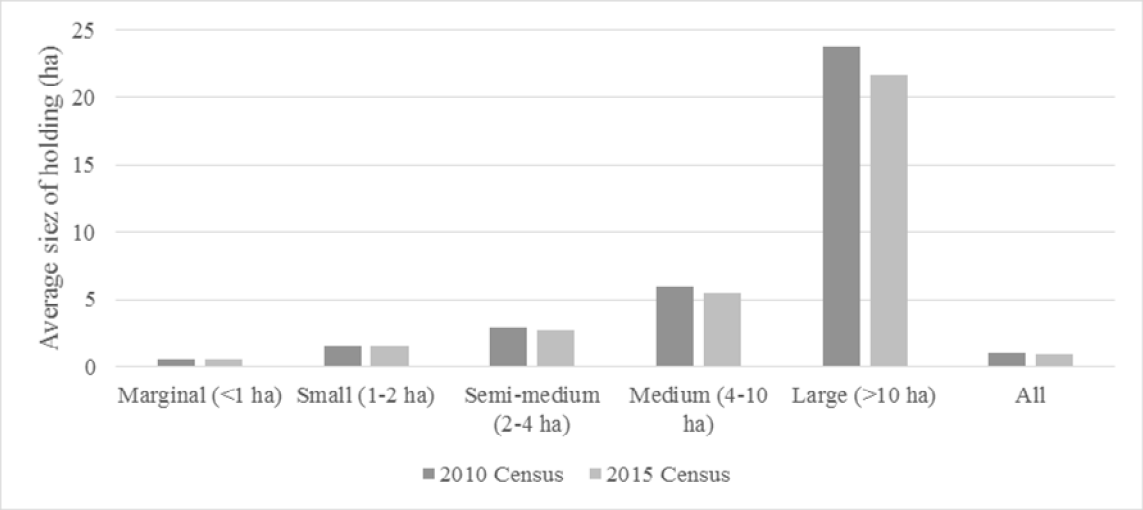

Fig 1: Average size of operational holding in Odisha: 2010 vs. 2015 Agricultural Census

Source: Figures are from Table 11 of Agriculture Census 2018 (p.46).

4.2 Insights from SAS of Agricultural Households, 2012-13

The NSS 70th Round Situation Assessment Survey of Agricultural Households was conducted to collect information on various aspects of farming among agricultural households. An 'agricultural household' refers to a household receiving at least Rs.3000 as value of produce from agricultural activities such as cultivation of field crops, horticultural crops, fodder crops, plantation, animal husbandry, poultry, fishery, piggery, bee-keeping, vermiculture, and sericulture; and having at least one member who is self-employed in agriculture: either in the principal status or in subsidiary status during last 365 days.[16]Therefore, an agricultural household as defined in NSS 70th round may or may not possess land.

The survey was conducted in the calendar year 2013 (1st January, 2013 to 31st December, 2013), and provides detailed assessment of the situation of agricultural households for the agricultural year 2012-13 (July 2012 – June 2013). In the survey, the same household was visited twice during the survey period: the period of first visit (visit 1) was from January to July 2013 and that of second visit (visit 2) was from August to December, 2013. Rich information on expenses and receipts from cultivation were collected for the period July to December, 2012 in visit 1 and for January to June, 2013 in visit 2. All crops, whether principal or not, harvested during agricultural year 2012-13 were duly considered in either visit 1 or visit 2.

For each season, for calculation of value of output, value of final product as well as bi-products was taken into account. For calculation of net returns from cultivation, cost of cultivation for the following purchased inputs were deducted from the value of output: seed, fertiliser, manure, insecticide, human labour, animal labour, diesel, electricity charges, irrigation, minor repair, interest, machine hiring cost, lease rent, minor repair, and other costs.

Size-classes were constructed based on information on land operated. The following size-classes of land operated were considered: near landless (less than 0.01 ha), marginal (0.01-1 ha), small (1-2 ha), semi-medium (2-4 ha), medium (4 ha), and large (more than 10 ha). In contrast to the size-classes presented in the Agriculture Census, the NSS based classification reports near landless agricultural households. From the perspective of KALIA,

[16]Entirely agricultural labour households and households receiving income entirely from coastal fishing, activity of rural artisans, and agricultural services were not considered as agricultural household.

these households are also potential beneficiaries and many among the near landless households are likely to be vulnerable as per the scheme guidelines. Near landless households and other size-classes of operational holders in the state have also been shown to be active in the tenancy arrangements such as sharecropping (Gaurav and Mishra, 2016). Although sharecroppers are included as potential beneficiaries of KALIA, a discussion on tenancy patterns is beyond the scope of this paper, and we confine our analysis to cost of cultivation and returns to cultivation for different size-classes irrespective of tenancy patterns. Nevertheless, identification of sharecroppers would pose considerable challenges during scheme implementation as it requires interpolation involving multiple administrative registries of individuals.

