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Explaining Recent Increases in Calorie Intake in Rural India: The Role of Social Policy Strengthening --Manuscript Draft--

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| Abstract: | <p>During the past decade, considerable research efforts have sought to explain India's 'calorie consumption paradox', namely, the coexistence of a decline in average per capita calorie intake in rural India alongside increased material living standards. Evidence from the most recent (68th) round of the National Sample Survey (NSS), released in 2014, however indicates increases in calorie intake, notably among poorer income quintiles. This paper argues that the turnaround in these data is linked to improved performance of pro-poor social protection measures. Analysis of data suggests a close association between states that have made the greatest improvements in social policy delivery systems, and increased calorie intake for the poorest quintile of rural populations. This conclusion supports wider international evidence on the importance of social protection strengthening for nutrition-sensitive economic growth.</p> |
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Explaining Recent Increases in Calorie Intake in Rural India: The Role of Social Policy Strengthening

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6 **Strengthening**
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11 **Abstract**
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15 *'calorie consumption paradox', namely, the coexistence of a decline in average per capita*
16 *calorie intake in rural India alongside increased material living standards. Evidence*
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22 *systems, and increased calorie intake for the poorest quintile of rural populations. This*
23 *conclusion supports wider international evidence on the importance of social protection*
24 *strengthening for nutrition-sensitive economic growth.*
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43 *Key words* — calorie intake, rural households, India, food consumption, social policy,
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Introduction

The debate on calorie intake and poverty in India is internationally important. Since the onset of India's liberalisation policies from 1991, economic growth has quickened and the poverty ratio has fallen,¹ albeit within contexts of large and rising levels of inequality.² Nevertheless, for the first two decades of post-liberalization India, evidence suggested that economic growth and poverty reductions encompassed a calorie consumption paradox; per capita calorie intake was actually falling for all segments of the population, including the poorest.³ India's economic transformation, it seemed, was not delivering a robust dividend in terms of improved food consumption, and the nutritional indicators (notably child stunting and wasting) that are associated with increased calories being consumed by the poor.⁴ This was unlike the situation in other Asian countries, where economic growth was associated with strong improvements in nutrition indicators, as discussed in the next section.

Data released in the past few years from large-scale surveys conducted between 2011 and 2014 however suggest a compelling narrative of calorie consumption turnaround, in particular for the poor. The most important of these surveys is the 68th round of the National Sample Survey (NSS) conducted in 2011/12, with results published in 2014. This surveyed covered over 100,000 households. Evidence of improved nutritional indicators is also apparent from the "HUNGaMA" (Hunger and Malnutrition) survey of India's 100 poorest districts conducted in 2011, the fourth District Level Health Survey (DLHS-IV) conducted from 2012-14, the second India Human Development Survey (IHDS-II) of 2011/12, and the Comprehensive Nutrition Survey of Maharashtra.⁵

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4 This newer evidence compels development studies scholars to consider the drivers of this
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6 turnaround. Not surprisingly, this is a complex and difficult undertaking. Rural India is home to a
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8 population with hugely diverse human and environmental circumstances that encompass manifold
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10 differences in terms of food cultures and relationships to local agro-ecosystems, labour markets,
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12 infrastructure and government services. Nevertheless, we contend that it is possible to see evidence
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14 of broad politico-economic transformations in rural India in the calorie consumption turnaround.
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21 Our argument is that increases in calorie intake and improved nutritional indicators bear the imprint
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23 of reforms to food-based social protection schemes, notably the Public Distribution System (PDS).
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25 In recent years, a number of state governments have given political priority to improving the PDS.
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27 These reforms have been complemented by wider social policy strengthening, including the rolling
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29 out of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA),
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31 improvements to the Integrated Child Development Scheme (ICDS),⁶ the Midday Meal Scheme
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33 and nutrition-specific programs such as the Maharashtra Comprehensive Nutrition Program.⁷
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35 Although these initiatives were all highly uneven in their geographical and social coverage,
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37 nevertheless they played an important role overall. In emphasising these social protection themes,
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39 we contribute to recent global scholarship into food and nutrition security that contends that
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41 “economic growth is necessary but not sufficient to accelerate reduction of hunger and
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43 malnutrition”,⁸ hence challenging neo-liberalist accounts, such as the so-called Dollar-Kraay
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45 thesis,⁹ that scorns the advocacy of redistributive welfare measures for pro-poor outcomes, in
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47 favour of a narrower focus on economic growth.
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58 **India’s Post-Liberalization Calorie Consumption Paradox**

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4 During the 1990s and into the 2000s, an Indian economic narrative was scripted which emphasized
5 material progress and national self-confidence. However, with the release of data from the 61st
6 Round of the NSS, covering the period 2004/05, statistics of calorie consumption presented in
7 sharp relief a very different reality that seemed to be playing out in India's villages. The data
8 estimated that mean per capita calorie consumption in rural India was 2,047 kcal, representing a
9 decline from the levels recorded in 1999/2000 (2,148 kcal), 1993/94 (2,153 kcal), 1987/88 (2,233
10 kcal) and 1983 (2,240 kcal).¹⁰ Whereas in 1983, 66.1% of rural India's population lived in
11 households where per capita calorie consumption was less than 2,400 kcal per day, by 2004/05,
12 this had increased to 79.8%.¹¹
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28 As these data came to light, the concept of the 'Indian calorie consumption paradox' was coined
29 and a flurry of research efforts took place seeking to explain these outcomes. The starting point
30 for this debate was international evidence published by the World Bank¹² which suggested a rule-
31 of-thumb for the relationship between economic growth and improvements to childhood stunting
32 and wasting. As summarized by Pritchard et al.,¹³ in the take-off stages of economic growth, the
33 prevalence of children underweight for age typically fell by "roughly half the rate of GDP growth.
34 Thus, if an economy's annual growth averages 4% over a decade, the prevalence of child
35 underweight for age would be expected to fall by 2% annually." More recent research into this
36 relationship has asserted an elasticity of 0.6 for child stunting (low height for age), meaning that
37 if GDP increases by 10%, the proportion of stunting would be expected to fall by 6%.¹⁴ Research
38 by Gillespie and Kadiyala¹⁵ however demonstrated that in India, international benchmarks for the
39 relationship between economic growth and improved nutrition failed to apply. Between 1990 and
40 2005, reductions in child underweight for age in India fell at less than half the rate than anticipated
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4 by the international rule-of-thumb. Although caveats must be observed in equating childhood
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6 stunting and wasting with calorie consumption data, these indicators tell a parallel and consistent
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8 story.
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14 Recognition of India's poor nutritional performance prompted diverse debate. Contributions raised
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16 questions both about the accuracy of data being reported, and the relative influence of socio-
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18 economic, dietary and physiological variables in determining apparent outcomes.
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22 23 24 *The accuracy of data?*

