

An Overview of India's Primary School Education Policies and Outcomes 2005-2011

Universal school enrolment of children aged 6 to 14 years has been a commitment enshrined in the Indian constitution since 1950. To attain this goal, the central government has set up a range of programs, such as incentive programs, teacher grants and infrastructure grants, while state governments share responsibility in implementing those educational policy initiatives. This paper reviews the progress of India's primary schools over the period 2005-2011 as public educational undertaking shifted more from the centre to the states. Using two waves of the Indian Human Development Survey conducted in 2005 and 2011, we track the progress of primary schools in terms of infrastructure upgrade, teachers' quality, the costs of education, enrolment and learning outcomes. We find that while progress has been made in terms of infrastructure provision and enrolment, other aspects have either seen no progress or have worsened over time, with notably numerical and reading skills of children 8 to 11 years old worsening over time. Better performing states are generally in the South and in the extreme North. However, in terms of learning outcomes, the abysmal results are nationwide.

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1. Introduction

There is a considerable literature on schooling and education in India that mostly focuses on enrolment, dropout, and incentive programs such as mid-day meals. The attention devoted to this area underscores the importance of these issues in India. Das (2007) points out that while the dropout rate has decreased in India between 1960 and 2004, the proportion of dropout is still quite high. One probable reason behind this could be that low-income families withdraw their children from school and get them to work to contribute to household income (Chamarbagwala 2008). Das (2007) emphasised that school enrolment alone is not a sufficient indicator of educational outcomes unless a standard educational attainment measure is used concurrently. Actual school going, performance of the students relative to expectation, school level infrastructure and the quality of teachers should also be considered, rather than the sole consideration of enrolment. The current paper aims to address a range of school level input and output measures to explore the current state of primary school achievements in India.

As Kingdon (2007) puts it, India has 22% of the world's population, 46% of the illiterate people in the world, and a substantial proportion of the global out-of-school children and youth population, with youth and adult literacy rates lagging behind most other developing countries, surpassing only Sub-Saharan Africa. A seminal paper by Psacharopoulos and Patrinos (2004) looked at social and private returns to education across the globe and found evidence of substantial returns on schooling, with higher rates of returns estimated at lower educational levels and in developing regions. Further, higher levels of education in India are correlated with higher levels of per capita incomes and economic growth (Trivedi 2006).

There is, hence, considerable scope for designing primary school education policies aimed at increasing human capital in India which has great potential to produce economic returns for both the individual and the country.

Since the 1950s, India has implemented numerous policies at both the federal and state levels targeted at improving educational outcomes, particularly for primary school aged children (Govinda and Bandyopadhyay 2010). However, there is a lack of studies looking at the change in school resources in terms of physical infrastructure and teacher quality over the last decade. Existing Indian studies, such as Parikh et al. (2015), tend to examine infrastructure provision outside of schools, although positive effects to educational outcomes from such infrastructure provision has also been clearly demonstrated. This paper aims to fill this gap by looking at the changes in school resources and learning outcomes for primary school-aged children over the past decade.

This study is purely descriptive in nature and does not intend to prove causality or demonstrate correlation between school resources and educational outcomes of the students. This paper, first and foremost, positions itself in the literature on primary education in India by mainly tracing out the path of progress in terms of educational inputs and outputs against the backdrop of changing national policies on education in the last decade. Between 2005 and 2011, the responsibility for elementary educational undertakings shifted from the central government to the state governments and this period in-between represents the window where the SSA policy was enacted and eventually reinforced with the RTE Act of 2009. We use the 2005 and 2011 waves of the nationally representative Indian Human Development Survey to analyse the national performance and to compare the state-specific achievements, before and after the shift in centre-state responsibilities. Specifically, we examine the levels of primary school infrastructure, incentive programs, and educational outcomes as measured by enrolment (conventionally used in the literature; see, for example, Dostie and Jayaraman 2006, Afridi 2011) but, also, more importantly, by learning outcomes relative to the expected standard of learning at age specific levels.

Our findings show that progress is mixed. While enrolment numbers have improved, students' attendance on an average day has worsened over time. Similar enrolment rates were observed by gender, caste, and geographic location (rural/urban) for schoolchildren less than 15 years old, but, from this age onwards, important disparities start to emerge. A large number of students perform below the expected age-specific level of reading, writing and mathematics competency as set by the National Council of Education Research and Training (NCERT 2005) primary education curriculum. While provision of school infrastructure has sharply increased, their actual usability can be limited. For instance, several toilets were found to be kept locked. Furthermore, many schools do not have electricity despite having been connected to the network. Moreover, wide disparities in levels of infrastructure provision remain among the states.

The rest of the paper is structured as follows. Section 2 outlines a brief historical overview of India's education policies. Data and methodology are described in section 3 followed by the results in section 4. Section 5 discusses and summarizes our key findings on the investment into and resultant achievements of primary schooling in India. Section 6 concludes.

2. An Overview of India's Educational Policies

India's commitment towards universally free and compulsory education for children aged up to 14 years old began post-independence, as stated in the Constitution in 1950 (article 45). However, while some improvement in enrolment was achieved, this goal remained largely unfulfilled and low enrolment rates in schools was a major concern of policy makers in the second half of the 20th century.

This disquiet over low enrolment rates paved the way to the establishment of the National Policy on Education 1986 by the Indira Gandhi government (revised 1992 by the Rajiv Gandhi government). The National Policy on Education (NPE) was a major landmark since it

established India's central government as the driver in the development and implementation of policy measures aimed at achieving universal elementary education (Govinda and Bandyopadhyay 2010). Under this policy, three aspects of elementary education were targeted:

1. Universal access and enrolment,
2. Universal retention of children up to 14 years of age, and
3. Substantial improvement in the quality of education to enable all children to achieve essential levels of learning.

Since then, policy makers have recognized that school enrolment rates do not fully reflect actual school participation rates and that school participation and attendance are important in influencing actual academic performance (Afridi 2011). A major reason behind low enrolment rates and high dropouts in village schools has been attributed to the high opportunity cost of sending children to school when this time could be spent on contributing to farm or house work. This gave rise to policies such as the mid-day meals program that offered immediate incentives to attend school for children from lower income families (Afridi 2011). The mid-day meals program has since been recognised to be quite successful in increasing attendance rates, particularly for girls (Afridi 2011; Dreze and Kingdon 2001).

In 2001, the Sarva Shiksha Abhiyan (SSA; Education for All Movement) programme was launched, to further the aims of achieving universal elementary education. The SSA programme set out explicit aims to be achieved under a clear timeframe, including the completion of at least five years of primary schooling by all children by 2007, the completion of elementary schooling by all children by 2010, universal retention of children in the education system by 2010, and the bridging of gender and social caste gaps at the primary school stage by 2007, and at the elementary education stage by 2010 (Das 2007).

Since the implementation of the SSA programme, several measures have been rolled out across India's elementary education system, albeit not uniformly. These measures include increasing school resources, such as number of teachers, classrooms, and teaching/learning equipment. It also aims to improve teachers' qualification and professionalism by providing training opportunities and improving school supervision. Girls, as a disadvantaged group, are given special attention via programs such as Kasturba Gandhi Balika Vidyalyas¹ (GoI, 2010). Additional funding was also made available for teacher training and for schools for children with special needs. The aims of the SSA programme were further preserved in legislation, namely, the Right to Free and Compulsory Education Act 2009 (RTE). The main objective of the RTE Act was to provide free and compulsory education to all children between the ages of 6 to 14 years. The SSA programme has retained its purpose as the main policy initiative for achieving the objectives of the RTE Act 2009.

Since the implementation of the educational reforms and policies laid down by the SSA, some improvements have been made, such as reducing dropout rates in primary and elementary education, particularly for girls (Das 2007) and increasing literacy rates (Kingdon 2007). However, India's performance in education is still considered lacklustre in comparison to other countries, such as China (Borooah and Iyer 2005). Moreover, lack of progress in the areas of student-teacher ratio, quality of teaching and equitable learning attainment between various social classes have been noted (Govinda and Bandyopadhyay (2010) and the primary goal of universal enrolment of children 6 to 14 years old remains elusive.

Kremer et al (2005) argue that teacher negligence and absence is the most important retarding factor behind low enrolment in school. Moreover, wide divergences in terms of educational opportunity and macroeconomic performance remain between states (Asadullah and

¹ The program was established in 2004 with a plan to set up 750 residential schools at elementary level for girls belonging predominantly to disadvantaged and educationally backward sections.

Yalonetzky 2011; Crost 2010), gender (Das 2007; White et al 2016) and marginalised groups (Borooah 2012; Govinda and Bandyopadhyay 2010). More cuttingly, studies have criticised enrolment as being a ‘noisy’ measure of participation, which does not track attendance or attrition from school (Afridi 2011). Rates of school attendance in India are particularly poor for children from impoverished households due to perceived low returns to education and high returns to child labour (Chamarbagwala 2008). This problem is made worse due to the perception of poor educational quality and the lack of access to schools. The existing literature on India’s primary school education, however, mostly looks at the provision of education in terms of enrolment numbers and is largely silent on the provision of education in terms of infrastructure and teacher’s quality.

The PROBE survey in 1996 on 242 villages was the first of its kind to focus on infrastructure and teacher quality (PROBE 1999). The report found that village schools did very poorly with respect to classroom infrastructure such as blackboards, maps and charts, library and musical instruments. Access to basic amenities was also very poor with almost 90% of the schools having no toilet facilities and over 50% of the schools with no playgrounds or no drinking water. Attention to hygiene was brought into focus only in the early 2000s after the launch of the SSA program. The ASER 2005 report by Pratham shows that infrastructure in schools improved over the decade with around 66% of the schools having access to drinking water and 42% with functioning toilets (Kingdon 2007). However, there was little change in the classroom infrastructure such as teaching resources and in terms of teacher’s attendance. The report further finds that, on average, around 25% of the teachers were absent in the schools surveyed with around 8-10% of the schools having no teachers present at all in the day of the survey.

Most of these studies, however, focus on India’s education policies before 2005. To our

knowledge, we are the first study to look at the progress, toward achieving those goals after the SSA to the lead up to the RTE and immediately thereafter until 2011. Specifically, the present study aims to examine whether there has been any significant improvement in the quality of education (as emphasised in the National Policy of Education, 1986), in terms of improvement in school infrastructure (the specific focus of SSA) and also in terms of learning outcome as per the objectives of the National Council of Education Research and Training's primary school curriculum (NCERT 2005, 2006).

While the Central government sets up the general guidance and share most of the cost related to education, states are given a lot of latitude on how they implement the policies. Moreover, over time, the share of central government expenditures on primary education decreased from 85% during the 9th Plan period when the SSA was implemented, to 50% during the 11th plan period, when the RTE Act was implemented (GoI 2010), further exacerbating the risk of unequal school quality provision across states. Our analysis will thus disaggregate the data at the state level to examine state-specific progress in terms of educational inputs and performance based output between the 9th Plan and the 11th Plan which mark the transition of elementary educational undertakings from the centre to the states and represent the window of SSA policy in action leading up to the RTE Act of 2009 and its immediate aftermath.

3. Data and Methodology

The Indian Human Development Survey (IHDS 2005, IHDS 2011) is a nationally representative survey conducted in 2005 and in 2011. The survey covers a broad range of issues, such as marriage, health, fertility and education. An in-depth questionnaire on education was carried out in households with children 8 to 11 years old, which correspond to the final 3 years of primary schooling, with a total of 17,061 and 14,703 children aged 8 to 11

years old covered in 2005 and 2011, respectively. A primary school survey was carried out alongside the household survey. We thus have information of the main primary school(s) in the village, as identified by village focus groups, for a total of 3,761 schools in 2005 and 4,251 schools in 2011.

As IHDS data was not collected with the purpose of being representative at the state level, insufficient data points were collected for the smallest states for their averages to be reliable. The data is, however, representative of the largest states and regions encompassing the smallest states. The analysis at the state/region level is thus done for: Andhra Pradesh, Assam, Bihar, Delhi, Chhattisgarh, Gujarat & Daman & Diu, Dadra & Nagar Haveli, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Maharashtra & Goa, Northeast (Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya), Orissa, Punjab & Chandigarh, Rajasthan, Tamil Nadu & Pondicherry, Uttarakhand, Uttar Pradesh and West Bengal, following IHDS recommendation (IHDS 2017).²

The primary school survey collected information on the schools' infrastructure (such as, if all classes meet inside, provision of chairs for students and blackboards for the classrooms), educational achievements of all staff members (headmasters, teachers and para-teachers), students-teacher ratio, teacher's absenteeism on the day of interview, access and exposure to incentive programs (free-meal, free uniforms, free books and scholarship programs), availability of incentive programs to all students (whether girls only and scheduled castes

² As a robustness check, descriptive statistics from the District Information System for Education (DISE, 2005-06 and 2011-12 academic year waves) were produced and compared to the IHDS's results. The DISE database (DISE 2005; DISE 2011) captures standardised school level data for 604 districts across 35 States and UTs. Trained surveyors visit each school in the district and fill up a school level questionnaire, which is then validated by the headmaster of the school. This much higher representativeness of the sample (all schools included instead of the main school(s) in the village only) however comes to the cost of less detailed information for each school and no way to assess learning outcomes such as reading or mathematical skills. Not surprisingly, given that the DISE dataset includes all schools, the DISE's story is even bleaker than the IHDS's story, despite pointing towards the same direction (results available in the Online Appendix).

only for some or all classes) and the school's self-reported students' attendance rate on an average day.³

Our analysis begins by examining the progress in the provision of Indian schools' infrastructures, one infrastructure at a time. However, to be able to assess the relative progress of different states, an infrastructure index is constructed. While the literature emphasizes the importance of infrastructures for enrolment, students' attendance and learning (Dostie and Jayaram 2006, Dreze and Kingdon 2001, Das 2007, Kingdon 2007, Afridi 2011 and White et al 2016), we are not aware of any study highlighting the types of infrastructure which has the largest impact. To assess progress at the state level we thus use a principal component factor analysis to calculate an infrastructure index, using 2005 as the reference year for the weight given to the different infrastructures (specifically, all classes meet inside, chairs for students, blackboard, library, computer, fan, playground, connected to electricity, separate toilets for boys and girls). The index has been normalized to range between 0 (no infrastructure) and 1 (most infrastructure).

From the village questionnaire, we know the distance of the village, in kilometres, to the nearest anganwadi centre (pre-school, for students 3 to 5 years old), primary school (classes 1 to 5, for 6 to 11 years old students), middle-school (classes 6 to 8, for students 12 to 14 years old), secondary school (classes 9 and 10, for students 15 to 16 years old) and higher secondary school (class 11 and 12, for students 17 to 18 years old).

Further, the household questionnaire contains detailed information on various educational aspects of children aged 8 to 11 years old. We thus know if the parents consider their child's teacher to be good and fair, if the teacher attends classes regularly, if he/she is local, if he/she is biased towards certain communities/jatis, if the child enjoys school and, finally, if their

³ The surveyors were asked to check the school's register of the day to ascertain this information.

child has been praised or beaten by the teacher in the last 30 days of school attended. We also know how much is spent on each child aged 8 to 11 years in terms of school fees, uniforms, books, bus to school and private tuition in the last year. The children were also tested on mathematical skills (ability to identify numbers from 0 to 99, perform addition and multiplication), reading skills (ability to read letters, words, a paragraph or a short story) and writing skills (able to write their name, a friend's name and a short sentence with less than 2 mistakes). As per the National Council of Education Research and Training guidelines (NCERT 2005, 2006), children should be able to recognize letters from class 1 (age 6-7), read words from class 2 (age 7-8), read a paragraph/story from class 2/3 (age 7-9), recognize numbers up to 99 and perform addition and subtraction from class 2 (age 7-8), division from class 4 (age 9-10) and write their name and short sentences from class 2/3 (age 7-9). We consider children to be behind schedule in reading if they are unable to read words at 8 years old, unable to read a paragraph at 9 years old or a story at 10 or 11 years old. In mathematics, a child is considered behind schedule if s/he is unable to recognize numbers below 99 at 8 years old and if a 9 to 11 years old child is unable to perform a division. Finally, a child is considered to be behind in writing skills if s/he cannot write their name, the name of a friend and a short simple sentence with less than two mistakes after the age of 8. Due to data availability, the standard is thus set at a low level for older children. Finally, we have data on current school enrolment for all household members aged 6 to 25 years old.

The following section will look at the progress (or lack thereof) between 2005 and 2011 in terms of educational inputs, specifically, school infrastructures (sub-section 4.1), teachers' quality (sub-section 4.2), the costs of education (sub-section 4.3), and enrolment rate (sub-section 4.4) and in terms of educational performance or output measured by reading, writing and mathematical skills (sub-section 4.5).