There were 1544 agricultural households in the sample for kharif analysis. In terms of size-class distribution, half were from the marginal size-class and 29% belonged to the small size-class.[17] Around 4% were from near-landless group. Semi-medium size-class contributed to 14% of the observations whilst medium and large size-class were 2% and 0.1% of the sample, respectively. For the rabi analysis, the sample size was 841, with size-class distribution similar to that of the kharif season. In light of differences between size-class distribution from Agriculture Census and NSS survey, the size-class wise shares based on the NSS data at agricultural household level and Agriculture Census at operational holding level should be compared with caution.[18]

4.2.1 Value of Output and Net Returns from Cultivation

In order to understand the level of cultivation income that households in the state would have faced around the time the scheme was rolled-out, it is necessary to study patterns of incomes from cultivation in both kharif and rabi season. Figure 2 shows the average value of output and net returns by size-class for agricultural households in the state for kharif season. The difference between the value of output and net returns from total cost of cultivation that is considerably higher as size of land operated increases. A1 and A2 in Appendix reports the per hectare cost of inputs (all crops taken together) for kharif and rabi, respectively. It is evident that even for small holders, the expenditure on purchased inputs not only considerable but also higher than on nearly similar to that of those in higher size-class groups. The intensity of

[17] The sample from Odisha comprises around 5% of the all India sample.
[18] For the state of Odisha, there are three NSS regions, and distribution of size-class by region differs. In this study, unless otherwise stated, size-class refers to size-class based on land operated, presented at the state level.

irrigation, fertiliser, insecticide, seeds, and labour use in agriculture is of particular concern. These patterns are in line with patterns of input expenditures per hectare for select crops observed at the all India level using SAS 2013 (Gaurav and Mishra, 2019). [19]

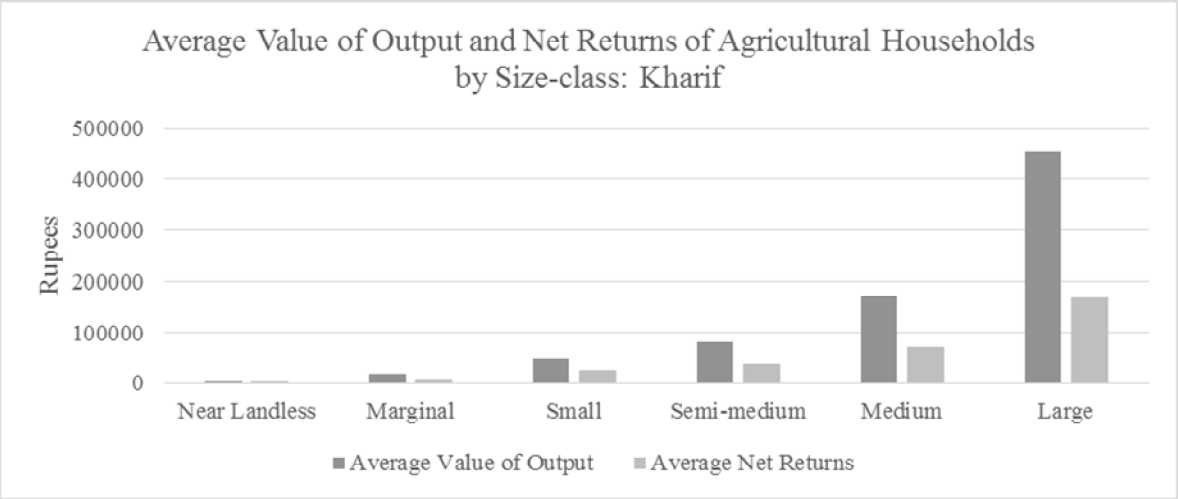

Fig 2: Value of output and net returns by size-class: Kharif

Note: Values are size-class weighted values.

Source: Author's calculation.