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26 The capture of accurate food consumption and income-expenditure data in the rural Indian context
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28 is a notoriously difficult exercise. Methodological concerns have been a bone of contention for
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30 decades. These concerns have been heightened in the post-liberalization era when estimates of
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32 aggregate consumption generated by India's National Accounts System (NAS) have tended to be
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34 much higher than those from the National Sample Survey (NSS).¹⁶ The potential for divergence
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36 between these two data sources is because they derive estimates of consumption in fundamentally
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38 different ways, and are therefore susceptible to different sources of bias.¹⁷ These differences are
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40 not insignificant. In 2009/10, the NAS was estimating food consumption levels 40% higher than
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42 those reported by the NSS.¹⁸ Review of these issues by the Rangarajan expert group on poverty
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44 measurement, a committee established by the Planning Commission of India in 2012, affirmed the
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46 legitimacy of the lower estimates of consumption produced by the NSS.¹⁹
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56 Nevertheless, uncertainty about trends over time has festered because of changes to NSS
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58 methodologies between surveys. Until the 1993/94 survey, all consumption estimates were derived
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4 on the basis of a 30-day recall period. From 1994/95 to 1998/99 in the ‘thin’ (or small sample size)
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6 sample surveys, NSSO experimented with two types of schedule – one based on the usual 30-day
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8 recall and another based on a 7-day recall for food items. This methodological change generated
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10 higher estimates of food consumption (i.e., respondents tended to report higher daily amounts in
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12 the shorter recall periods of 7 days compared to the 30 day recall period). However, the relative
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14 standard error of these estimates was also higher and the estimates for the first week of every
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16 month were higher than other weeks.²⁰ Given these concerns, the ‘thick’ (large sample consisting
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18 of more than 100,000 households) round of 1999/2000 was designed to record consumption of
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20 each food item according to both a 7 day and 30 day recall period. Questions regarding both recall
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22 periods were compiled as columns for each commodity. This change in the reporting method,
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24 however, created inconsistency with previous data series. The presence of both recall periods
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26 caused confusion for respondents, with responses for one period potentially biasing the other.
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28 Thus, for the 2004/05 survey, the NSS reverted to a 30-day recall period. From then on, later
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30 ‘thick’ rounds (2009/10 and 2011/12) had two independent surveys: one on the basis of the usual
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32 30-day recall period (covering consumption of all items (i.e., food and non-food)); the other on the
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34 basis of a 7-day recall period for food items that are frequently consumed. The net conclusion to
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36 be made from these episodes of change is that the NSS estimates should be considered as providing
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38 a valid estimation of food consumption, so long as comparisons between survey periods are done
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40 using data series that were derived from the same methodological approaches.
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53 *Social and economic explanations*

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55 Focusing on social and economic explanations for these results, it is possible to distil four lines of
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57 argument in debate on India’s calorie consumption paradox. The first of these relates to lower daily
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4 dietary energy requirements in the rural population. This is the focal argument of Deaton and
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6 Dréze,²¹ who suggest firstly, that in rural India, mechanization in agriculture and the construction
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8 industry, increased availability of motorized transport, the availability of processed food grains,
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10 and improved kitchen appliances have all helped reduce individual activity levels and thus
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12 individual calorific requirements. As a result, they contend there is a downward shift in the calorie
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14 Engel curve (logarithm of calorie per capita plotted against logarithm of Monthly Per Capita
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16 Expenditure [MPCE]) over time. This hypothesis was further supported by Eli and Li,²² who claim
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18 that a substantial portion of decline in calorie consumption can be explained by changes in physical
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20 activity levels.
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29 A second line of argumentation revolves around the costliness of food items and a food budget
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31 squeeze facing households. Basole and Basu²³ establish that the burden of expenditure on non-
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33 food essentials has led to a squeeze on food budgets. This is especially the case for fuel
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35 expenditure, as prices relative to food have increased over time. Siddiqui and Chakraborty²⁴ also
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37 find that many families in rural Bihar and Jharkhand have become used to eating cooked meals
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39 only once a day (mostly in the evening) to economize on fuel costs. For other meals, they depend
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41 on the readymade cereal/pulses-based meal *sattu*.
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48 These considerations are connected to Banerjee and Duflo's²⁵ more general argument derived from
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50 behavioral economics that poor people might intentionally exchange the benefits of additional
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52 calories for other expenditures that are perceived as having more immediate, dependable or
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54 enjoyable benefits. This helps explain why many poor people devote relatively high expenditures
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56 to status and comfort goods, in contexts where the future benefits from increased calories are
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4 marred with uncertainties. The role of India’s dietary and culinary traditions is much debated
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6 within these frames. In other parts of the world, reduced per capita consumption of cereals tends
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8 often to be associated with increased overall calorie intake as households substitute cereal-
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10 dominated diets with increased dietary diversity, including larger amounts of fruits, vegetables and
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12 in particular, protein-rich animal foods. In rural India however, these processes are refracted
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14 through a much more complex and differentiated social and cultural landscape. Food choice is
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16 dictated for many rural Indians by dietary norms and taboos. This is most apparent regarding
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18 vegetarianism, but is also manifested in an array of cultural practices connected to seasonal and
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20 festival events. The importance of these factors has been highlighted most forcefully by Landy,²⁶
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22 who contends that India’s distinctive culinary and dietary traditions ensure its food transitions take
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24 different shape from elsewhere in the world. This is an issue that is not easily resolved. Social and
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26 cultural factors endemic to rural India evidently make it ‘different’, but the extent to which this
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28 difference is a determining factor of the calorie consumption paradox is difficult to establish. For
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30 example, evidence from the 68th round of the NSS (2011/12, made available only after Landy’s²⁷
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32 publication) indicates that vegetarian households have higher per capita calorie consumption than
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34 non-vegetarian households, within all income quintiles and in both urban and rural areas (Table
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36 1). Evidently, absence of meat in diets is not associated with lower calorie intake.
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48 Table 1. *Calorie consumption per capita of vegetarian and non-vegetarian items, 2011/12.*
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| Quintile | Rural | | Urban | |
|----------|-------------------------------|--------------------------------|-------------------------------|--------------------------------|
| | Consumed non-vegetarian items | Consumed only vegetarian items | Consumed non-vegetarian items | Consumed only vegetarian items |
| 1 | 1747 | 1750 | 1694 | 1703 |
| 2 | 1927 | 1978 | 1884 | 1891 |
| 3 | 2053 | 2115 | 2001 | 2036 |

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|-------|------|------|------|------|
| 4 | 2200 | 2271 | 2162 | 2221 |
| 5 | 2458 | 2574 | 2449 | 2583 |
| Total | 2074 | 2143 | 2021 | 2120 |

Source: Calculated from NSS 68th round consumption expenditure survey data. Note: includes vegetarian and non-vegetarian households

A third broad line of argumentation relates to PDS failures. During the 1990s and early 2000s, an extensive body of evidence was amassed that documented widespread maladministration and pilferage riddled through the PDS. Bhalla²⁸ suggests that the 1999/2000 NSS data indicates that just 29% of allocated food grains reached beneficiaries. According to the Planning Commission of India,²⁹ 42% of subsidised food grains reached their intended target group. Jha and Ramaswami³⁰ argued that in 2004/05, 40% of PDS rice and 73% of PDS wheat were pilfered. Whatever the actual numbers, it was clear that the poor performance of the PDS during the 15 years or so after the liberalisation reforms of 1991 meant that social protection measures played an under-whelming role in India's nutritional challenge.

Fourth and finally, there is the issue of whether meals eaten outside the home are fully captured in calorie consumption data. Smith³¹ advances an argument that, at least in part, the NSSO data has not been able to fully account for cooked meals that individual members of the households receive in kind or in exchange of cash and also as assistance meals e.g., mid-meal in schools and meals provided by employees. Since this component has been increasing over time and if NSS systematically underreports this component of food consumption, it is likely that fall in calorie consumption may be attributed at least partly to this unobserved component. Gaiha, Jha and Kulkarni³² use another nationally representative survey (the India Human Development Survey

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4 (IHDS)) conducted in 2005 to show much higher incidence (28% of households) of eating
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6 purchased meals than NSS survey (6% of household) conducted in 2004-05. Specifically, urban
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8 slum residents have very high incidence (46%) of eating purchased meals according to IHDS data,
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10 probably because of many households do not have kitchens and working hours for members of
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12 these households extremely high. Smith³³ also shows that the countries that follow diary methods
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14 of collecting information regarding food items report systematically higher calorie intake than
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16 countries that do not follow this method including India.
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24 In summary, there is no clear single explanation for India's calorie consumption paradox in the
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26 post-liberalization period, however various major contextual drivers can be identified. Pritchard,
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28 Rammohan and Sekher³⁴ theorize these issues in terms of a series of mutually-reinforcing
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30 entitlement failures for food that confronted rural India's poor populations in this period. Whatever
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32 the precise contribution of factors, the key concern for this paper is that *something changed* to
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34 catalyze a turnaround in calorie consumption trends as revealed by the 2011/12 NSS results. We
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36 now address the dimensions of this turnaround, and move towards the identification of potential
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38 associative factors.
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45 46 *Evidence of a Calorie Consumption Turnaround*