4. Empirical Results

4.1 School Infrastructure

Upgrading school infrastructure has been a key policy goal since the enactment of the SSA in 2001-2002. Important progress has been made in terms of infrastructure (Table 1). By 2011, nearly all schools have been connected to the electricity network. The effective access to electricity, however, depends on the state's network capacity, with a mere 22% of schools having electricity all days, which is a modest 5 percentage point increase since 2005.

Substantial progress on the provision of toilet facilities was made over the period 2005-2011. In 2011, 90% of primary schools in India had a toilet, a 20 percentage point increase since 2005. In 71% of the cases, the toilet is located within the school building. About a third of the toilets are flush toilets and similar proportions are pit toilets or improved ventilated pit toilets. Among schools having a toilet, the vast majority (80%) provide separate facilities for boys and girls. However, these figures do not reveal the true extent of toilet provision in schools as the data also show that 25% of the schools toilets are locked, 20% do not have water and 19% are not clean. This results in a mere 57% of the toilets being actually usable, a far detraction from the intended universal provision of toilets.

Nearly all schools already had a blackboard in 2005. By 2011, all classes were conducted inside in 84% of the schools, a 10 percentage point increase since 2005. However, by 2011, only 50% of the schools had chairs for their students, and only 60% had a fan. 66% of schools had a library, an increase by 19 percentage points over the period 2005-2011. The percentage of schools with a computer more than doubled, from 17% in 2005 to 38% in 2011. No progress was made in terms of playground provision, which remained at 69% in the two time periods analysed.

[Table 1 about here]

All states have progressed in terms of infrastructure provision over the period 2005-2011. The Northern and some Eastern states generally perform poorly compared to states in the Extreme North and in the South (Figure 1).⁴

[Figure 1 about here]

While nearly all villages had a primary school within 1 kilometre of the village in 2005, important progress have been made in terms of increasing the accessibility of middle schools, with 82% of villages now having a middle school within 1 kilometre, an increase by 9 percentage points compared to 2005. Though some progress has been made for secondary and higher secondary schools, it is not enough since half of the villages do not have a secondary school within 1 kilometre of the village in 2011 and almost three quarters of the villages do not have a higher secondary school (Table 2).

[Table 2 about here]

West Bengal is by far the worst performer when it comes to the provision of middle schools, with 48% of villages not having a middle school within 1 kilometre. This is ironic since West Bengal started out as one of the most advanced states in terms of educational attainment in post-independence India. Other weak performers are mostly found in central India, with some also in the Northern and Eastern states.

4.2 Teachers' Quality

For learning to take place, a teacher must be effective in teaching. Overworked, absent and

⁴ The performance of Jammu and Kashmir partly reflects the special attention the state received through the Reconstruction Plan of 2004 (GoI 2005).

biased teachers will thus have a negative impact on enrolment, attendance and, ultimately, learning (Singh and Sarkar 2015). To assess teacher's commitment, we rely on parents' assessment of their 8 to 11 years old child's teacher and, for only 2011, on schools' report. It should be noted that parents' assessment is not an ideal measure as parents may not have a perfect understanding of what makes an effective teacher, their knowledge would be mostly derived from what their child says and there is potentially a selection issue as parents who think the teacher in a particular school is incompetent are likely to send their child to a different school. This selection bias is, however, unlikely to change over time and thus, the comparison over time is likely to be more reliable than for a given year. While imperfect, parents' assessment of teachers' quality is the only measure we have available across both survey years; it is likely to be a rough indicator of teachers' quality and should be treated as such.

We find that parents of 8 to 11 years old children regard their child's teacher favourably (Table 3). In 2011, 96% consider their child's teacher to be good and fair, and report that the teacher regularly attends school. However, around 10% of the teachers are reported to be biased towards certain communities/jatis and 27% of children have been beaten by the teacher at least once. The assessment of teachers' commitment by parents is surprisingly constant over time. The only notable changes are a 10 percentage point drop in the proportion of teachers being local (from 57% in 2005 to 47% in 2011), a 12 percentage point increase in the fraction of children being praised at school (from 33% to 45%), a 4 percentage point increase in the proportion being beaten (from 23% to 27% in 2011) and a 6 percentage point decrease in parents reporting their child to be enjoying school (from 93% to 87%). The level of satisfaction is not only constant over time but is also fairly constant across states.

[Table 3 about here]

Even the best teacher will struggle to teach a large number of students. Keeping the student-teacher ratio low is a goal since 2005-06 when the pupil student ratio (PTR) was observed at 46:1 (GoI 2006); the RTE Act, 2009 emphasised that this ratio should be brought down to 30:1. Important progress towards that goal has been made between 2005 and 2011 as the median student-teacher ratio has decreased to 27 students per teacher in 2011, a median decrease of 6 students per teacher compared to 2005⁵. Again, the extreme Northern states and the Southern states are outperforming the Northern and Eastern states (Figure 2).

In terms of qualifications, in 2011, the average headmaster, teacher and para-teacher had an average 14 years of education, with most having completed college (42%) or post-graduate (25%) education. Another 25% had completed only higher secondary education and the remaining had completed secondary education or below, with education at the middle school level or below being rare. Interestingly, the best performers are the Northern states and the worst performers are mostly in Southern and Eastern states, with the exception of Andhra Pradesh (Figure 2).

In 2011, 14% of the headmasters, teachers and para-teachers were absent on the day the survey was conducted, of whom 83% were absent without official leave. The states performing the best in having teachers present in schools are the extreme Northern states and the Southern states (Figure 3). The states that have the most qualified teachers are thus not the best in their ability to keep teachers in school, an impression confirmed by the negative correlation between states average teachers' year of education and states teachers' attendance rate.

[Figures 2 and 3 about here]

⁵ The median was taken instead of the mean as there are some schools reporting extremely large/small student-teacher ratios.

4.3 The Costs of Education

Although primary and lower middle school education have been free in India since 1986 (National Policy on Education), it was found that parents have nevertheless spent 3631 Rupees on average in 2011, a two-fold increase from 2005, on schools fees, uniforms, books, bus to school and private tuition per child aged 8 to 11 years old. Nearly half of this expenditure is for school fees, 40% for books, uniforms and transportation and the remaining 10% go towards private tuition. In 2011, parental school expenditure accounts for 3.7% of GDP per capita in the country. Furthermore, this represents a 21% increase from the equivalent parental school expenditure-GDP per capita figure for 2005. To reduce the costs of education, the government has encouraged schools to implement incentive programs which either reduce the costs of education or reduce the opportunity cost of sending children to school, notably, the free meals program, the free uniforms program, the free book program and various scholarship programs.

We calculated the number of such incentives per school. For the meals program, the strength of the incentive varies by school, in terms of the number of days the free meal is available and in terms of the quality of the food offered, that is, only grains or a variety of food. We consider a school as having an incentive meal program if a variety of food is offered at least 4 days a week.

The average number of incentive programs for children to attend school has increased sharply over time, from 0.9 to 1.5 incentives per school on average. The increasing use of incentives is seen across India, with the exception of Delhi, Tamil Nadu & Pondicherry and Uttarakhand.

[Table 4 about here]

Looking specifically at the different programs, the percentage of schools offering no food at all has only slightly decreased over time (Table 5). The progress has come mostly from

schools that were offering grain only in 2005 but upgraded the program to a variety of food by 2011. Among those offering food, we also observed an increase in the frequency at which cooked meals are offered, with 87% of the schools offering cooked meals at least 4 times a week in 2011, compared to 46% in 2005.

In 2011, over half the schools offered free books to all grades, an increase by 19 percentage points between 2005 and 2011. While girls and scheduled caste children were favourably discriminated in their access to free books in 2005, by 2011, schools offering access to free books usually provide them to all children.

Free uniforms are offered for all grades in around a third of the schools in 2011, again a 20 percentage point increase between 2005 and 2011. The distribution of free uniforms for all grades discriminated positively in favour of girls and scheduled caste children.

Scholarships for all grades are given in less than 20% of the schools in 2011, which is however a threefold increase since 2005. The scholarship programs targeted mostly girls and scheduled caste children, with a quarter or a third of the schools offering scholarship at all grades for girls or scheduled caste children, respectively.

[Table 5 about here]

4.4 Enrolment

Universal school enrolment of children aged 6 to 14 years old has been a goal since Indira Gandhi's National Education Policy of 1986 which made primary and lower secondary education principally free. The goal has been reiterated in 1992 with Rajiv Gandhi's National Policy on Education. As of 2011, universal education still remains a goal yet to be achieved since only 90% of 14 years old children are enrolled, despite substantial progress in enrolment for lower middle school age group (11 to 14 years old) over the period 2005-2011.

Very little differences exist in terms of enrolment rates across gender, caste and rural/urban areas, for children below 14 years of age (Figure 4). However, important regional disparities continue to remain in 2011, with mostly Northern states – Rajasthan, Uttar Pradesh, Assam, Orissa, Chhattisgarh, Gujarat and Daman & Diu – and some Eastern states performing poorly, while states at the extreme South and extreme North have reached near universal 14 years old enrolment rate (Figure 5).

Sharp disparities across socio-economic groups start to emerge at age 15, with an 89% enrolment rate for that age group in urban areas compared to 81% in rural areas. However, 15 years old girls and backward castes do not yet face a sharp disadvantage. Girls drop out faster than boys after passing the School Board Examination, resulting in a much lower enrolment rate of girls 16 years old and above. For the backward castes, the disadvantage starts to kick in the year prior to the Higher Secondary Exam (Figure 4), an examination necessary to qualify for public sector jobs such as clerks, postal worker, railway technician or private sector jobs in sales and call centres or to enter apprenticeship programs offered by the Ministry of Labour to become a trained craftsman such as carpenter, event manager and nurse (Raman 2015).

[Figures 4 and 5 about here]

While universal primary school enrolment has been nearly achieved in India, enrolling children in school is not sufficient. Children need to attend school and, ultimately, they should learn.

It is noteworthy that alongside the sharp increases in enrolment over 2005-2011, students' attendance rate on an average day (self-reported by school) has decreased by 4 percentage points to 85%.

The few states that improved their students' attendance rate on an average day were the states with the worst performance in 2005, namely Chhattisgarh, Jharkhand and Andhra Pradesh (Figure 6).⁶ All other states have seen a decline in their students' attendance rate on an average day; notably, Bihar, the state with the lowest students' attendance rate on an average day in 2005 (74%), saw its attendance rate decline by 6% in 2011. However, the states with the largest decline were Puducherry and Tamil Nadu with a drop of 13%, albeit from a high initial level. Uttar Pradesh also saw a substantial decline in attendance rate with a 10% drop.

[Figure 6 about here]

4.5 Learning

In 2011, 36% of all 8 years old children are behind schedule in reading, a 4 percentage point increase compared to 2005. Moreover, 23% are behind schedule in mathematics, a similar share to 2005. It is only in terms of writing skills that progress has been made, with 46% of all 8 years old children behind schedule, a decrease by 6 percentage points since 2005 (Table 6).

Similar results are observed for the age group up to 11 years old, with the proportion of children behind schedule in reading climbing to 52%, a 3 percentage point increase since 2005. Children aged 11 years old perform even worse in mathematics, with 72% behind schedule, an increase by 10 percentage points. It is only in terms of writing that significant progress has been made between 2005 and 2011, with 84% of 11 years old being able to write their name, a friend's name and a simple short sentence with less than 2 mistakes, an increase by 7 percentage points. This later result should, however, be interpreted with caution as, due to data limitations described earlier, the standard for writing ability is very low.

⁶ The only exception is Maharashtra/Goa that had a high attendance rate in 2011 and successfully improved its attendance rate by 2011.

It should be noted here that those figures include all children aged 8 to 11 years old. Specifically, the reading, writing and numerical skills were measured via the household questionnaire and thus, all children aged 8 to 11 years old were asked to respond to those questions, independent of their school enrolment status or attendance. Thus, the sharp increase in enrolment, which would have resulted in more children with less ability for formal education and more children from disadvantaged background to be enrolled in school in 2011 compared to 2005, cannot explain the drop in mathematical and reading skills.⁷

[Table 6 about here]

On the whole, academic performance can be considered poor, given that the best performing state in mathematics and in reading (Himachal Pradesh) has 53% and 30% of its children behind as per the mathematics and the reading schedule, respectively.

The situation in the worse performing states is much more dire as three quarter of children are behind in mathematics in Uttar Pradesh, 65% are behind in reading in Andhra Pradesh, while in Bihar 43% of children do not meet the (low) standards for writing (Figures 7-9).

[Figures 7-9 about here]

5. Discussion

The results indicate a substantial amount of progress has been achieved in terms of infrastructure provision, particularly in connecting schools to the electricity network. While progress has also been made in terms of the provision of other school equipment such as chairs, fans, libraries and computers, the proportion of schools with such infrastructure

⁷ Excluding children currently out of school (never enrolled or enrolled in the past) does not change the results substantively. These results are available in the Online Appendix.

remains low. Furthermore, the results indicate that provision of infrastructure alone is ineffective if they are not used as intended, as the results on toilet facilities and access to electricity show. Although the proportion of schools equipped with toilets has risen sharply between 2005 and 2011, the proportion of schools with *usable* toilets remains low.

The results on teacher commitment indicate that parental assessments of teachers are generally favourable, and that the student-staff ratio has improved. However, the proportion of children who have been beaten remains high and should be addressed, as should the bias of teachers against certain communities/jatis. Teacher absenteeism is also an issue that still requires attention.

The disparities across states for infrastructure and teacher quality remain substantial, with states in the Extreme North and South performing much better relative to the Northern states and some Eastern states.

Substantial progress has been made in terms of enrolling children. Near universal enrolment has been achieved among children 6 to 10 years old. The higher enrolment rate, however, masks a decline of the students' attendance rate on an average day between 2005 and 2011, from 89% in 2005 to 85% in 2011.

Near universal enrolment of children aged 6 years old has been achieved in 2011, with 99.7% of 6 years old enrolled. The figure is however much more disappointing for 14 years old, the oldest among the age range for which universal enrolment is a policy goal. Indeed, despite a 6 percentage points increase in enrolment rate among 14 years old since 2005, in 2011 one out of ten 14 years olds is out of school. The cohorts of 14 years old in 2011 were 8 years old in 2005. We are thus able to infer that 99% of those children were enrolled at age 8. The vast majority of those 14 years old that are not enrolled were thus enrolled at some point in time but have dropped out. This result is in line with Das (2007) who conclude that dropout rates

have been high in India even though enrolment has gone up over the last couple of decades. Hence, attrition and its causes are important issues that requires governmental attention if universal enrolment of 14 years old is to be achieved.

While enrolment rates do not vary substantially by gender, caste, and rural/urban areas for children below the age of 14, enrolment rates in rural areas worsened compared to urban areas for children aged 15 years old or above, while enrolment rates for lower castes and girls worsened compared to higher castes and boys from 16 years old onward.

The progress in terms of educational outcomes is mixed. While writing skills of 8 to 11 years old children may have improved over the period 2005-2011, this result may be driven by the very low standard set by the Indian Human Development Surveys questionnaire to evaluate writing skills. In terms of numeracy and reading skills, the performance either show no progress or has worsened, depending on the age group looked at. This is particularly disappointing, given the massive expansion in funding education in India as well as the improvements in infrastructure and school resources highlighted in this study.

6. Conclusion

This study has examined issues relating to India's educational landscape, using data from Indian Human Development Surveys conducted in 2005 and 2011. The contribution of this study to the literature is two folds. First we examine the progress made across states in school infrastructure provision, teachers' commitment, and provision of incentive programs between 2005 and 2011. These teaching inputs have been shown in the literature to positively impact on educational outcomes, and have also been a focus of Indian educational policy makers and programs. Second, we track the progress made in terms of educational performances across the states over the same time period. Thus the study charts the progress of both educational

input and output across the states as the balance of public educational undertaking shifted more from the centre towards the states and as the SSA and RTE were implemented.

In terms of inputs, progress has been mixed. While progress has been made in provision of teaching inputs in some areas, such as toilet provision and student-teacher ratio, a lack of progress was observed for other inputs, such as playground provision and teacher's presence. Furthermore, there are issues relating to access to the inputs provided, such as in terms of toilet access or usability, and reliable electricity connection and use. The findings from the analysis of these latter items suggest that Indian policy makers need to exercise more care and caution in how policies are implemented. That is, well-intentioned policies could go awry when they are carried out (infrastructure provided), but not in the way intended (restricted access).

The analysis on educational outcomes, again, provides a mixed picture of progress, and reinforces our point on policy delivery above. While enrolment rates are approaching the target of universal enrolment, students' attendance rates on an average day paint a rather different picture, dropping significantly over 2005-2011. Learning outcomes in reading and mathematics have also slid backwards, although the silver lining in the cloud comes from improvement in writing skills.