In kharif, near landless agricultural households have an average net returns of less than Rs.400 from land cultivated. A small agricultural household has a net return of around Rs.26,000 from kharif production whereas a marginal household has a net return of a meagre net returns of Rs.9,000. In comparison, semi-medium holders have net revenue of Rs.39, 000; medium holders have a net return of Rs.71, 000 and a large holder of Rs.1,69,000.

Figure 3 shows value of output and net returns by size-class of land operated in rabi season. In rabi season, near landless agricultural households have an average net returns below Rs.900. Marginal holders have net returns of around Rs.9, 000 and small-holders have net returns of Rs.22,000 from rabi production. In contrast, semi-medium households have net returns of Rs.38, 000; medium holders have around Rs.85,000 whereas large holders have net returns of Rs.2,12,000 from rabi production.

[19] For crop specific insights, cost of cultivation (rupees per hectare of production) and cost of production (rupees per kg of production) for major crops grown in the state can be examined using CACP releases. Such an analysis is beyond the scope of this paper.

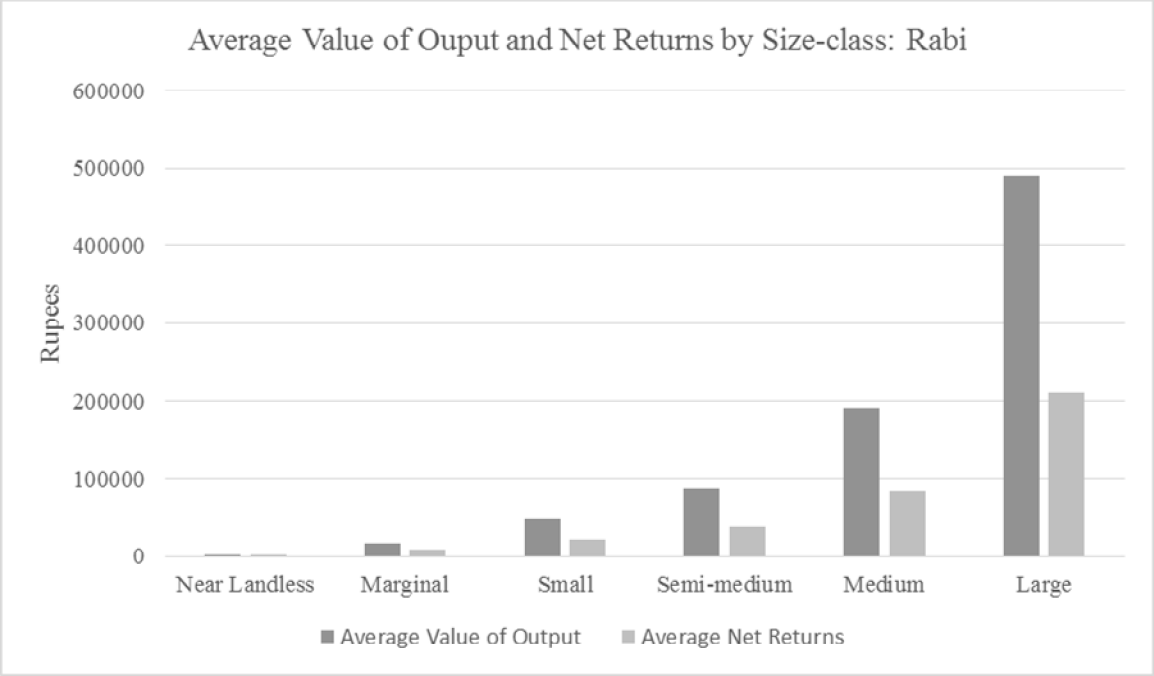

Fig 3: Value of output and net returns by size-class: Rabi

Note: Values are size-class weighted values.

Source: Author's calculation.