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48 Our contribution to the debate on the Indian consumption paradox primarily involves assessment
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50 of data for rural India from the 68th round of the National Sample Survey (NSS), covering the
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52 period 2011/12. The method we use is to analyse calorie consumption levels for carbohydrates,
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54 protein and fats, disaggregated by states, income quintiles and PDS categories. Calorie
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56 consumption levels are estimated from sample households' information on consumption quantities
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4 for an exhaustive of list of food items, converted into calorie, fat and protein equivalents, using
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6 the framework presented in NSSO.^{35,36} These calculations enable us to estimate carbohydrate
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8 content of each item as a residual from total calorie content after subtracting protein and fat.
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14 Our analysis of these data indicates a turnaround in calorie consumption trends. As indicated in
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16 the last column of Table 2, total per capita calorie intake in rural India fell during the two periods
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18 1972/73 to 1993/94, and 1993/94 to 2004/05, but then increased in the period 2004/05 to 2011/12.
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20 Analysis of this reversal by income quintiles (Figure 1 and Table 2) provides important insights
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22 into the drivers of this change. In the pre-liberalization period (1972/73 to 1993/94), there was
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24 rapid convergence of per capita calorie intakes by quintile on account of a significant fall in calorie
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26 intake of the top quintile (quintile 5), and increased calorie intake of the poorest two income
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28 quintiles (quintiles 1 and 2). During the middle period (1993/94 to 2004/05) however, increased
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30 per capita calorie intake for the poorer quintiles stalled and, in combination with continuing
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32 reductions in per capita intake for richer quintiles, led to an overall reduction in rural India's per
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34 capita calorie intake. As discussed previously, the coincidence of this with more rapid economic
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36 growth inspired conceptualization of India's nutrition situation in terms of a calorie consumption
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38 paradox.
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48 Table 2. *Compounded annual growth of per capita calorie intake by economic (quintile) classes*
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50 *in rural India (percentage).*
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| | 1 | 2 | 3 | 4 | 5 | Total |
|--------------------|------|-------|-------|-------|-------|-------|
| 1972/73 to 1993/94 | 0.62 | 0.11 | -0.11 | -0.33 | -0.86 | -0.23 |
| 1993/94 to 2004/05 | 0.07 | -0.17 | -0.27 | -0.27 | -0.56 | -0.46 |
| 2004/05 to 2011/12 | 1.05 | 0.45 | 0.16 | -0.26 | -0.66 | 0.31 |

Sources: For 1972/-73 Suryanarayana³⁷, for the remaining years it was calculated from NSS 50th, 61st and 68th round consumption expenditure reports.

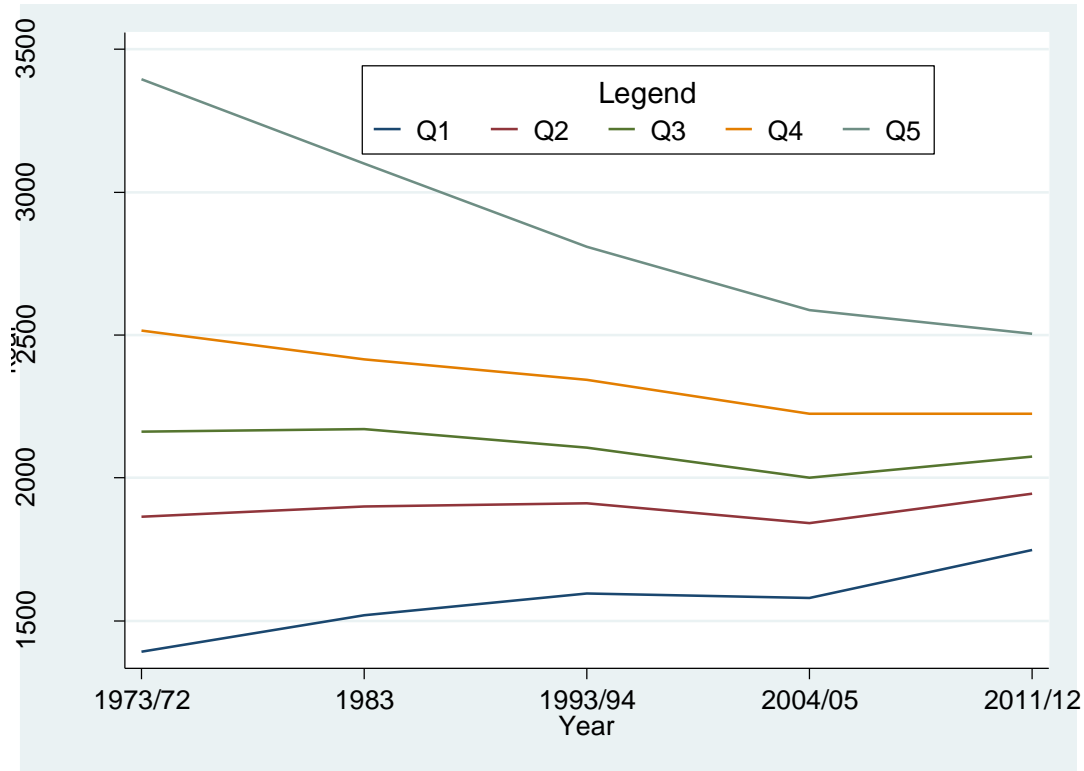


Figure 1

Trend of per capita calorie consumption across economic class (quintiles) in rural India.

Sources: For 1972/-73 Suryanarayana,³⁸ for the remaining years it was calculated from unit level data of 50th, 61st and 68th round consumption expenditure.

Inclusion of the 2011/12 data however challenges the narrative of a calorie consumption paradox.

The trend in per capita calorie intake between 2004/05 and 2011/12 corresponds more closely to expectations. These data show a clear pattern of change, with growth strongest for the lowest quintile and becoming sequentially weaker for each higher quintile. That is, the dynamic of calorie

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4 consumption in the post 2004/05 period displays a classic pro-poor orientation, with the poorest
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6 and most food-deprived quintiles making strongest gains, and the richest quintiles continuing a
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8 trend of lower per capita consumption, no doubt reflecting the driver of lower dietary energy
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10 requirements, especially for richer people less likely to be involved in manual labor, identified by
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12 Deaton and Dréze,³⁹ discussed above.
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19 Evidence of an apparent turnaround in Indian calorie consumption indicators however raises the
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21 further question of how these trends are related to dietary shifts. One perspective that can be used
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23 to glean insights here involves disaggregating the trends in Figure 1 and Table 2 into the dietary
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25 components of carbohydrates (Figure 2), protein (Figure 3) and fats (Figure 4). Comparison of
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27 these three graphs shows rapid convergence among quintiles of per capita intake for carbohydrates
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29 and (to a lesser extent) protein, and rapid growth of fat intake across all quintiles.
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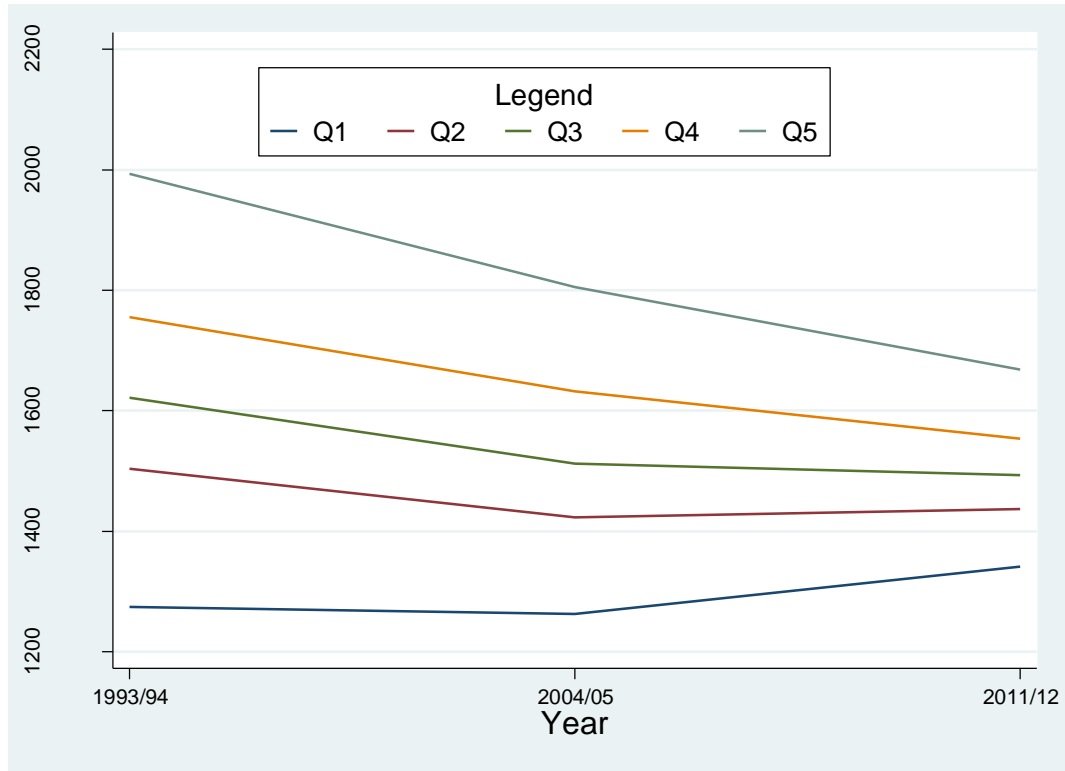