This poor performance of the Indian educational system has been highlighted by others. Notably, only two Indian states, Tamil Nadu and Himachal Pradesh participated in the 2009 Programme for International Student Assessment (PISA) test where India ranked 72 among the 73 participating countries (Chhappia 2012). Though India refused to participate in the 2012 and 2015 PISA tests following the catastrophic 2009 performance, the country aspires to participate in the 2021 test. As only the two best performing Indian states participated in the 2009 PISA test and given the sharp disparities across states identified in our paper, India

urgently needs to improve its school performance overall, particularly for states in the North and in the East.

Data References

DISE 2005. National University of Educational Planning and Administration (NUEPA).

District Information System for Education (DISE) School Reports Card, 2005-2006.

<http://schoolreportcards.in/SRC-New/Default.aspx>

DISE 2011. National University of Educational Planning and Administration (NUEPA).

District Information System for Education (DISE) School Reports Card, 2011-2012.

<http://schoolreportcards.in/SRC-New/Default.aspx>

IHDS 2005. Desai, Sonalde, Reeve Vanneman, and National Council of Applied Economic

Research, New Delhi. *India Human Development Survey (IHDS)*, 2005. ICPSR22626-v8.

Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor],

2010-06-29. <http://doi.org/10.3886/ICPSR22626.v8>

IHDS 2011. Desai, Sonalde, Reeve Vanneman and National Council of Applied Economic

Research, New Delhi. *India Human Development Survey-II (IHDS-II)*, 2011-12.

ICPSR36151-v2. Ann Arbor, MI: Inter-university Consortium for Political and Social

Research [distributor], 2015-07-31. <http://doi.org/10.3886/ICPSR36151.v2>

References

- Afridi, F. 2011. "The Impact of School Meals on School Participation: Evidence from Rural India", *The Journal of Developmental Studies* 47(11): 1636-1656.
- Asadullah, M.N and Yalonetzky, G. 2012. "Inequality of Educational Opportunity in India, Changes over Time and Across States", *World Development* 40(6): 1151-1163
- Borooah, V.K. 2012. "Social Identity and Educational Attainment: The Role of Caste and Religion in Explaining Differences between Children in India", *The Journal of Development Studies*, 48(7): 887-903
- Boroorah, V.K. and Iyer, S. 2005. "Vidya, Veda and Varna: The influence of religion and caste on education in rural India", *Journal of Development Studies*, 41(8): 1369-1404
- Chamarbagwala, R. 2008. "Regional Returns to Education, Child Labour and Schooling in India", *Journal of Development Studies*, 44(2): 233-257
- Chhapiya, H. 2012. "Indian students rank 2nd last in global test", *Times of India*, January 15, <http://timesofindia.indiatimes.com/home/education/news/Indian-students-rank-2nd-last-in-global-test/articleshow/11492508.cms>
- Crost, B. 2010. "Political Market Characteristics and the Provision of Educational Infrastructure in Northern India", *World Development*, 38(2):195-204
- Das, A. 2007. "How Far have We Come in Sarva Siksha Abhiyan?", *Economic and Political Weekly*: 21-23
- Dostie, B. and Jayaraman, B. 2006. "Determinants of School Enrollment in Indian Villages", *Economic Development and Cultural Change* 54(2): 405-421.

- Dreze, J. and Kingdon, G. G. 2001. "School Participation in Rural India", *Review of Development Economics* 5(1): 1-24.
- GoI 2005. Annual Report, 2004–05. New Delhi: Department of School Education and Literacy, Department of Higher Education, Ministry of Human Resource Development, Government of India.
- GoI 2006. Annual Report, 2005–06. New Delhi: Department of School Education and Literacy, Department of Higher Education, Ministry of Human Resource Development, Government of India.
- GoI 2010. Annual Report, 2009–10. New Delhi: Department of School Education and Literacy, Department of Higher Education, Ministry of Human Resource Development, Government of India.
- Govinda, R. and Bandyopadhyay, M. 2010. "Social Exclusion and School Participation in India: Expanding Access with Equity", *Prospects* 40: 337-354.
- IHDS. 2017. "Frequently Asked Question", [Online] <http://ihds.info/faq-page#n188> (accessed 30/06/2017).
- Kingdon, G.G. 2007. "The Progress of School Education in India", *Oxford Review of Economic Policy* 23(2): 168-195.
- Kremer, M., Chaudhury, N. and Rogers, F. H. 2005. "Teacher Absence in India: A Snapshot", *Journal of the European Economic Association*, 3(2–3): 658–667.
- Parikh, P., Fu, K., Parikh, H., McRobie, A. and George, G. 2015. "Infrastructure Provision, Gender and Poverty in Indian Slums", *World Development*, 66: 468-486

Psacharopoulos, G. and Patrinos, H.A. 2004. "Returns to Investment in Education: A Further Update", *Education Economics* 12(2): 111-134.

PROBE 1999. Public report on basic education in India. New Delhi: Oxford University Press.

NCERT 2005. Seventh all-India school education survey (AIES): Provisional statistics as of September 30, 2002. New Delhi: NCERT.

NCERT 2006 Syllabus at Elementary Level, [Online]

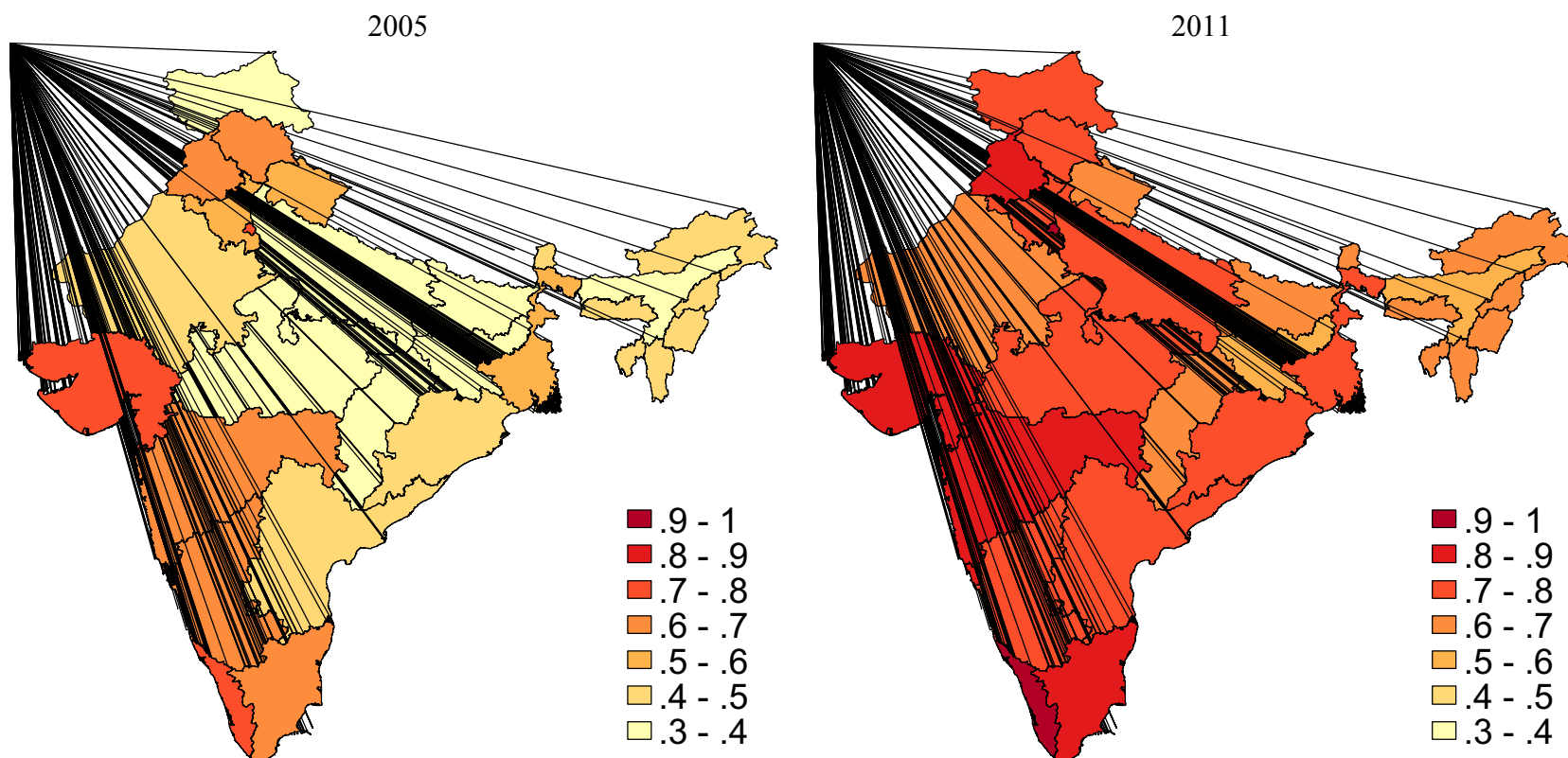
<http://www.ncert.nic.in/rightside/links/syllabus.html>

Raman, C. and Gupta, V. 2015. "Preparation for the World of Work: Secondary and Higher Secondary Education in India", Working Paper No. 2015-02-03. Indian Institute of Management, Ahmedabad, India.

Singh, R. and Sarkar, S. 2015. "Does teaching quality matter? Students learning outcome related to teaching quality in public and private primary schools in India", *International Journal of Educational Development* (41): 153–163.

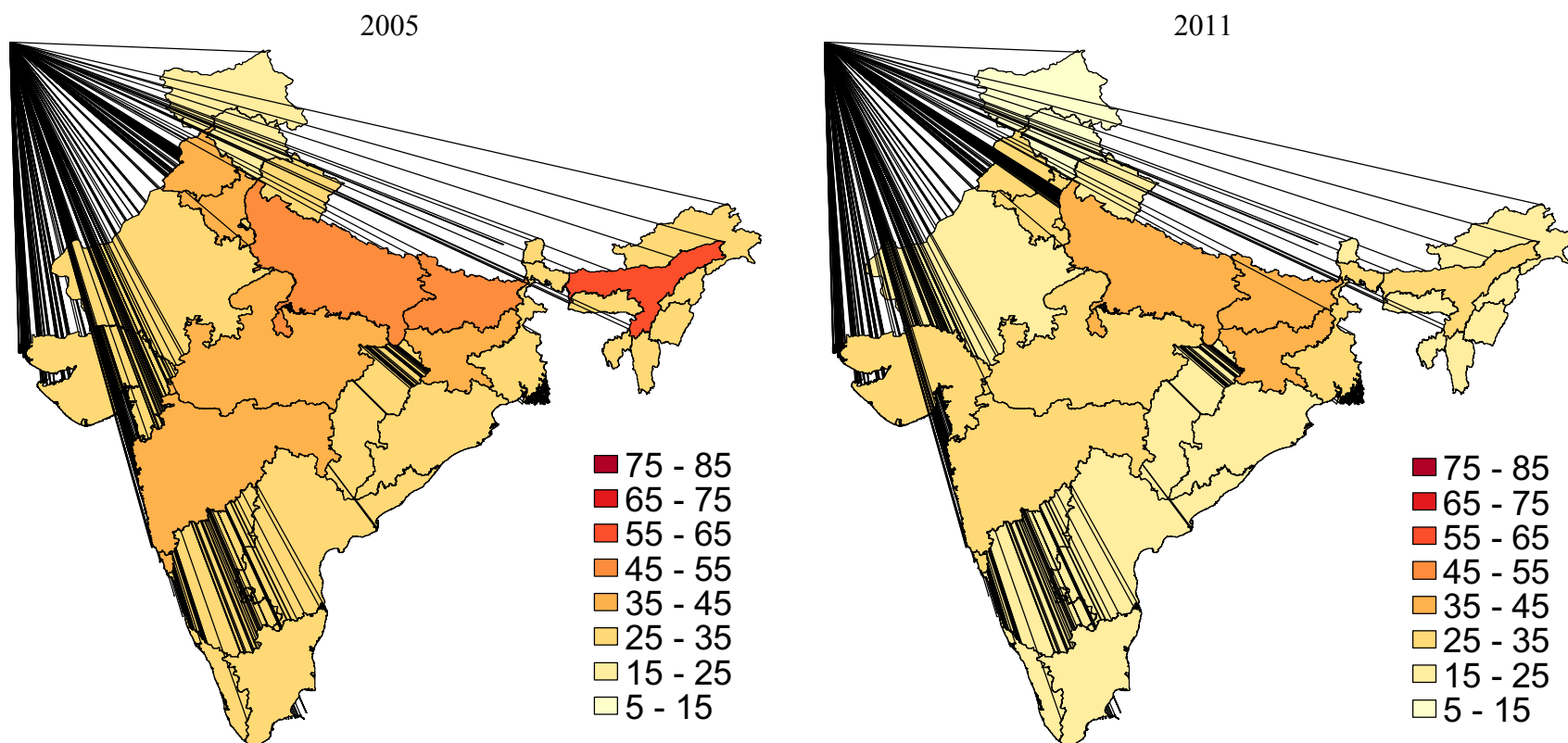
Trivedi, K. 2006. "Educational Human Capital and Levels of Income: Evidence from States in India, 1965-92", *The Journal of Development Studies*, 42(8): 1350-1378.

White, G., Ruther, M. and Kahn, J. 2016. "Educational Inequality in India: An Analysis of Gender Differences in Reading and Mathematics", *IHDS Working Paper 2016-2*.



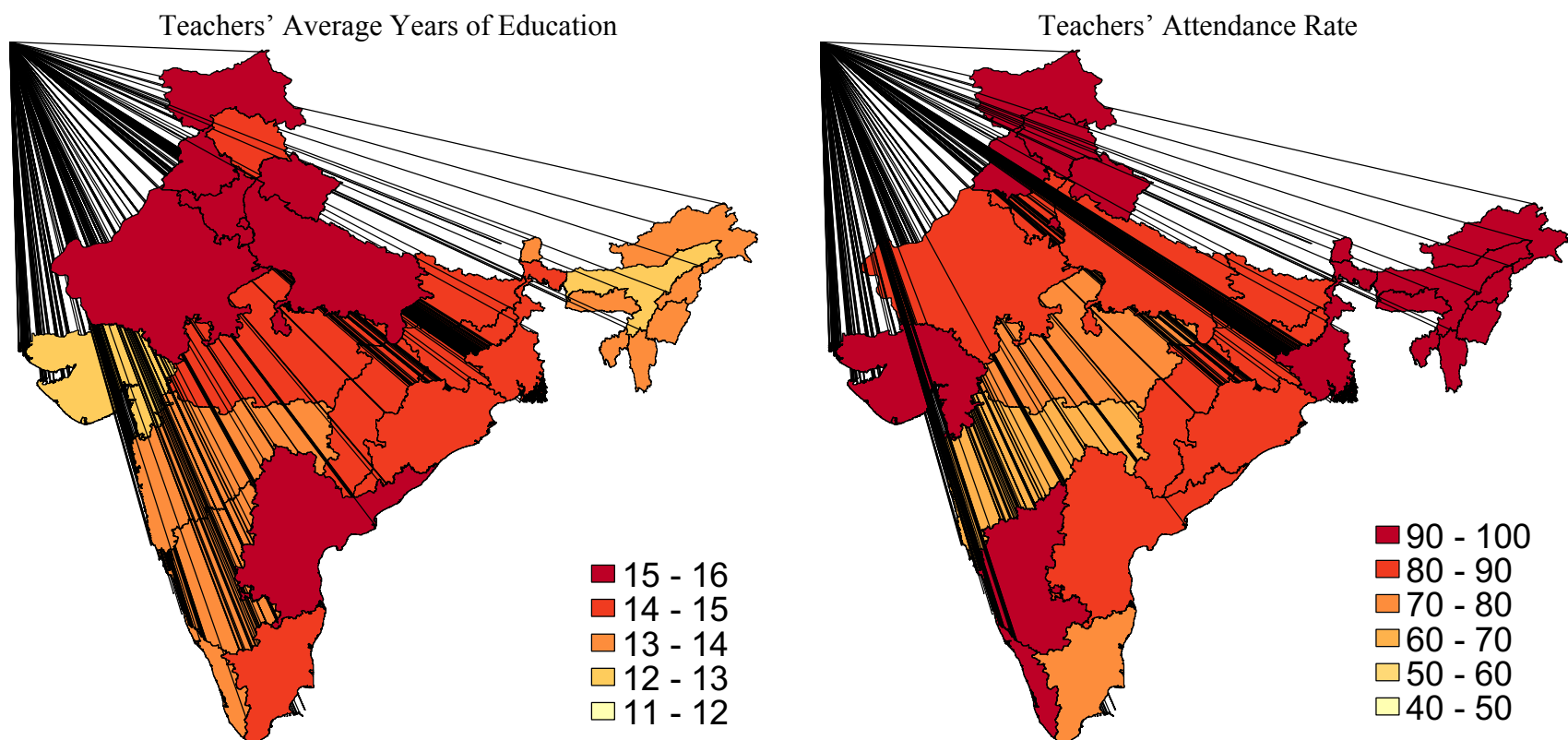
Notes: A principal component factor analysis was used to calculate the infrastructure index, using 2005 as the reference year for the weight given to the different infrastructures (all classes meet inside, chairs for students, blackboard, library, computer, fan, playground, connected to electricity, separated toilets for boys and girls). The index has been normalized to range between 0 (no infrastructure) and 1 (most infrastructures).