Assuming that an average household had both kharif and rabi production in 2013, the average net returns from cultivation for an average household in the state would be around Rs.30500.[20]This amounts to a monthly income from cultivation equivalent to around Rs.2500.[21]Considering variations by size-class, marginal household would have net returns of around Rs.12,000 from cultivation while small-holders would have Rs.25,000. Semi-medium, medium, and large holders would have annual net returns of Rs.46,000; Rs.98,000; and Rs.2,30,000, respectively. Furthermore, extrapolating the net returns from the 2013 values to 2018 rupees assuming a 5% per annum inflation rate between the two periods, the share of financial assistance from KALIA in annual cultivation income and cost of cultivation is reported in Table 2. The patterns raise concerns of sustainability of cultivation income of

[20] An average of Rs.19,500 in kharif and Rs.11,000 in rabi. Although, 2013 was not a normal monsoon year, the aggregate net returns from cultivation is much lower than the all India level. Odisha's agricultural is primarily monsoon dependent and kharif dominates the agricultural systems. Paddy in particular is mainstay of agriculture in the state. Nevertheless, the low values are representative of a typical poor agricultural year for farmers, and relevant from the perspective of risk and shocks to household income (Gaurav, 2015).

[21] The net returns used in this study is the difference between total value of output and cots of cultivation of all paid out expenses as explained in the methodology section. The concept of income used depending on which cost concepts (e.g. following CACP or other methodologies) are followed will result in variation in cultivation income

Odisha's farmers – an issue that has been well acknowledged by the state government recently.[22]

Table 2. Cost of Cultivation and Net Returns from Cultivation: 2013 and 2018 projections.

	Cost of Cultivation		Net Returns from Cultivation		Annual KALIA assistance (% of 2018 cost of cultivation)	Annual KALIA assistance (% of 2018 cultivation income)
	2013 rupees	2018 rupees	2013 rupees	2018 rupees		
Near Landless	5319	6788	1244	1588	147	630
Marginal	16744	21369	18062	23052	47	43
Small	49576	63274	47280	60343	16	17
Semi-medium	49416	63069	77529	98949	16	10
Medium	206006	262921	156137	199274	4	5
Large	563720	719465	380860	486084	1	2

Note: 2018 values are calculated using an assumption of a 5% inflation per annum between 2013 and 2018. Under KALIA scheme a financial assistance of Rs.5,000 per season would be extended for five seasons, therefore the numerator in the calculation of the percentage share of KALIA assistance is Rs.10,000 as two agricultural seasons comprise a year.

4.2.2 Sustainability of Agricultural Livelihoods in Odisha

The financial assistance from KALIA would manage to cover only 16% of the costs of small households where as it would cover nearly half of the cost of cultivation of the marginal households. For near-landless, the assistance under KALIA would exceed the cost of cultivation considerably. Considering the assistance under KALIA as a share of cultivation income of households, the range is between 17% to 630% for the eligible groups. Although semi-medium farmers and those operating more land than them are excluded from the scheme, the financial protection that KALIA would have provided in case they were included, would have been negligible. However, there seems to be little distinction between the condition of small and semi-medium farmers and their exclusion due to the cut-off may offer an opportunity to employ innovative methods such as regression discontinuity which is a quasi-experimental methodology (Imbens and Lemieux, 2008) for impact evaluation.

[22] In November 2018, the then Agriculture Minister, Mr.Pradeep Maharathy cited NSS SAS 2013 figure of Rs.1407 per month as morning of agricultural household in the state. Aggregating income from livestock, labour wages, and non-agricultural wages, the average earning of agricultural household was reported as Rs.4976 per month. However, those figures were not based on weighted values based on unit level data.

From a sustainability of livelihoods perspective, the meagre income from cultivation for agricultural households that is reported in Table 2 becomes stark if one considers the per capita per day values based on these figures. Assuming a family of five, near landless households are expected to receive less than a rupee per day. Small-holders have an average per capita per day cultivation income equivalent of Rs.33 whereas marginal holders have around Rs.12 per capita per day considering annual cultivation income. Among relatively large holder farmer households that are excluded as beneficiaries from KALIA, it is Rs.54 for semi-medium farmers and Rs.109 for medium farmers. Only for the medium and large size-class agricultural households, the per capita per day income from cultivation of around Rs.109 and Rs.266, respectively is above the 1.25 USD per day poverty threshold.[23]