Figure 2. Per capita daily carbohydrate intake by economic (quintile) classes in 1993/94, 2004/05 and 2011/12 for rural India.

Source: Calculated from NSS unit level data of 68th, 61st and 50th round on consumption expenditure.

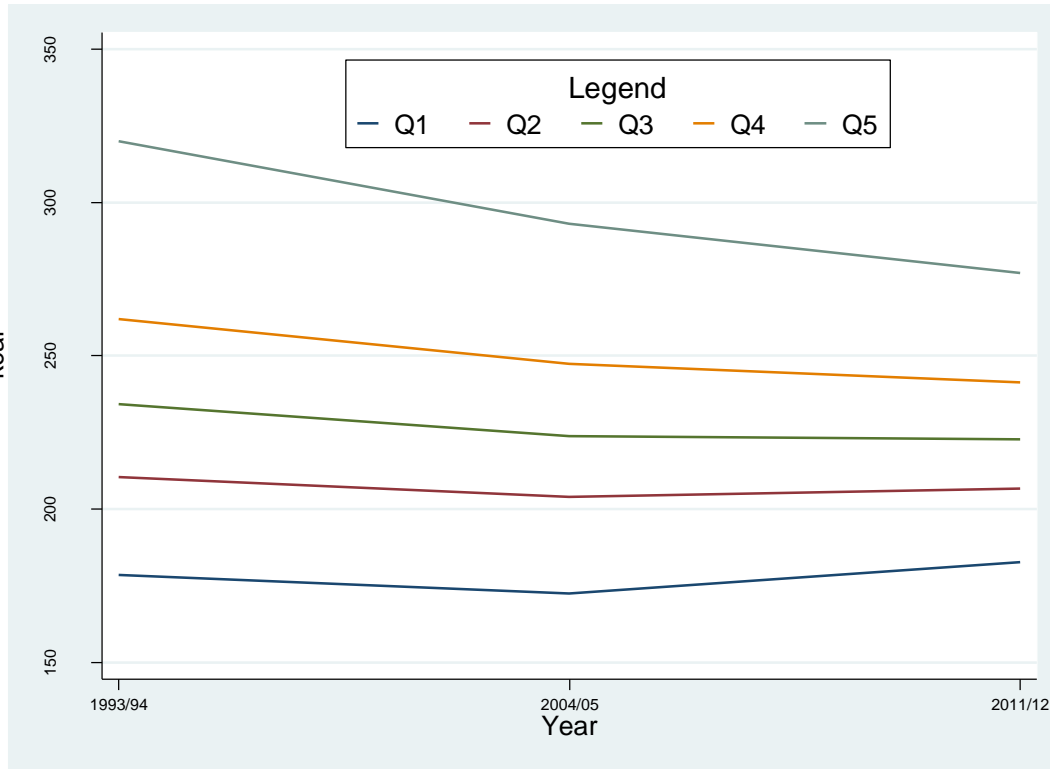


Figure 3. *Per capita daily protein intake by economic (quintile) classes in 1993/94, 2004/05 and 2011/12 for rural India.*

Source: Calculated from NSS unit level data of 68th, 61st and 50th round on consumption expenditure.

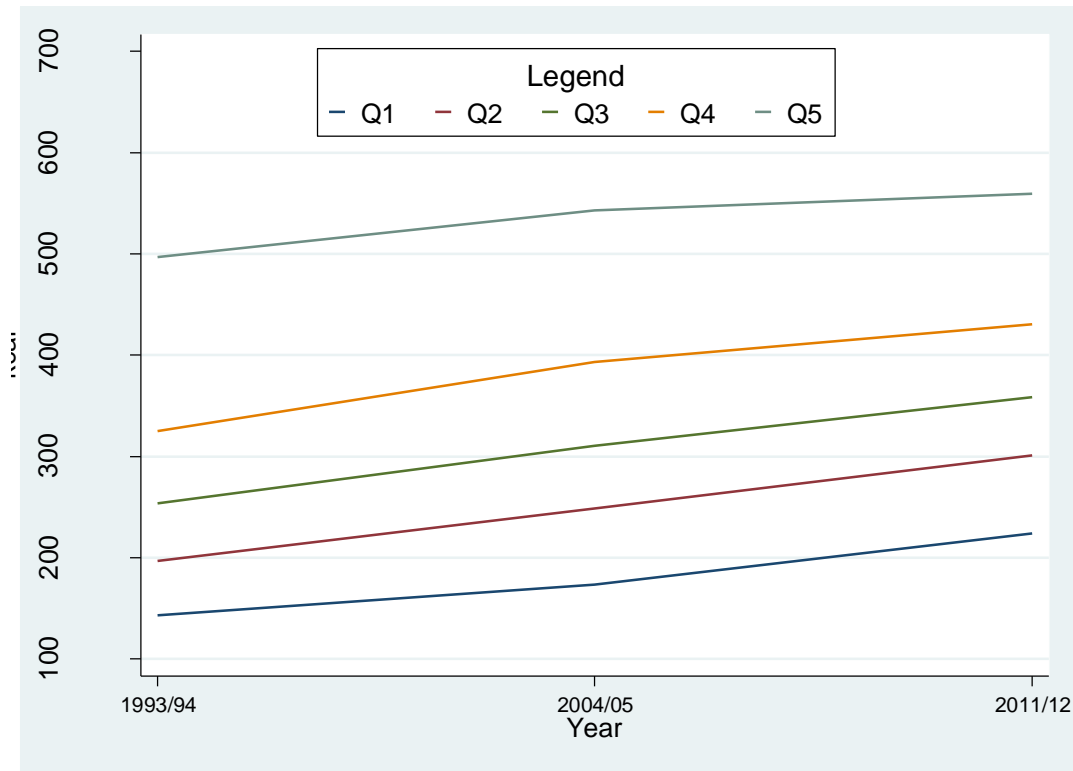


Figure 4. *Per capita daily fat intake by economic (quintile) classes in 1993/94, 2004/05 and 2011/12 for rural India.*

Source: Calculated from NSS unit level data 68th, 61st and 50th round on consumption expenditure.

The rapid convergence in carbohydrate consumption among quintiles is the key driver of broader trends in consumption, as this dietary component accounts for more than two-thirds of total per capita calories. As seen readily in Figure 2, between 2004/05 and 2011/12 there was a noticeable increase in per capita carbohydrate consumption among the poorest quintile, which as discussed below provides strong evidence of increased cereals consumption with particular reference to PDS-supplied rice and wheat. A similar pattern is displayed for per capita protein consumption (Figure 3), potentially linked to increased pulses and meat consumption (for non-vegetarians) among the poor. These data point to an interesting variant on narratives of declining pulse consumption in India - evidently, this appears valid for richer quintiles but not among the poorest.