Figure 1: Infrastructure Index by State



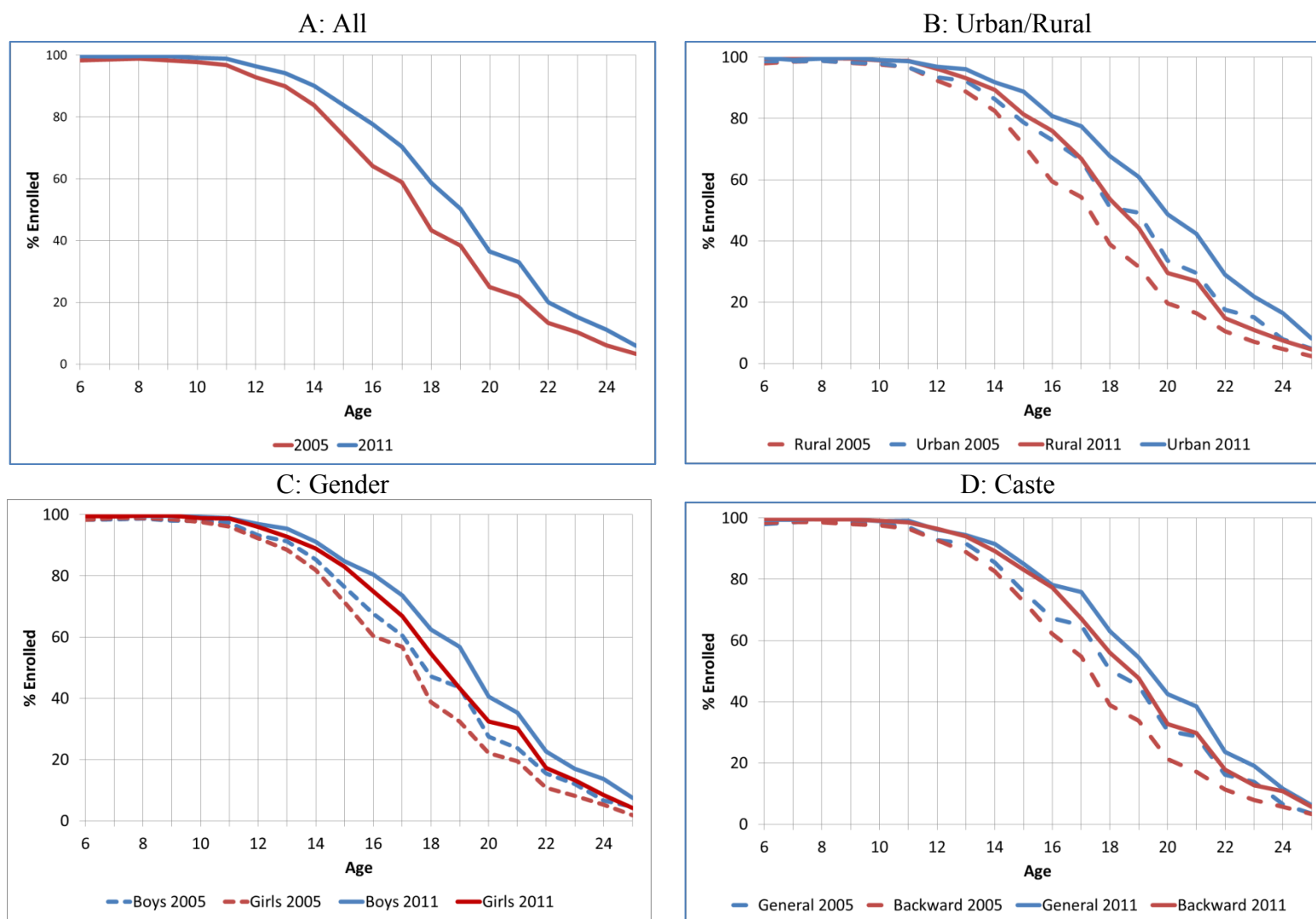
Sources: IHDS 1 and 2 (authors' calculation).

Figure 2: Students-teacher Ratio by State



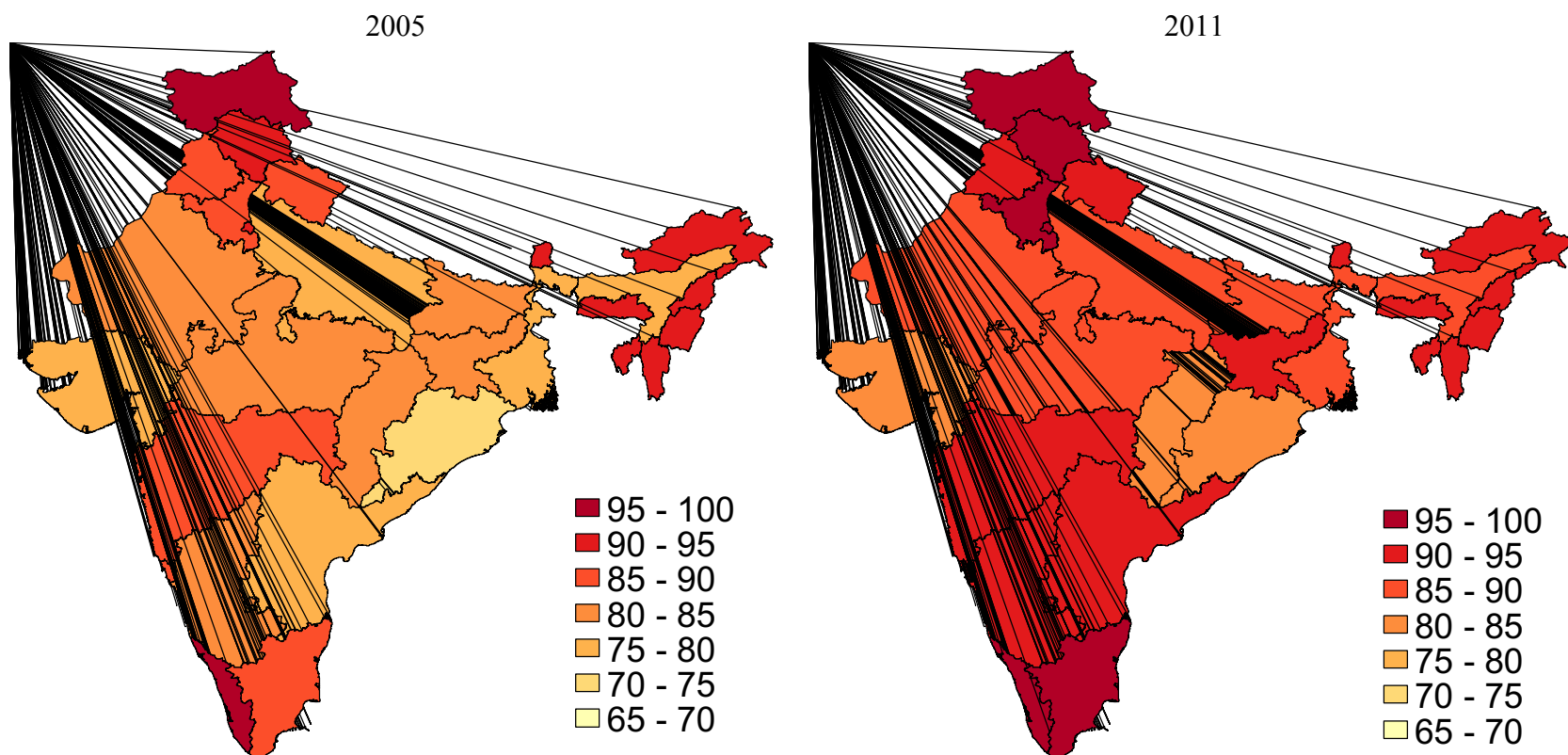
Sources: IHDS 1 and 2 (authors' calculation).

Figure 3: Teachers' Average Years of Education and Teachers' Attendance Rate by States in 2011



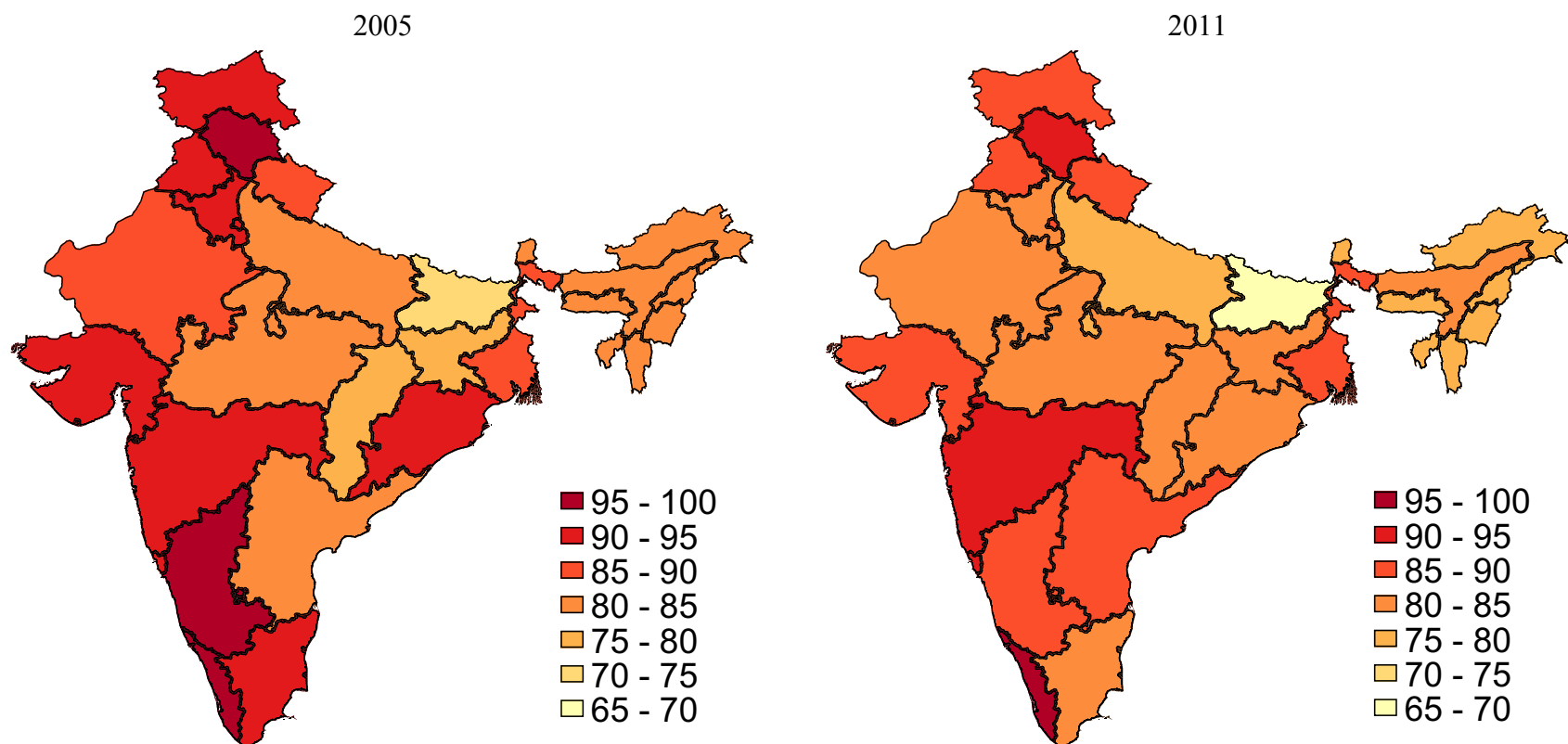
Sources: IHDS 1 and 2 (authors' calculation).

Figure 4: Enrolment Rate by Age and Socio-economic Group



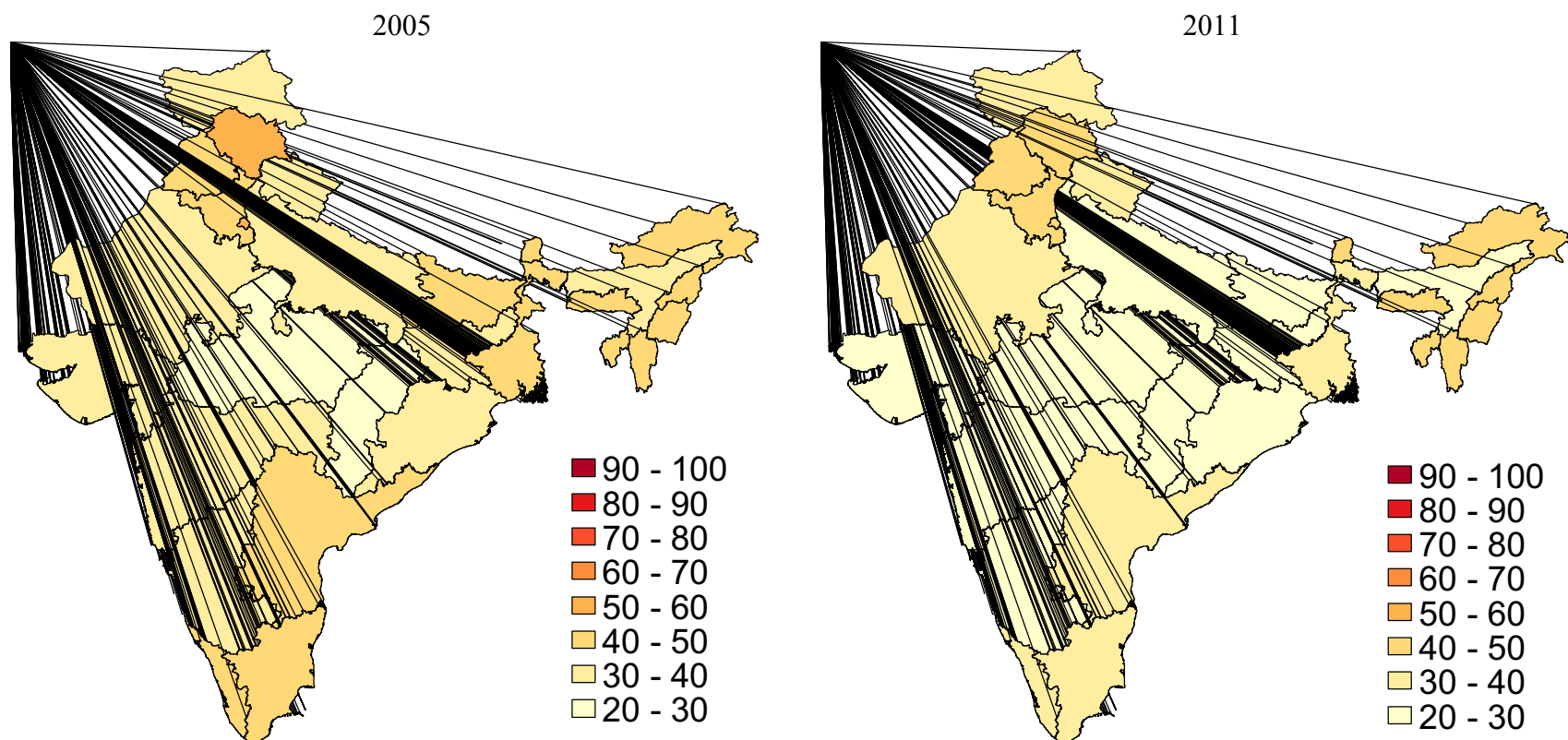
Sources: IHDS 1 and 2 (authors' calculation).