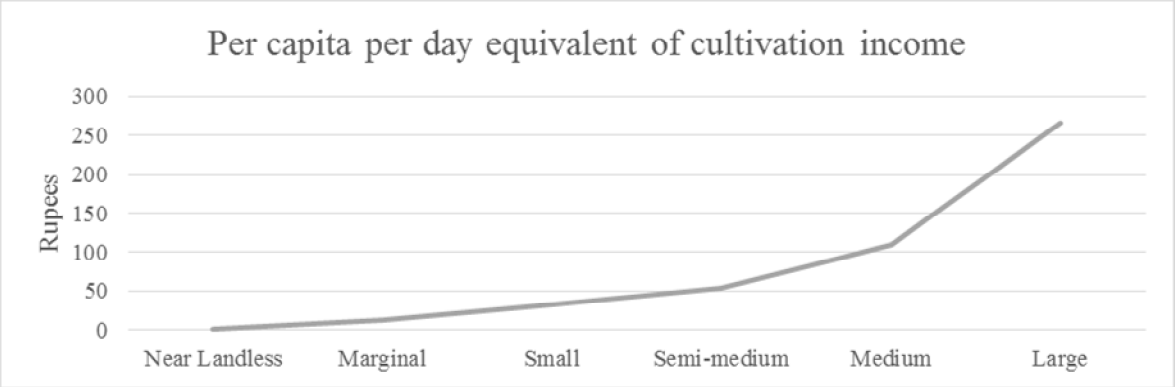

Fig 4: Per capita per day equivalent of cultivation income (in rupees) by size-class

Note: An average agricultural household is assumed to comprise a family of five.

Source: Author's calculation.

Although non-agricultural incomes augment agricultural incomes, in rural Odisha, non-farm income opportunities are limited, and cultivation is the primary source of income for agricultural households. Therefore, depressed incomes from cultivation as is not only a matter of serious concern for sustainability of agrarian livelihoods (Chand *et al*. 2011) but also worrisome in the absence of adequate non-farm employment opportunities.

[23] This comparison is based on nominal terms rather than the 2008 World Bank at 2005 purchasing-power parity (PPP).

5. CONCLUSION

In this paper, we use unit level data from the Situation Assessment Survey of Agricultural Households 2013 (SAS) as well as the Agriculture Census 2015-16 to develop a baseline for the implementation of the recently launched KALIA scheme of government of Odisha. KALIA is a massive direct benefit transfer (DBT) scheme with heavily subsidised components aiming at improving the condition of over three million farm households, landless cultivators, sharecroppers, agricultural labourers, and vulnerable households. Surprisingly, despite the fiscal and welfare implications, the absence of a baseline offers considerable challenges in identifying intended impacts of the scheme. Moreover, from a policy perspective as well impact evaluation point of view, future evaluations of the impacts of the scheme face difficulties in the absence of an appropriate counterfactual. This paper is an attempt to initiate a discourse on not only alternative methodologies to rigorously evaluate the impact of KALIA but also potential channels and models that could be used to examine how the intervention could impact household welfare. In doing so, it also raises concerns about the state of agriculture and rural livelihoods that KALIA attempts to bolster.

The preponderance of marginal and small holders, falling average size of land holdings to below one hectare, and patterns of low earnings from cultivation in the state raise doubts on the sustainability of agricultural production. They also raise concerns about ability of well-intentioned public schemes such as KALIA to generate stable and sustainable livelihoods. In this context, it can be argued that the financial assistance component of KALIA is expected to boost the earnings and address liquidity concerns of farmers operating less than two hectare of land to a large extent. However, the low level of returns from cultivation for farmers higher than two hectare of land is also a matter of concern. Furthermore, while KALIA may address liquidity crunch of households for five seasons, for a more sustainable solution, the high and rising cost of cultivation as well as non-farm employment opportunities need attention. At the state level, there has been a boost in public investment in agriculture (Government of Odisha, 20180 as well as the roll-out of other well intended agricultural programmes such as Odisha Millets Mission. In this context, KALIA may have overlaps with other schemes such as the PM-KISAN that need to be properly identified during impact evaluation exercises. Similarly, KALIA in isolation would be insufficient at most to tackle the complexities of agricultural systems. In the presence of multiple interventions addressing agrarian crisis or livelihoods sustainability in the state,

disentangling the effect and impact of KALIA would not only be challenging but also an interesting research proposition.

At the national level, low incomes from agriculture (Ranganathan, 2015), and the stunted structural transformation of the economy (Binswanger-Mkhize, 2013) are well known. The evidence on structural transformation in the state of Odisha and the need to accommodate inter-district variations in labour force composition and sectoral distribution of workforce (Mishra, 2010) is an important aspect that needs further analysis in the context of KALIA's impacts. Following the implementation of KALIA, whether the scheme improves or worsens the transition from agricultural livelihoods to non-agricultural livelihoods and whether it strengthens the agricultural systems heterogeneously remains to be seen and evaluated.