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4 The fact that the poorest quintile has increased its per capita consumption of protein at a time when
5 this has fallen for other (richer) quintiles is suggestive of significant nutritional improvements in
6 the lives of the poor, as protein foods to be relatively expensive components of diets. Finally,
7 Figure 4 points to increased fats consumption across all quintiles, which would appear to be
8 symptomatic of a transition in food intake that has a high proportion of edible oils. There is a
9 transition that is more focused on snacking deep-fried vegetarian items like *samosas* and *puris*,
10 which according to these data, is pervasive across income quintiles. Although outside the strict
11 focus of this paper, increased fat consumption is implicated in higher prevalence of
12 overweight/obesity and non-communicable diseases across the country.
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29 The apparent turnaround in per capita calorie consumption for the poorer quintiles also has a
30 distinctive state-wise component. In Figure 5, and the charts that follow, per capita calorie
31 consumption for individual states is compared against two time periods.⁴⁰ The vertical distance
32 between the 45 degree line (the line of equality), and a point for a particular state shows the amount
33 of change in per capita calorie intake for that state between the two time periods. Points below the
34 line of equality imply that the per capita calorie intake for an individual state has fallen. Points
35 above the line of equality indicate they have increased. In Figure 5, therefore, it is apparent that
36 between 1993/94 and 2004/05 (the left chart), per capita calorie consumption declined for most
37 states. However, from 2004/05 to 2011/12 (the right chart), the opposite was true (as also indicated
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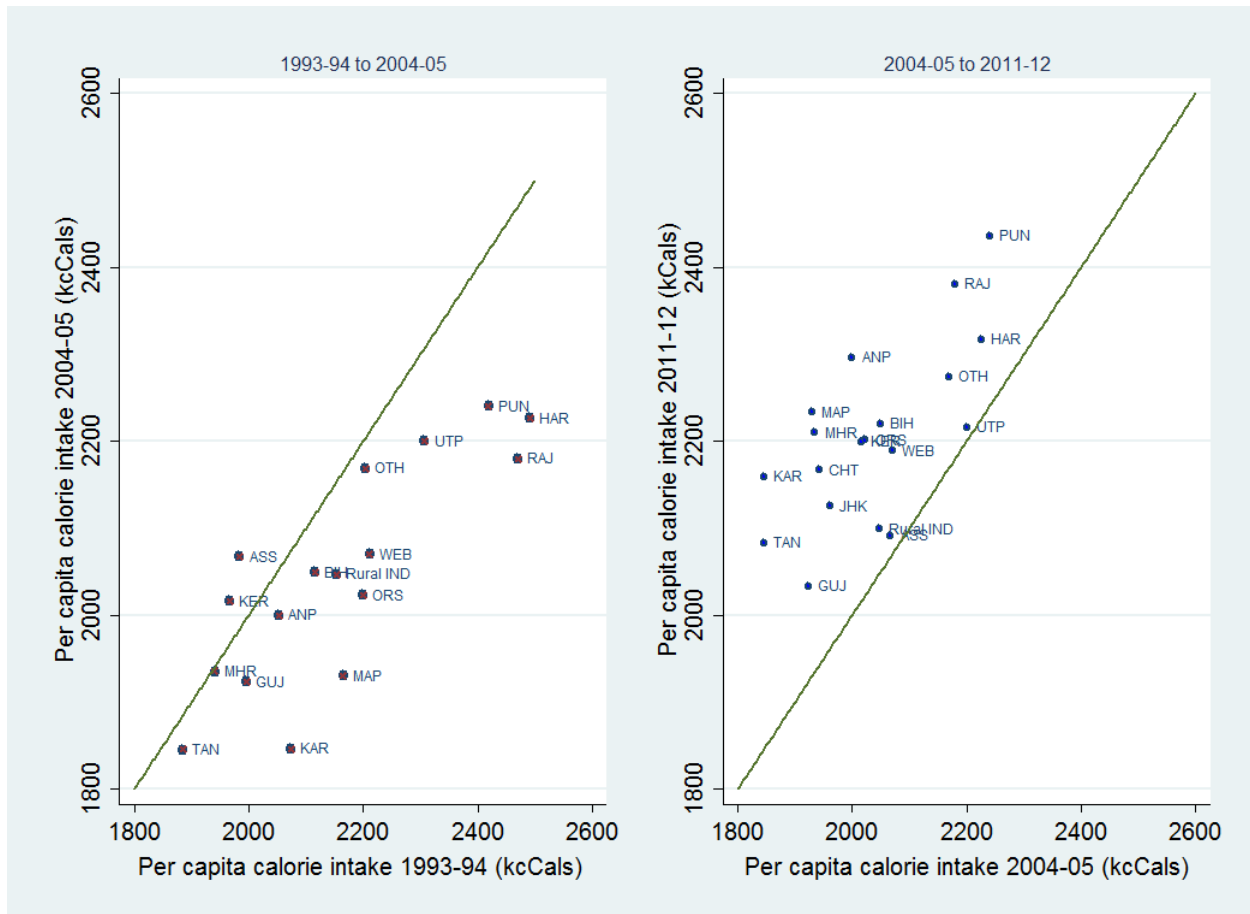


Figure 5. Average per capita calorie intake by major states in rural India from 1993/94 to 2011/12.

Note: The vertical distance between the 45-degree line (the line of equality), and a point for a state shows the amount of change in per capita calorie intake for that state between the two-time periods.

Source: Calculated from NSS unit level data of 68th, 61st and 50th round on consumption expenditure.

Figure 5 shows that the states with the greatest improvements in per capita calorie consumption between 2004/05 and 2011/12 (the data points furthest from the line of equality) were Tamil Nadu, Karnataka, Madhya Pradesh, Maharashtra, Chhattisgarh, and Andhra Pradesh (See the Appendix for acronyms of state used in the Figures 5 to 8). This group comprises what would appear at first glance to be diverse collection of states, with very different characteristics and levels of