Figure 5: Enrolment Rate at Age 14 by State



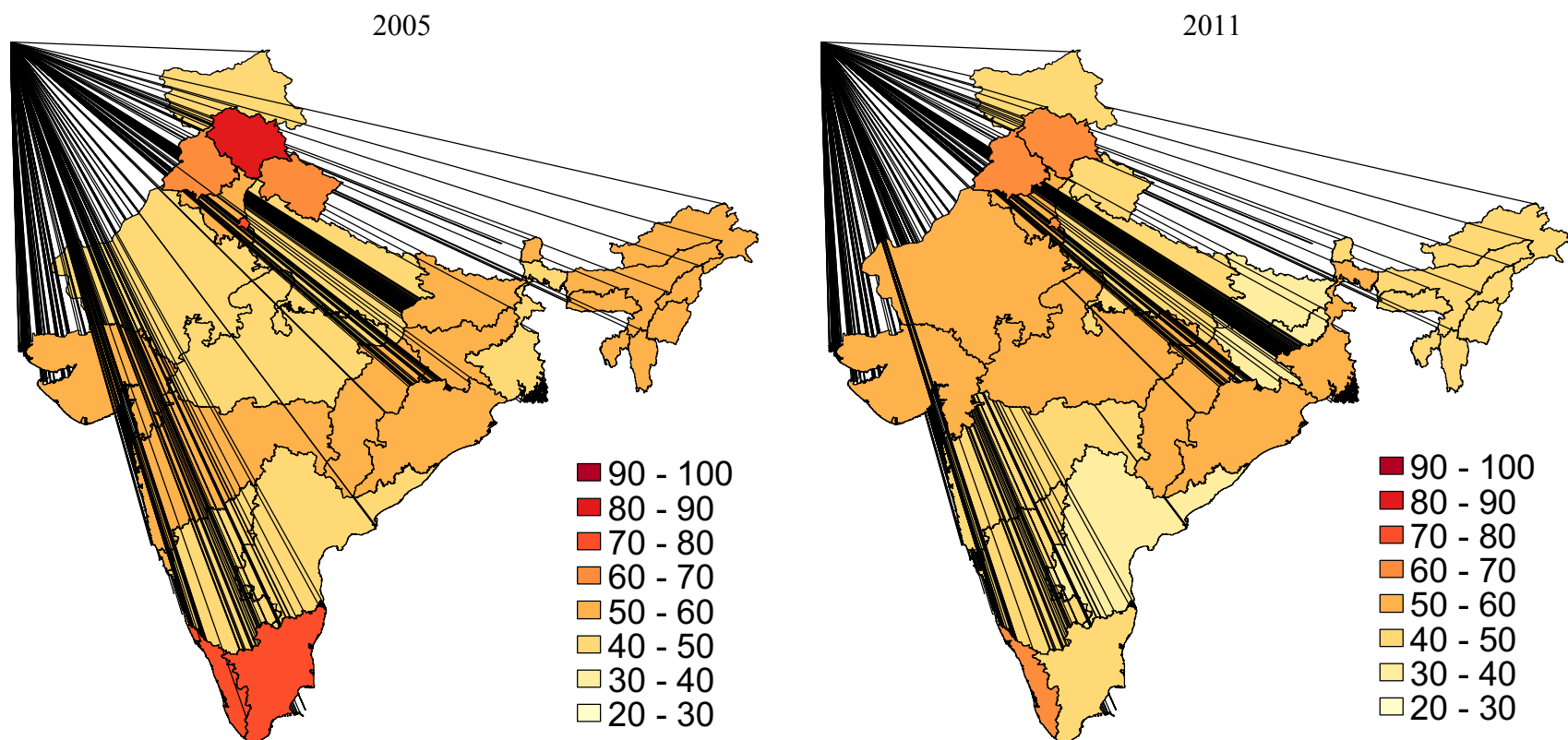
Sources: IHDS 1 and 2 (authors' calculation).

Figure 6: Students' Attendance Rate on an Average Day



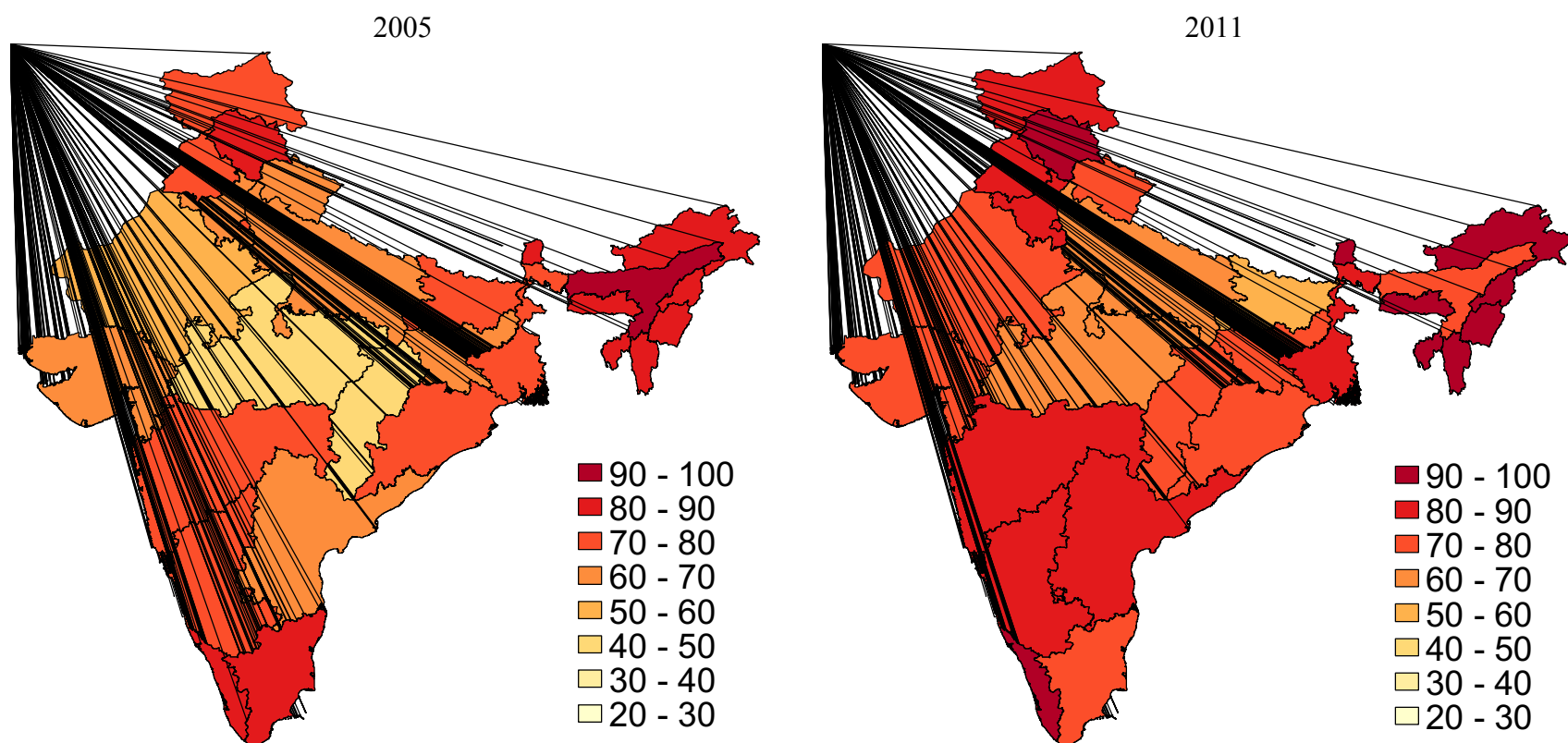
Sources: IHDS 1 and 2 (authors' calculation).

Figure 7: Percentage of Children with the Expected or Above Expected Level of Mathematical Skills by Year



Sources: IHDS 1 and 2 (authors' calculation).

Figure 8: Percentage of Children with the Expected or Above Expected Level of Reading Skills by Year



Sources: IHDS 1 and 2 (authors' calculation).

Figure 9: Percentage of Children with the Expected or Above Expected Level of Writing Skills by Year

Table 1: Average Infrastructure Provision by Years

| | 2005 | 2011 |
|-------------|------|---------|
| Inside | 0.74 | 0.84*** |
| Chair | 0.45 | 0.50*** |
| Blackboard | 0.97 | 0.99*** |
| Library | 0.47 | 0.66*** |
| Computer | 0.17 | 0.38*** |
| Fan | 0.45 | 0.60*** |
| Playground | 0.69 | 0.69 |
| Electricity | 0.6 | 1.00*** |
| Toilet | 0.69 | 0.90*** |

Notes: T-tests of statistical difference between years were performed for each infrastructure type ***, p -value<0.01, ** p -value<0.05 and * p -value<0.10.

Table 2: Distance between School and Village by Years

| | Anganwadi | | Primary School | | Middle School | | Secondary School | | High School | |
|---------|-----------|---------|----------------|--------|---------------|---------|------------------|---------|-------------|---------|
| | 2005 | 2011 | 2005 | 2011 | 2005 | 2011 | 2005 | 2011 | 2005 | 2011 |
| ≤ 1 km | 0.96 | 0.99*** | 0.99 | 0.99* | 0.73 | 0.82*** | 0.43 | 0.49*** | 0.21 | 0.26*** |
| 2 -5 km | 0.04 | 0.01*** | 0.01 | 0.00** | 0.23 | 0.15*** | 0.34 | 0.32 | 0.31 | 0.31 |
| ≥ 6 km | 0.00 | 0.00* | 0.00 | 0.00 | 0.04 | 0.04 | 0.23 | 0.20* | 0.48 | 0.43** |

Notes: T-tests of statistical difference between years were performed for each school type/distance. ***, p -value<0.01, ** p -value<0.05 and * p -value<0.10.

Table 3: Teacher's Professionalism as Assessed by Parents

| | 2005 | 2011 |
|--|------|---------|
| <i>Child's Teacher:</i> | | |
| Regularly Attends | 0.97 | 0.96*** |
| Is Rarely/Never Absent | | 0.64 |
| Is Sometimes Absent | | 0.32 |
| Is Often Absent | | 0.04 |
| Is Local | 0.57 | 0.47*** |
| Is Fair | 0.97 | 0.96*** |
| Never Favours Certain Communities/Jatis | | 0.91 |
| Sometime Favours Certain Communities/Jatis | | 0.07 |
| Often Favours Certain Communities Jatis | | 0.02 |
| Is Good | 0.97 | 0.96*** |
| Is Excellent | | 0.29 |
| Is Good | | 0.67 |
| Is Fair | | 0.04 |
| Is Poor | | 0.00 |
| Is Bias | 0.10 | 0.09 |
| <i>Child:</i> | | |
| Enjoys School | 0.93 | 0.87*** |
| Always Enjoys School | | 0.55 |
| Usually Enjoys School | | 0.31 |
| Sometime Enjoys School | | 0.07 |
| Rarely Enjoys School | | 0.06 |
| Ever Praised | 0.33 | 0.45*** |
| Ever Beaten | 0.23 | 0.27*** |

Notes: Respondents were given a broader range of choices while answering the questions in 2011. The sample includes parents' opinion regarding the teacher of each of their child aged 8 to 11 years old and who is currently enrolled or was enrolled in the past. There is no statistical significance or, if there is, no economic significance between answers regarding teacher of currently or previously enrolled children (results available in the Online Appendix). T-tests of statistical difference between years were performed for each variable. ***, p -value<0.01, ** p -value<0.05 and * p -value<0.10.

Table 4: Average Number of Incentive Programs by State and Year

| | 2005 | 2011 | | 2005 | 2011 | | 2005 | 2011 |
|-------------------------------|------|---------|---------------------|------|---------|----------------------------|------|---------|
| Dadra & Nagar Haveli, | 1.13 | 2.08*** | Delhi | 1.67 | 2.04 | Madhya Pradesh | 1.20 | 1.55*** |
| Daman & Diu and Gujarat | | | Goa and Maharashtra | 1.49 | 1.93*** | Orissa | 0.73 | 1.53*** |
| Andhra Pradesh | 1.00 | 1.45*** | Haryana | 0.96 | 1.37** | Punjab & Chandigarh | 0.40 | 1.35*** |
| Arunachal Pradesh, Manipur, | | | Himachal Pradesh | 0.63 | 1.03*** | Rajasthan | 0.75 | 0.98*** |
| Meghalaya, | 0.46 | 1.49*** | | | | | | |
| Mizoram, Nagaland, Sikkim and | | | Jammu & Kashmir | 0.72 | 1.16** | Tamil Nadu and Pondicherry | 1.55 | 1.53 |
| Tripura | | | Jharkhand | 0.25 | 1.26*** | Uttar Pradesh | 0.69 | 1.80*** |
| Assam | 0.77 | 1.88*** | Karnataka | 1.51 | 1.77** | Uttarakhand | 1.00 | 1.21 |
| Bihar | 0.23 | 1.26*** | Kerala | 0.60 | 2.04*** | West Bengal | 0.73 | 1.09*** |
| Chhattisgarh | 0.83 | 1.58*** | | | | | | |

Notes: T-tests of statistical difference between years were performed for each state. ***, p -value<0.01, ** p -value<0.05 and * p -value<0.10.

Table 5: Percentage of Schools offering Different Incentive Programs for All Students, Scheduled Caste Students and Girl Students by Years

| | All Students | | Scheduled Castes | | Girls | |
|--------------------|--------------|---------|------------------|---------|-------|---------|
| | 2005 | 2011 | 2005 | 2011 | 2005 | 2011 |
| <i>Food</i> | | | | | | |
| None | 0.45 | 0.42** | | | | |
| Grain Only | 0.13 | 0.04*** | | | | |
| Variety | 0.42 | 0.53*** | | | | |
| <i>Cooked Meal</i> | | | | | | |
| Never | 0.53 | 0.01*** | | | | |
| 2-3 Days a Week | 0.01 | 0.02*** | | | | |
| 4-6 Days a Week | 0.07 | 0.21*** | | | | |
| Always | 0.39 | 0.76*** | | | | |
| <i>Free Book</i> | | | | | | |
| None | 0.45 | 0.40*** | 0.41 | 0.38** | 0.41 | 0.39** |
| Some Grades | 0.19 | 0.07*** | 0.17 | 0.06*** | 0.16 | 0.06*** |
| All Grades | 0.35 | 0.54*** | 0.42 | 0.55*** | 0.43 | 0.55*** |
| <i>Uniforms</i> | | | | | | |
| None | 0.77 | 0.59*** | 0.74 | 0.52*** | 0.71 | 0.50*** |
| Some Grades | 0.12 | 0.10** | 0.11 | 0.09*** | 0.13 | 0.09*** |
| All Grades | 0.11 | 0.31*** | 0.15 | 0.40*** | 0.16 | 0.41*** |
| <i>Scholarship</i> | | | | | | |
| None | 0.71 | 0.66*** | 0.62 | 0.51*** | 0.62 | 0.55*** |
| Some Grades | 0.24 | 0.16*** | 0.20 | 0.19 | 0.28 | 0.20*** |
| All Grades | 0.05 | 0.17*** | 0.18 | 0.30*** | 0.10 | 0.25*** |

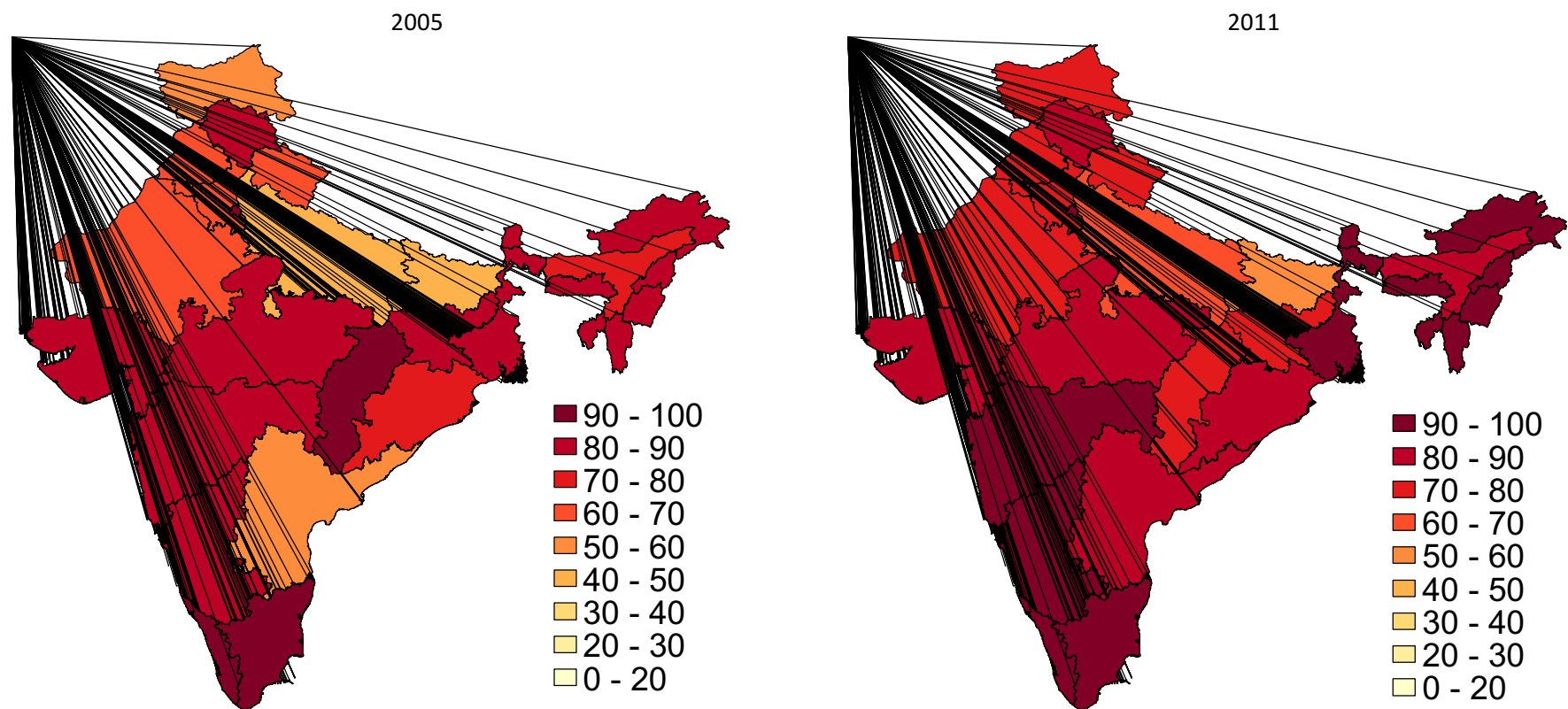
Notes: T-tests of statistical difference between years were performed for each incentive. ***, p -value<0.01, ** p -value<0.05 and * p -value<0.10.