A limitation of the study is that it is confined to returns from cultivation and focuses on agricultural households. Using unit level data non-cultivation earnings of agricultural households could also be taken up in future research to improve the estimate of household income provided in this analysis. Nevertheless, the estimates offer a lower bound of household incomes. Furthermore, detailed stakeholder analyses and an enquiry on the development and environment setting could offer rich insights into how KALIA could impact lives and livelihoods in the state. Moreover, in the context of agriculture in Odisha that is particularly prone to natural disasters such as floods and cyclones, the fiscal implications of public interventions such as KALIA may have considerable macroeconomic and fiscal implications. However, these aspects are beyond the scope of the study and can be taken up in future research.

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A1, Size-class was per hectare costs, revenue, net returns in Kharif

Size Class	Seed	Fertiliser	Manure	Insecticide	Human Labour	Animal Labour	Diesel	Electricity	Irrigation	Minor Repair	Interest	Machine Hire	Lease Rent	Others
NL														
Mean	13955	15745	4132	3861	12152	2353	4267	516	4813	1575	699	14228	1859	3628
N	57	57	57	57	57	57	57	57	57	57	57	57	57	57
MA														
Mean	1787	4012	533	1082	3978	437	557	289	710	323	172	1938	752	782
N	785	785	785	785	785	785	785	785	785	785	785	785	785	785
SL														
Mean	1993	3497	440	1181	3721	300	602	254	255	313	247	1603	989	584
N	451	451	451	451	451	451	451	451	451	451	451	451	451	451
SM														
Mean	2141	3492	417	1500	3851	276	667	220	182	318	287	1545	972	428
N	213	213	213	213	213	213	213	213	213	213	213	213	213	213
ME														
Mean	2369	3476	262	1775	3844	174	1067	271	121	411	339	1197	2019	346
N	36	36	36	36	36	36	36	36	36	36	36	36	36	36
LA														
Mean	2508	2935	334	2210	3504	58	2136	284	183	392	347	1018	3679	252
N	2	2	2	2	2	2	2	2	2	2	2	2	2	2
All														
Mean	2360	4209	616	1289	4183	439	736	277	642	368	233	2221	925	769
N	1544	1544	1544	1544	1544	1544	1544	1544	1544	1544	1544	1544	1544	1544

Note: NL,MA,SL,SM,ME,LA denotes Near Landless, Marginal, Small, Semi-medium, Medium, Large size-class of land operated, respectively. N is number of observations.

Figures are size-class weighted averages.
Source: Author's calculation.

A2. Size-class wise weighted average costs per ha, revenue per ha, and net returns per ha in Rabi

Size Class	Seed	Fertiliser	Manure	Insecticide	Human Labour	Animal Labour	Diesel	Electricity	Irrigation	Minor Repair	Interest	Machine Hire	Lease Rent	Others
NL														
Mean	5441	8144	2399	2301	7071	939	584	412	3120	513	701	5542	1942	2608
N	152	152	152	152	152	152	152	152	152	152	152	152	152	152
MA														
Mean	2224	4741	469	1151	3704	279	832	464	1400	345	151	2872	823	722
N	557	557	557	557	557	557	557	557	557	557	557	557	557	557
SL														
Mean	2030	4197	404	1434	4005	168	956	489	742	353	248	2312	1442	593
N	83	83	83	83	83	83	83	83	83	83	83	83	83	83
SM														
Mean	1965	3797	340	1383	3619	95	1319	469	426	445	505	1929	1519	533
N	39	39	39	39	39	39	39	39	39	39	39	39	39	39
ME														
Mean	1741	3438	460	1839	3360	97	1713	379	251	512	346	1603	3273	469
N	9	9	9	9	9	9	9	9	9	9	9	9	9	9
LA														
Mean	1681	3355	371	1462	4034	64	1991	313	218	493	581	1750	3664	355
N	1	1	1	1	1	1	1	1	1	1	1	1	1	1
All														
Mean	2768	5243	806	1405	4335	377	833	456	1587	383	279	3241	1148	1038
N	841	841	841	841	841	841	841	841	841	841	841	841	841	841

Note: NL,MA,SL,SM,ME,LA denotes Near Landless, Marginal, Small, Semi-medium, Medium, Large size-class of land operated, respectively. N is number of observations.

Figures are size-class weighted averages.

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