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4 development. However, as elaborated upon below, closer inspection of their recent histories bears
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6 out striking insights.
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11 To complement Figure 5, which presents state-wise averages, Figures 6 and 7 display the change
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13 in per capital calorie consumption for the top and bottom quintiles of each state, for each of the
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15 two time periods (1993/94 to 2004/05 and 2004/05 to 2011/12) under consideration. Focusing
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17 firstly on the richest quintile (Figure 6), per capital calorie consumption fell in all states except
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19 Kerala and Assam in the period from 1993/94 to 2004/05. In the second period, however, the state-
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21 wide pattern was very different, with roughly equal numbers of states experiencing increased and
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23 decreased levels of per capita calorie consumption. It is difficult to interpret the reasons for this
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25 scattered pattern in the more recent period of analysis. Disaggregation of these data by the key
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27 dietary components of fats, carbohydrates and protein does not provide a ready explanation,
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29 suggesting that the answer would seem to lie in the fact that modernity, dietary change and culinary
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31 cultures are intersecting in complex and differentiated ways within the richest 20% of rural India's
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33 population.
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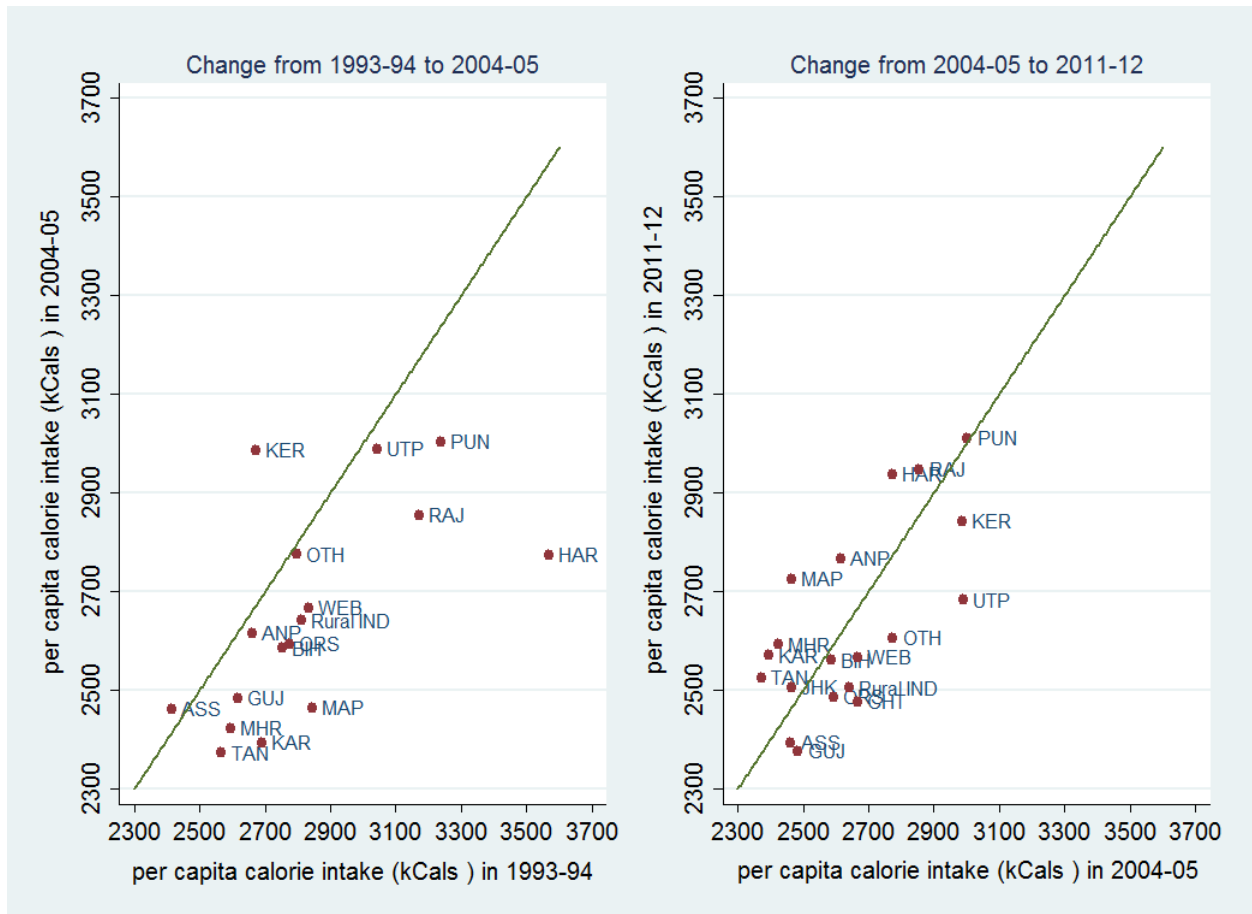


Figure 6. Calorie intake of the top (richest 20%) quintile of major states of rural India, 1993–94 to 2011–12. Source: Calculated from NSS unit level data of 68th, 61st and 50th round on consumption expenditure.

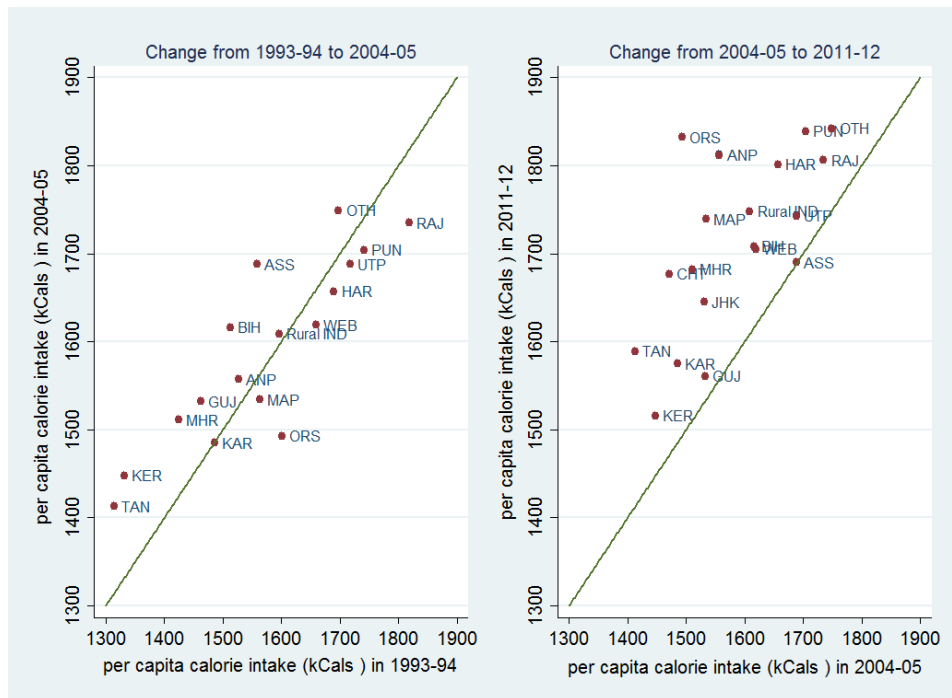


Figure 7. Calorie intake of the bottom (poorest 20%) quintile of major states of rural India, 1993/94 to 2011/12. Source: Calculated from NSS unit level data of 68th, 61st and 50th round on consumption expenditure.

For the purposes of this paper, trends for the poorest quintile are of greater interest than those for the richest 20%, as this links more directly to arguments about the calorie consumption paradox. As seen in Figure 7, during the period 1993/94 to 2004/05, states were split almost evenly between those registering an increase in per capita calorie consumption among their poorest 20%, and those registering a fall. In the latter period, however, the poorest quintile of all states registered an increase in per capita calorie consumption, with increases being largest in Odisha, Tamil Nadu, Andhra Pradesh, Madhya Pradesh and Chhattisgarh. Gains were weakest in Assam, Gujarat, Uttar Pradesh, Rajasthan, West Bengal and Bihar. Increased consumption of PDS-sourced calories seems an important reason for this pattern, as indicated in Figure 8, which indicates that Chhattisgarh and Odisha are the states at the furthest top-left of the diagram, suggesting greatest improvement. In both periods, Tamil Nadu was the state that provided the bottom 40% of the

population with the largest amount of calories per capita from PDS, and Maharashtra, Andhra Pradesh and Madhya Pradesh also witnessed strong improvements.