Table 6: Percentage of Children with Different Reading, Mathematical and Writing Skills by Year and Age Group

| | 8 Years Old | | 9 Years Old | | 10 Years Old | | 11 Years Old | |
|-----------------------------|-------------|----------------|-------------|----------------|--------------|----------------|--------------|----------------|
| | 2005 | 2011 | 2005 | 2011 | 2005 | 2011 | 2005 | 2011 |
| <i>Reading Skills:</i> | | | | | | | | |
| None | 0.14 | 0.17*** | 0.08 | 0.11*** | 0.08 | 0.10*** | 0.06 | 0.06 |
| Letters | 0.18 | 0.19 | 0.14 | 0.15 | 0.11 | 0.13** | 0.09 | 0.09 |
| Words | 0.26 | 0.25 | 0.21 | 0.22 | 0.19 | 0.19 | 0.14 | 0.15 |
| Paragraph | 0.20 | 0.16*** | 0.24 | 0.20*** | 0.23 | 0.20*** | 0.20 | 0.21 |
| Story | 0.21 | 0.24*** | 0.33 | 0.32 | 0.40 | 0.39 | 0.51 | 0.48** |
| <i>Mathematical Skills:</i> | | | | | | | | |
| None | 0.24 | 0.23 | 0.16 | 0.15 | 0.15 | 0.14 | 0.12 | 0.10 |
| Numbers | 0.40 | 0.43** | 0.33 | 0.39*** | 0.29 | 0.34*** | 0.24 | 0.28*** |
| Subtraction | 0.24 | 0.24 | 0.31 | 0.30 | 0.28 | 0.32*** | 0.27 | 0.34*** |
| Division | 0.11 | 0.09* | 0.19 | 0.16*** | 0.28 | 0.20*** | 0.38 | 0.28*** |
| <i>Writing Skills</i> | | | | | | | | |
| Less than 2 mistakes | 0.58 | 0.64*** | 0.69 | 0.75*** | 0.73 | 0.77*** | 0.77 | 0.84*** |

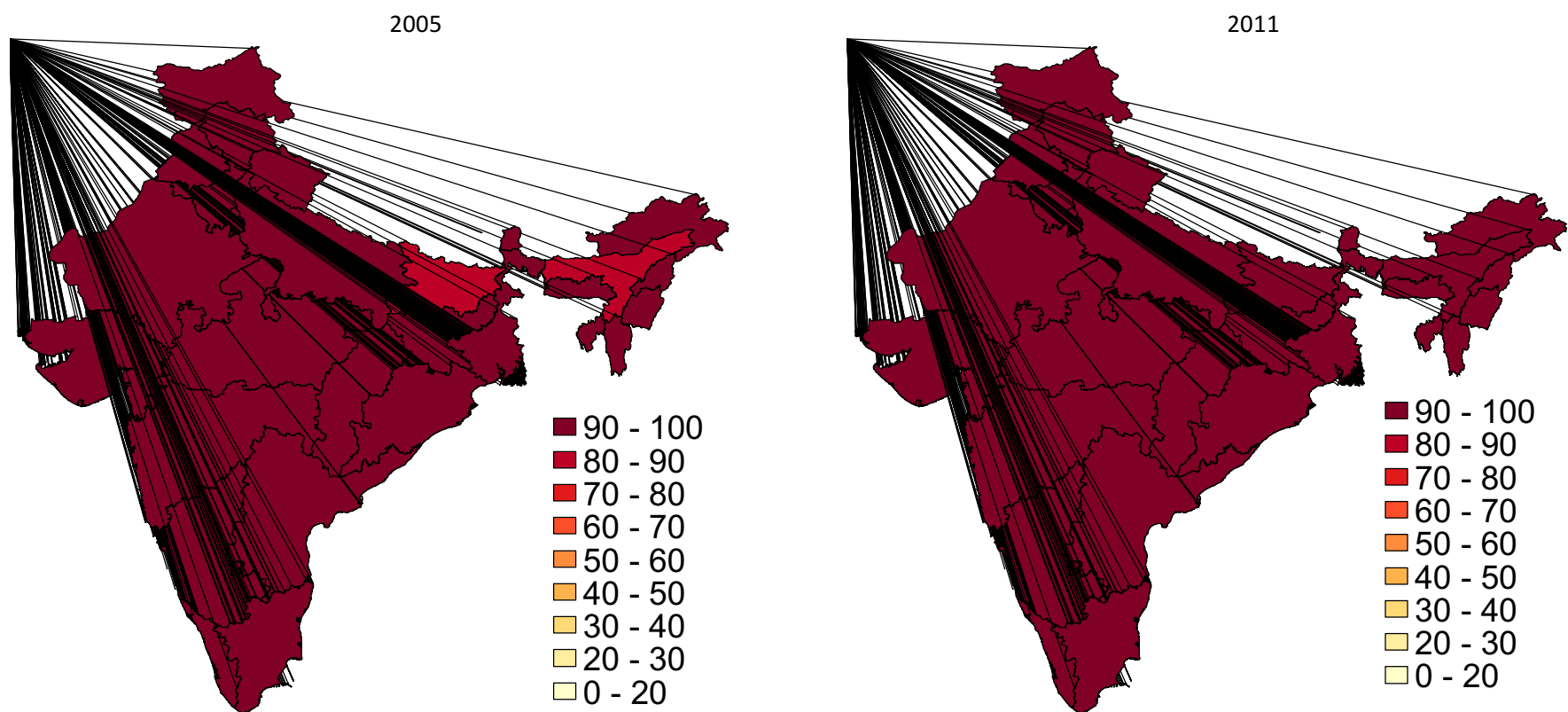
Notes: A value in bold (regular) indicates that the skill level is below (is or is higher than) the expected level for this age group. T-tests of statistical difference between years were performed for each skill. ***, p -value<0.01, ** p -value<0.05 and * p -value<0.10.

Supplemental Materials



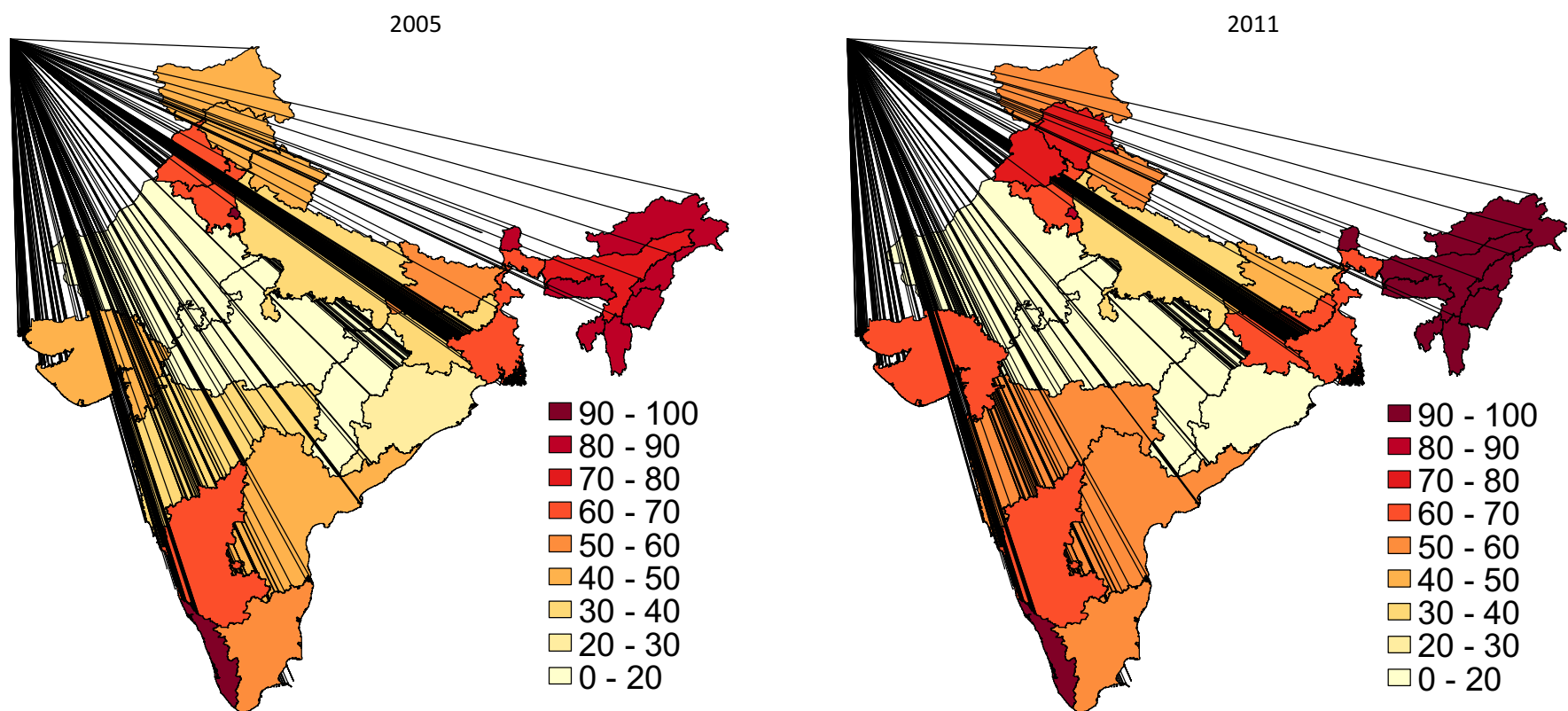
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.1: Percentage of Schools in Which All Classes Meet Inside



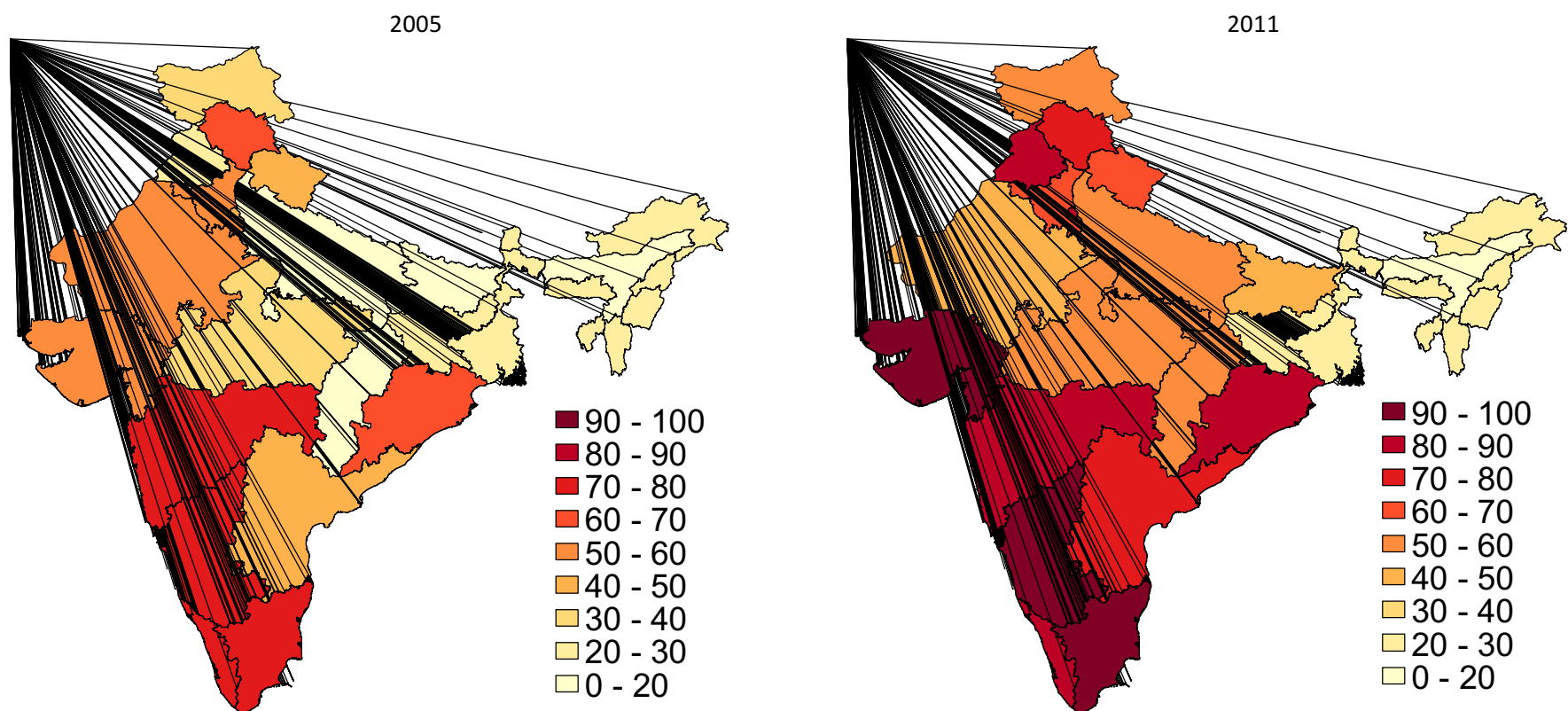
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.2: Percentage of Schools with a Blackboard



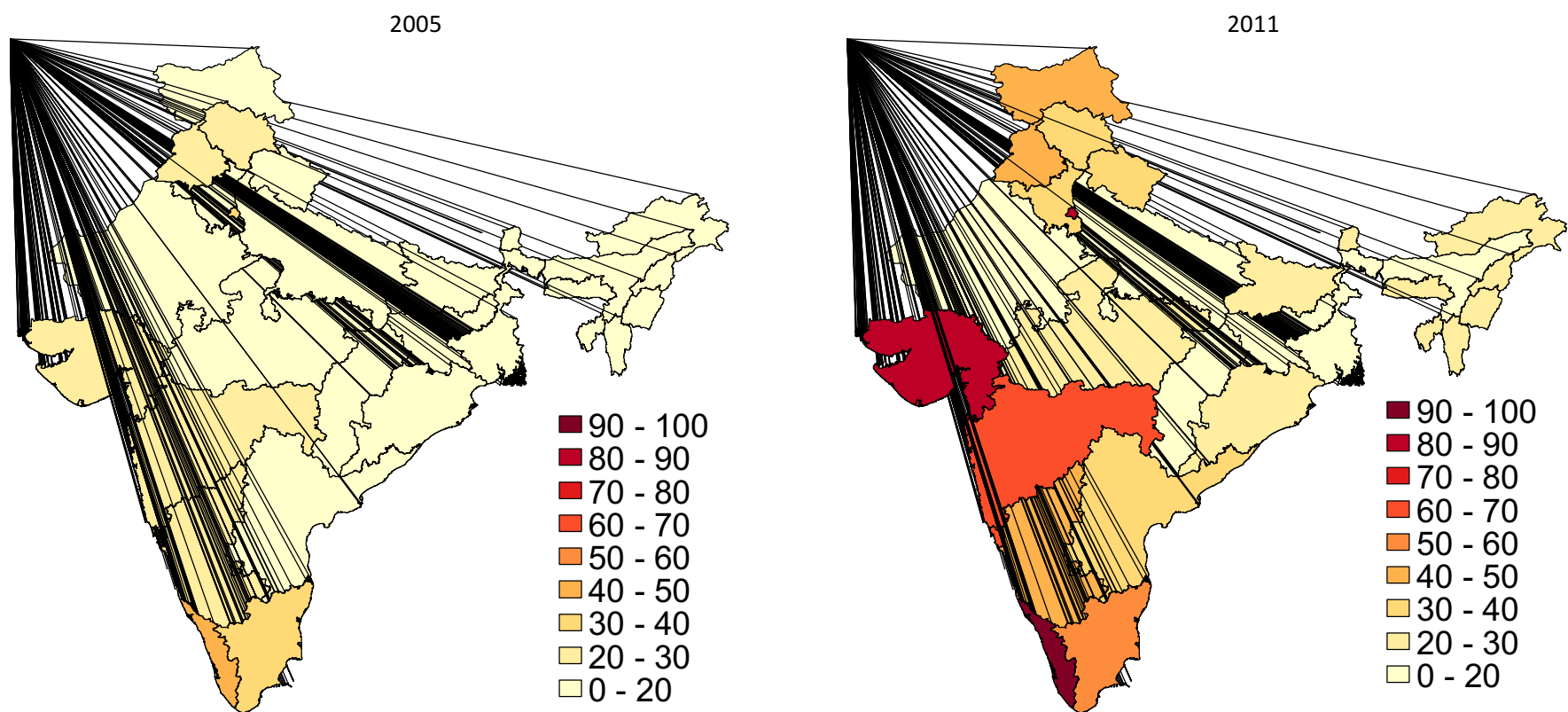
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.3: Percentage of Schools with Chairs for Students