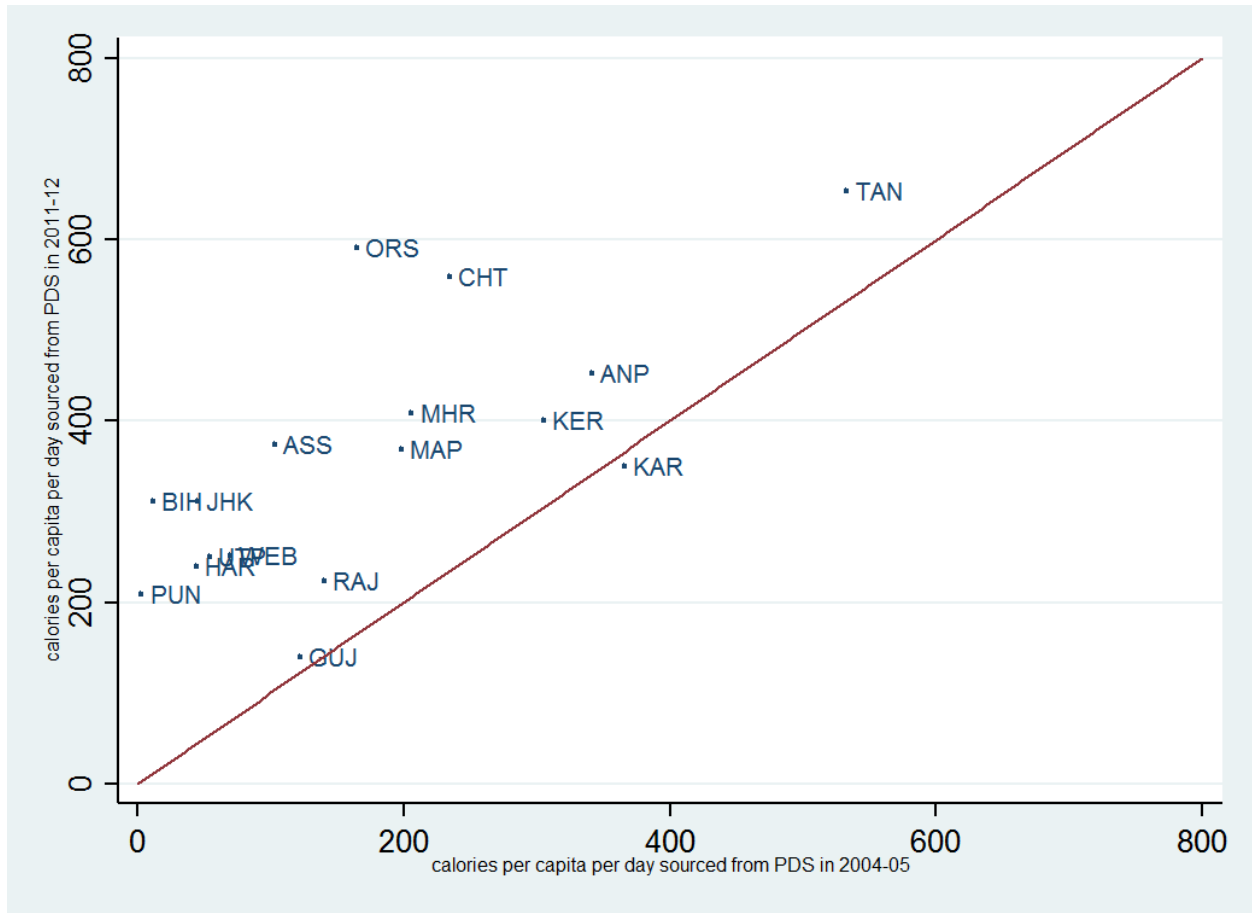


Figure 8. Calorie intake from PDS of the poorest 40% of the population of major states of rural India, 2004/05 compared with 2011/12. Source: Calculated from NSS unit level data of 68th and 61st round on consumption expenditure.

Social Policy Strengthening and the Calorie Consumption Turnaround

The data discussed above beggar the question of what factors are driving changes, particularly with regards to the recorded differences in state-wise calorie consumption within the poorest quintile. The first apparent explanation that needs to be considered is economic growth. Is it the

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4 case that the states recording increased per capital calorie consumption growth among poor
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6 populations are also those with higher rates of economic growth, particularly in the rural sector?
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8 If such an association was found to be robust, it would strongly endorse the role of trickle down
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10 effects emanating from economic liberalization. Evidence from the first decade of the
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12 liberalization period does not support this argument. In a study of National Family Health Survey
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14 (NFHS) data from 1992 to 2005, Subramanyam et al.⁴¹ found no relationship between economic
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16 growth and childhood undernutrition, as measured in anthropometric indicators (stunting and
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18 wasting) for infants and children. Undernutrition is a key influence in stunting and wasting,
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20 although, it needs to be noted, not the sole determinant. Our analysis of calorie consumption within
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22 the NSS database supports the argument that there is no robust relationship between economic
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24 growth and food/nutrition outcomes, in agreement with a significant body of literature addressing
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26 this same topic.⁴² As illustrated in Figure 9, there is no systematic state-wise relationship between
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28 growth in real per capita domestic product (valued at 2004/05 prices) and growth in per capita
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30 calorie intake of poorest 20% in rural areas for both time periods (i.e., 1993/94 to 2004/05 and
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32 2004/05 to 2011/12).
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Figure 9. Scatter plot of growth in per capita calorie intake of poorest 20% and per capita state domestic product.

Source: Calculated from NSS unit level data of 68th, 61st and 50th round on consumption expenditure.

If the rate of a state's economic growth is not closely associated with the rate of change in per capital calorie consumption for the poorest 20% of its rural population, the next most obvious driver is the coverage and efficiency of food-based social protection schemes, in particular the PDS, as the single most important component of India's social safety net.

The period leading up to the 68th NSS round coincided with a period of social protection policy strengthening. A slew of studies published since 2010, led by Reetika Khera⁴³ provide evidence of

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4 substantial improvements to delivery ratios within the PDS. Khera⁴⁴ concludes that the PDS
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6 deteriorated in the 15 years to 2004/05 (total leakage increasing from 24% to 54% of PDS supply),
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8 but from 2004/05 to 2010/11, leakages fell from 54% to 44%. While this is still high, stark
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10 improvements were recorded in some of the traditionally worst-performing states.
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16 The data from the NSS 68th round provides support to these arguments. Table 3 provides an
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18 overview of the link between PDS entitlement (ration card status) and per capita calorie
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20 consumption for the two poorest quintiles. This Table clearly shows the pivotal importance of
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22 ration card status to the quantity of calories consumed. In 2011/12, within the poorest quintile,
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24 households with Antyodaya status (a ration card allocated to the ‘poorest of the poor’) consumed
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26 on average approximately 4% more calories than households with BPL cards (Below the Poverty
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28 Line, the next lowest card status) and 10% more calories than households with no card.
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Table 3. Calorie intake for bottom 40 per cent of rural population by type of ration card in 2004/05 and 2011/12.

| | Quintile | Year | Antyodaya | BPL | Others | No card | Total |
|--------------------------------|------------------------|---------|-----------|------|--------|---------|-------|
| Bottom 40% of population | Poorest 20% | 2004–05 | 1648 | 1591 | 1633 | 1580 | 1609 |
| | | 2011–12 | 1820 | 1756 | 1748 | 1660 | 1748 |
| | Next poorest 20% | 2004–05 | 1893 | 1865 | 1887 | 1857 | 1876 |
| | | 2011–12 | 2003 | 1962 | 1935 | 1882 | 1944 |
| Total population | | 2004–05 | 1923 | 1920 | 2129 | 1994 | 2047 |
| | | 2011–12 | 2021 | 2060 | 2162 | 2026 | 2099 |

Source: Calculated from NSS unit level data of 61st and 68th round consumption expenditure.

The importance of PDS is reinforced, moreover, when 50th, 61st and 68th Round NSS data is disaggregated by state to examine the share of PDS beneficiaries among bottom 40% population of the respective rounds (Table 4). Within the NSS, a household is defined as PDS beneficiary if that household reports any rice or wheat purchased from PDS. The table illustrates the quite dramatic increases in PDS coverage for the poorest 40% of recipients, and especially the bottom quintile, that occurred from 2004/05 to 2011/12. As supported by Figure 8, many of the poorer and historically more poorly-performing states, including Bihar, Madhya Pradesh, Odisha, Chhattisgarh, Jharkhand, West Bengal and Uttar Pradesh led this turnaround. These data strongly support evidence of the improved performance of the PDS during the past decade, as discussed above. They also support the findings of parallel research by Kishore and Chakrabarti⁴⁵ which

finds that household food consumption levels improved in states where PDS reform efforts were strongest, and is again consistent with the data presented in Figure 8.

Table 4: Improvements in coverage of PDS for bottom 40% of rural population over time

| State | Poorest 20% of households | | | Next poorest 20% of households | | |
|----------------|---------------------------|---------|---------|--------------------------------|---------|---------|
| | 1993/94 | 2004/05 | 2011/12 | 1993/94 | 2004/05 | 2011/12 |
| Andhra Pradesh | 80.67 | 78.56 | 97.03 | 72.10 | 75.70 | 95.33 |
| Assam | 37.49 | 19.69 | 65.83 | 21.33 | 12.15 | 55.39 |
| Bihar | 3.64 | 2.96 | 62.97 | 2.72 | 1.55 | 51.78 |
| Chhattisgarh | N/A | 43.33 | 82.24 | N/A | 22.70 | 68.79 |
| Gujarat | 50.89 | 51.82 | 55.72 | 51.95 | 40.40 | 33.43 |
| Haryana | 3.08 | 6.43 | 47.13 | 3.50 | 6.01 | 21.83 |
| Jharkhand | N/A | 11.59 | 60.12 | N/A | 5.85 | 34.13 |
| Karnataka | 69.07 | 80.54 | 80.83 | 58.69 | 67.16 | 82.52 |
| Kerala | 88.25 | 62.23 | 98.08 | 89.28 | 47.41 | 91.41 |
| Madhya Pradesh | 13.85 | 37.57 | 63.70 | 10.05 | 25.32 | 47.49 |
| Maharashtra | 30.50 | 45.46 | 74.16 | 41.25 | 35.03 | 56.82 |
| Odisha | 8.43 | 45.19 | 85.84 | 4.06 | 24.65 | 76.94 |
| Punjab | 22.05 | 0.55 | 49.25 | 17.57 | 0.28 | 31.67 |
| Rajasthan | 81.10 | 22.08 | 48.51 | 78.44 | 15.85 | 31.51 |
| Tamil Nadu | 2.77 | 93.63 | 98.92 | 3.30 | 91.04 | 97.72 |
| Uttar Pradesh | 10.21 | 12.24 | 47.91 | 10.11 | 6.35 | 27.99 |
| West Bengal | 48.63 | 24.30 | 62.30 | 45.97 | 16.11 | 52.15 |
| Others | 1.40 | 48.63 | 80.25 | 0.83 | 39.36 | 81.33 |
| Total | 29.08 | 35.49 | 67.22 | 27.29 | 27.98 | 54.45 |

Source: Calculated from NSS unit level data of 61st and 68th round consumption expenditure.

It is here that the national-scale analysis provided by NSS data needs complementing by detailed state-specific research, if the drivers of change are to be appropriately identified. One example is research by Puri⁴⁶ into the background of changes in Chhattisgarh, historically one of India's poorest performing states when it comes to the PDS. Puri⁴⁷ and Krishnamurthy et al.⁴⁸ note how

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4 improved PDS performance was closely associated with government reforms following the 2003
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6 election and a change of political administration. The enactment of the *Chhattisgarh Public*
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8 *Distribution System (Control) Order 2004* mandated that Fair Price Shops be operated by Gram
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10 Panchayats, self-help groups and local cooperatives, and that the transport of PDS supplies be
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12 undertaken in government trucks painted yellow. Further reforms in 2007 extended the PDS
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14 franchise to households that were excluded previously by administrative error, adding a further
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16 1.9 million PDS beneficiaries in the state. Then, in 2012, the Chhattisgarh administration
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18 legislated its own version of a *Food Security Act* in advance of the central government,
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20 enshrining the right to food in law. A second example is provided in the study by Rahman⁴⁹ of
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22 PDS reforms in the Kalahandi-Balangir-Koraput (KBK) region of Odisha, which has an
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24 extended history of hunger and starvation deaths. In 2008, the targeted PDS was replaced by
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26 universal PDS. Rahman⁵⁰ finds that the move to universal PDS provision was associated with a
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28 significant improvement in both the quantity of calorie intake and the quality of diets. Both these
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30 case studies provide exemplars of the role of social protection mechanisms and political
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32 commitment for raising nutrition indicators, underscoring the more general arguments presented
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34 in this paper. As suggested by Krishnamurthy et al.,⁵¹ improvements to PDS require “sustained
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36 reforms... coupled with political and social will.”
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48 The turnaround in trends identified by the 2011/12 data prompts the suggestion that India’s calorie
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50 consumption paradox was a temporary phenomenon, relevant to the first decade or so of the
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52 liberalization period. Subsequently, the nutritional implications of economic growth in India have
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54 reverted to a pattern that is more in line with international expectations. Indeed, accumulation of
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56 recent evidence from other quarters would seem to verify this conclusion. The Comprehensive
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4 Nutrition Survey in Maharashtra, based on a representative survey of 2,809 children under five
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6 years of age, revealed a stunting rate of 24% in 2012, which was a marked reduction from 39%
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8 revealed in 2006.⁵² Stunting rates are a well-established indicator of chronic undernutrition.
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11 Haddad and Valli⁵³ argue that this was “one of the fastest declines ever recorded”.
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15 16 *Conclusion* 17

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19 This paper has made two core contributions to debate on trends in per capita calorie consumption
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21 in rural India. The first of these relates to arguments about India’s calorie consumption paradox.
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23 We argue that with the addition of the 2011/12 NSS data to the historical record, the perceived
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25 significance of this problem becomes diminished. Data from the 68th round conducted in 2011/12
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27 and released in 2014 paints a much more positive story. By no means does it suggest that India’s
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29 problems of nutrition insecurity among the poor have been resolved. There is still an estimated
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31 194.6 million under-nourished persons in India, and most of these live in rural areas.⁵⁴ However,
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33 in contrast to the scenario that faced the country upon the release of the 2004/05 data, at least the
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35 trend now appears to be moving in a positive direction.
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43 The second contribution of this paper, and its most novel finding, relates to the explanation for this
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45 turnaround. In this, we attribute importance to the role of food-based social safety net programs
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47 operated by the state. Prior to liberalization, from 1972/73 to 1993/94, there was weak but positive
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49 growth in calorie intake of the bottom (poor) quintiles. The 1970s and 1980s is generally
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51 considered as a period of pro-poor spending. However, the pro-poor bias of government policy
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53 was ameliorated, if not compromised, by the new economic policies inaugurated after 1991. The
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55 legacy of this shift in policy direction, compounded by inattentiveness to administrative failure
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4 within the PDS, is seen in the 2004/05 NSS data, which indicate that for at least a decade after
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6 liberalization, India's poor did not obtain a calorie consumption dividend.
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11 Recognition of this policy failure inspired renewed focus on food-based social welfare policies, at
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13 the national level in the UPA-II administration (2009 to 2014) and in some states, as noted in the
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15 discussion of Chhattisgarh, above. Interpretation of the NSS data from 2011/12, as well as other
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17 recent sources cited earlier in this paper, suggests that these initiatives may now be bearing
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19 benefits.
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26 It is important that the findings reported in this paper are not be interpreted in such a way as to
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28 engender complacency in India's nutrition challenge. Hunger remains a pervasive characteristic
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30 across much of India's rural population, and the effects of undernutrition provide both a human
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32 rights failure and a drag on the country's economic growth. Yet there is evidence that the
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34 strengthening of social protection mechanisms relating to food that has occurred in India during
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36 the past decade is at last producing a nutrition dividend. The release of further, more recent data is
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38 required to verify the duration and strength of these directions of change.
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43 Notes

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58 ⁴ We note that measures of childhood stunting and wasting are not solely determined by calorie
59 consumption levels. As suggested by Deaton and Dréze (2009: 43) "just as there is no tight link
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6 between incomes and calorie consumption, there is no tight link between the number of calories
7 consumed and nutritional or health status.” Evidently, the quality of diets, hygiene and health are
8 also crucially important in determining these nutritional indicators. Nevertheless, the debate on
9 nutrition cannot ignore the fundamental role of calorie intake, and measurements of average
10 calorie consumption represent a vital proxy for wider discussion on this point.

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Appendix: Glossary of acronyms for India States

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|-----|----------------|
| ANP | Andhra Pradesh |
| ASS | Assam |
| BIH | Bihar |
| CHT | Chhattisgarh |
| GUJ | Gujarat |
| HAR | Haryana |
| JHK | Jharkhand |
| KAR | Karnataka |
| KER | Kerala |

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| MAP | Madhya Pradesh |
| MHR | Maharashtra |
| ORS | Odisha |
| PUN | Punjab |
| RAJ | Rajasthan |
| TAN | Tamil Nadu |
| UTP | Uttar Pradesh |
| WEB | West Bengal |
| OTH | Others |