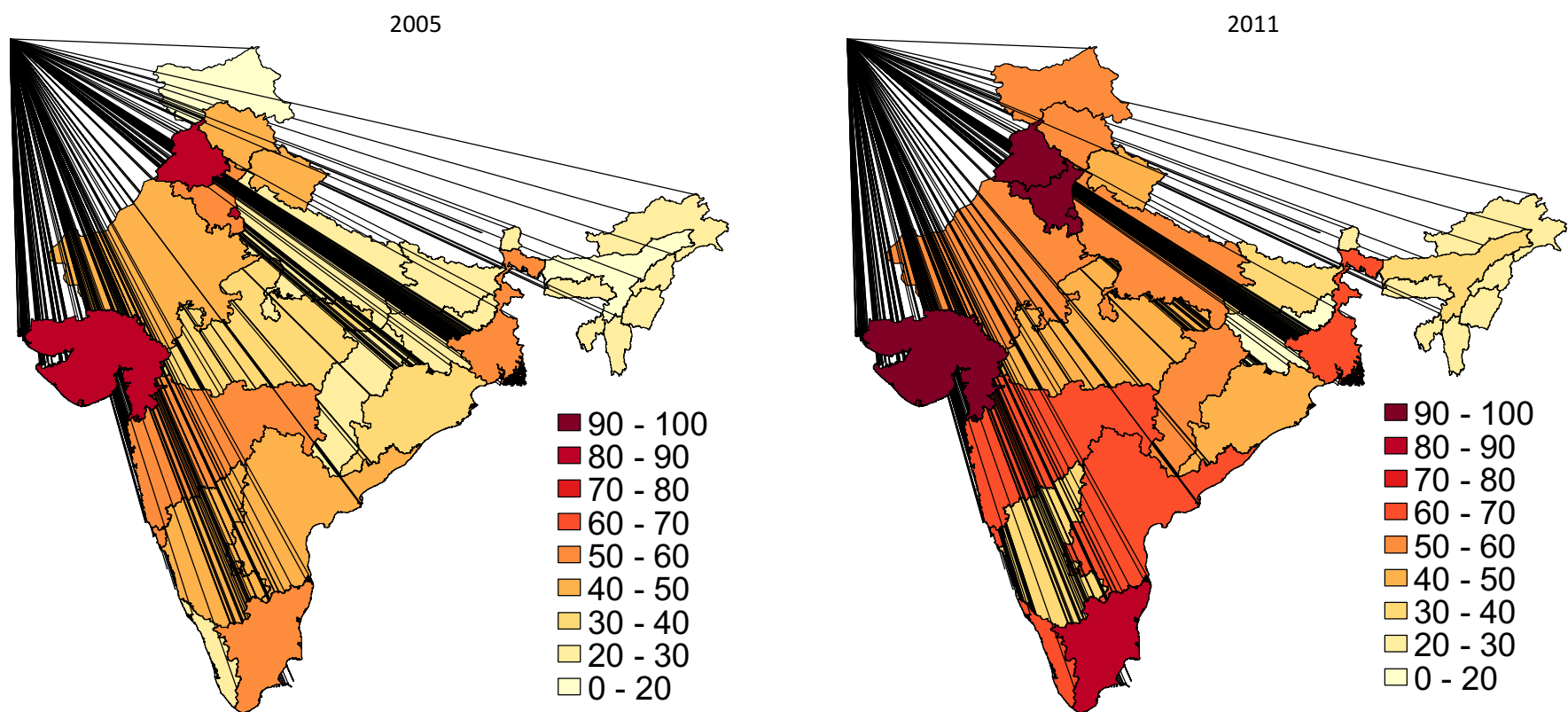
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.4: Percentage of Schools with a Library



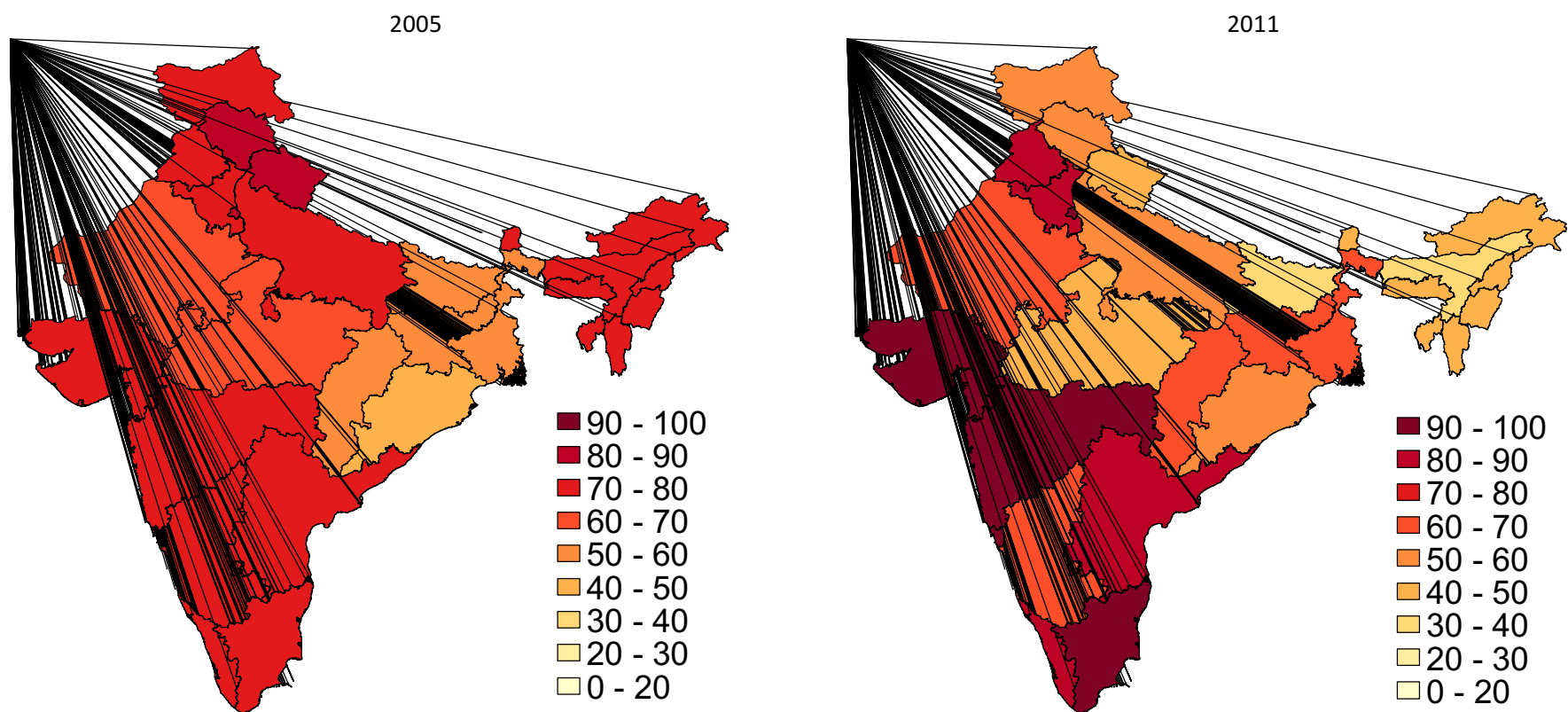
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.5: Percentage of Schools with a Computer



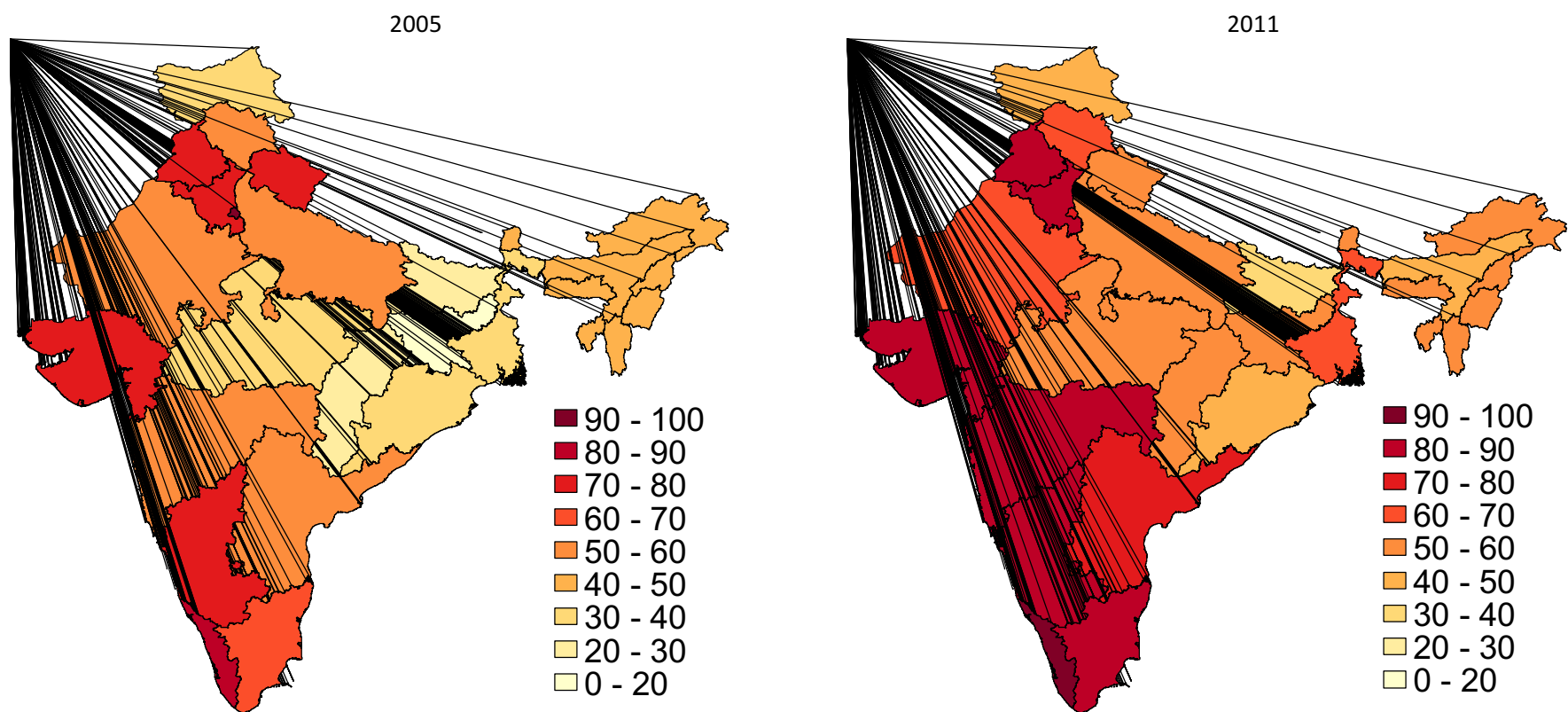
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.6: Percentage of Schools with a Fan



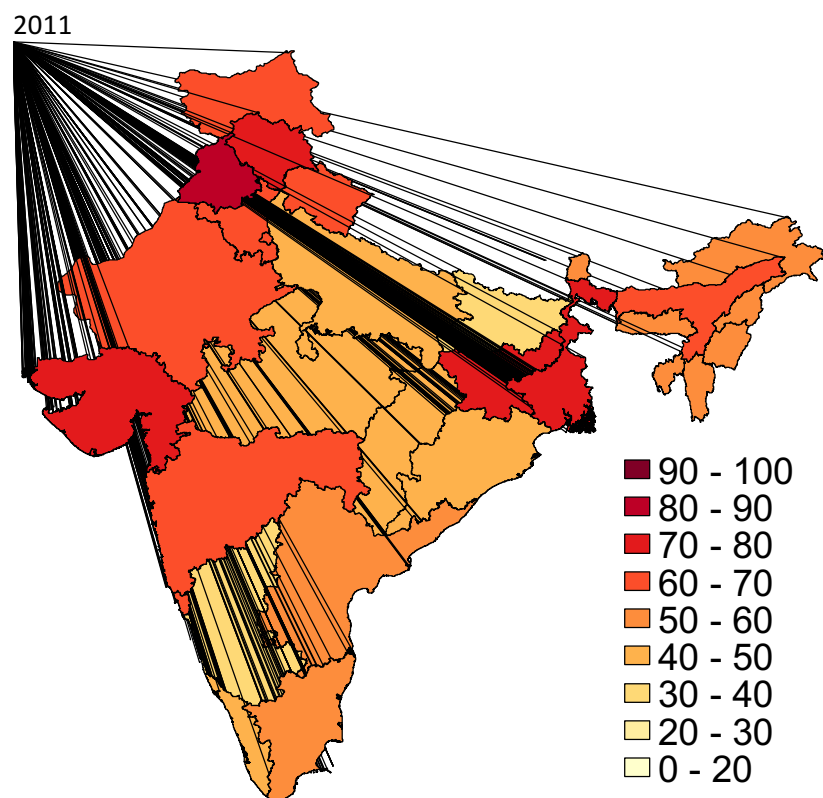
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.7: Percentage of Schools with a Playground



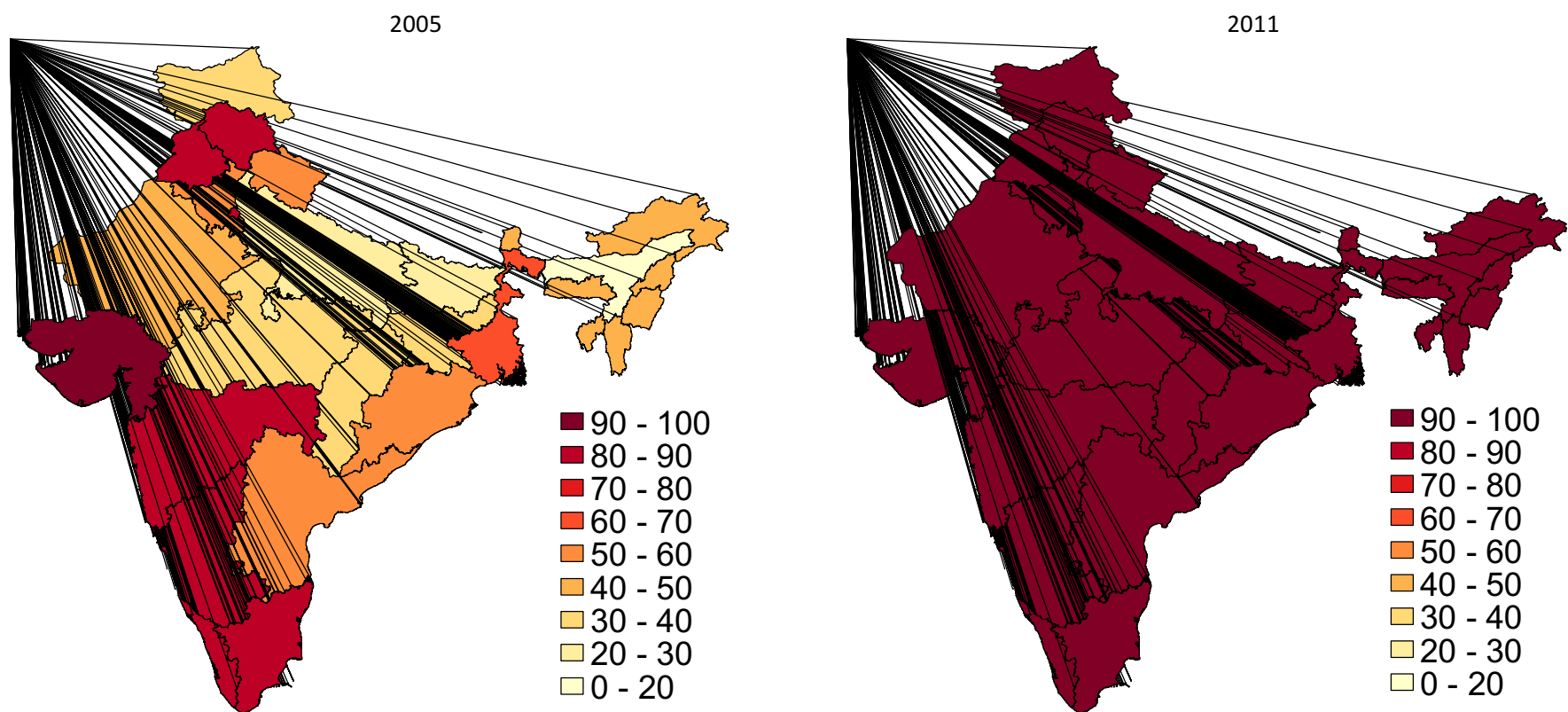
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.8: Percentage of Schools with Separated Toilets by Gender



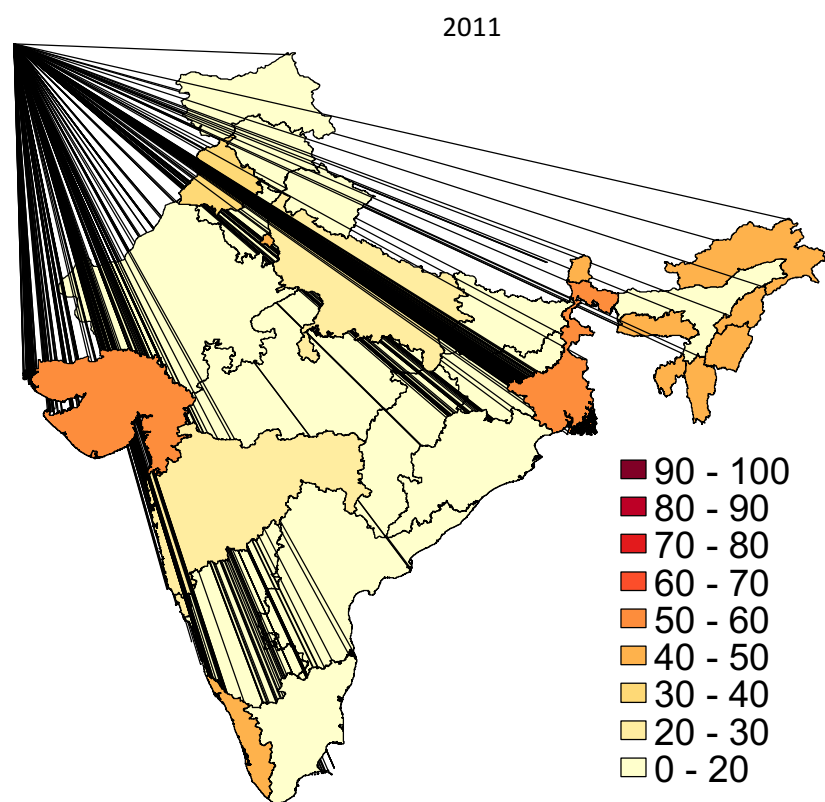
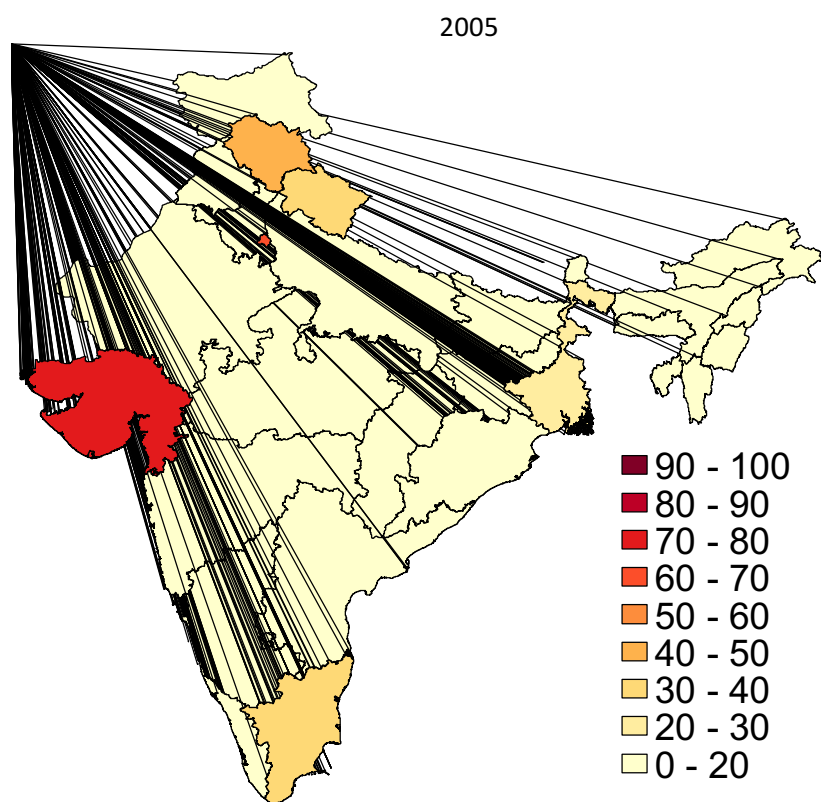
Sources: IHDS 2 (authors' calculation). The information was not collected in 2005.

Figure R.9: Percentage of Schools with Usable (Clean, Unlocked and with Water) Toilets



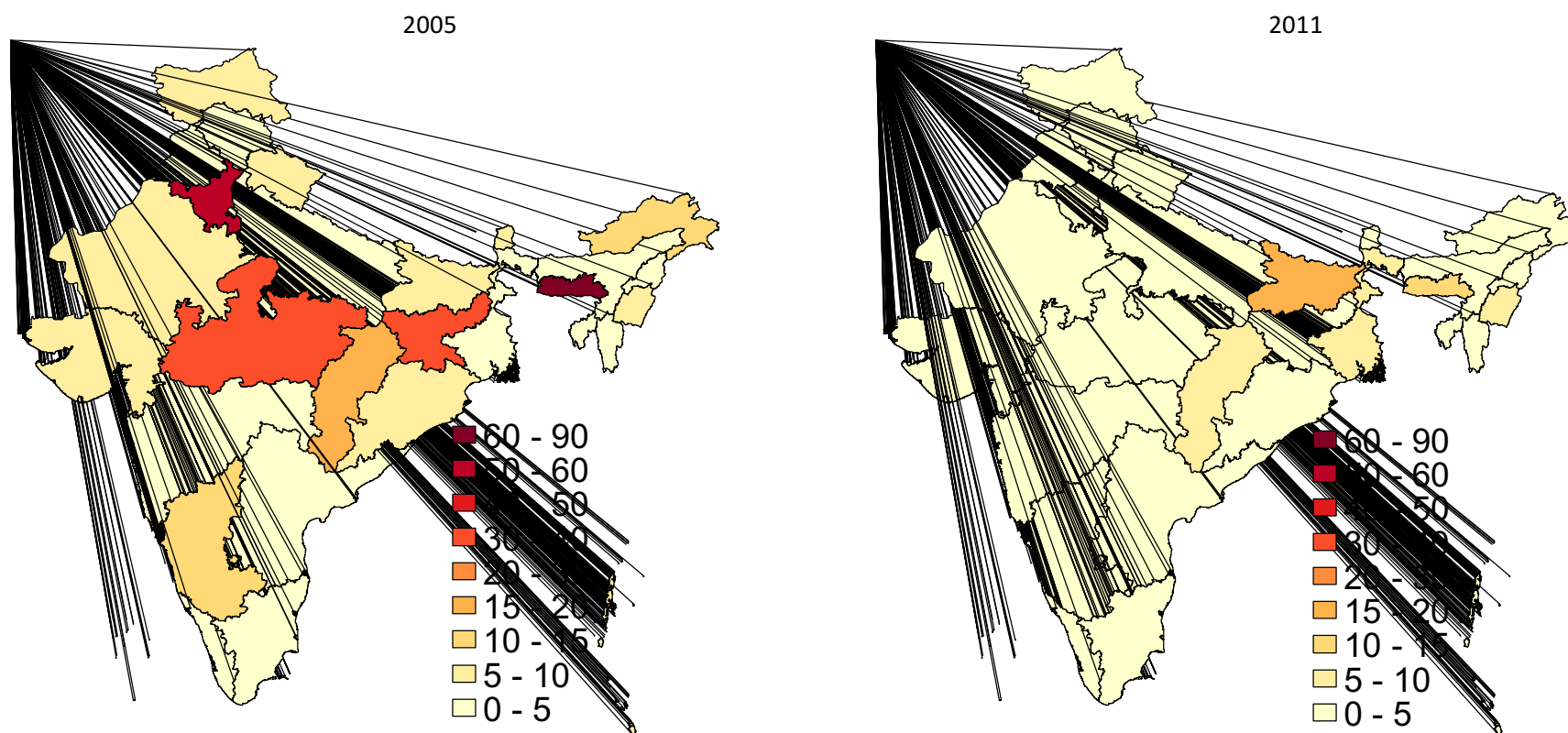
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.10: Percentage of Schools Connected to the Electric Grid



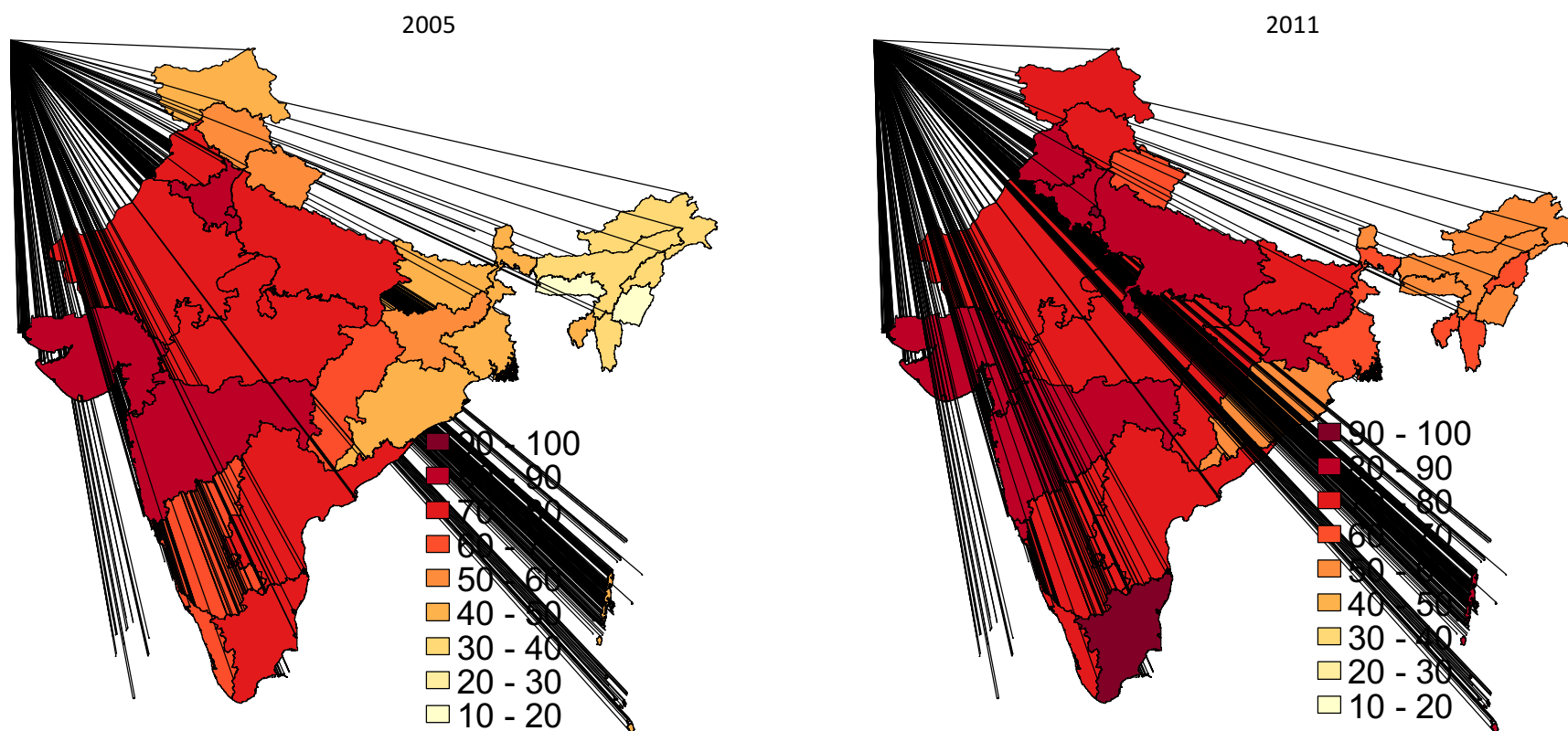
Sources: IHDS 1 and 2 (authors' calculation).

Figure R.11: Percentage of Schools with Electricity Every Day



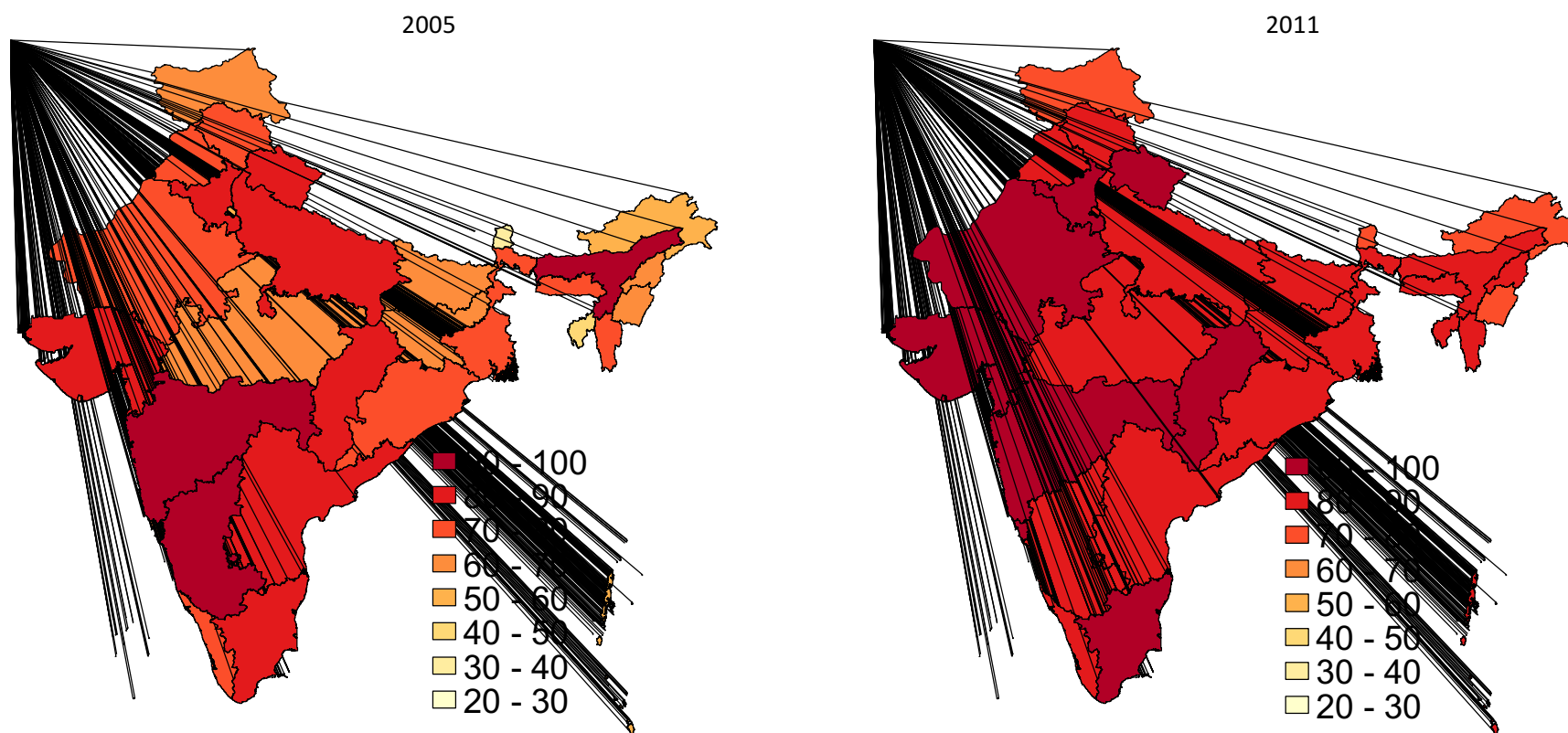
Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation).

Figure R.12: DISE: Percentage of School with No Classroom



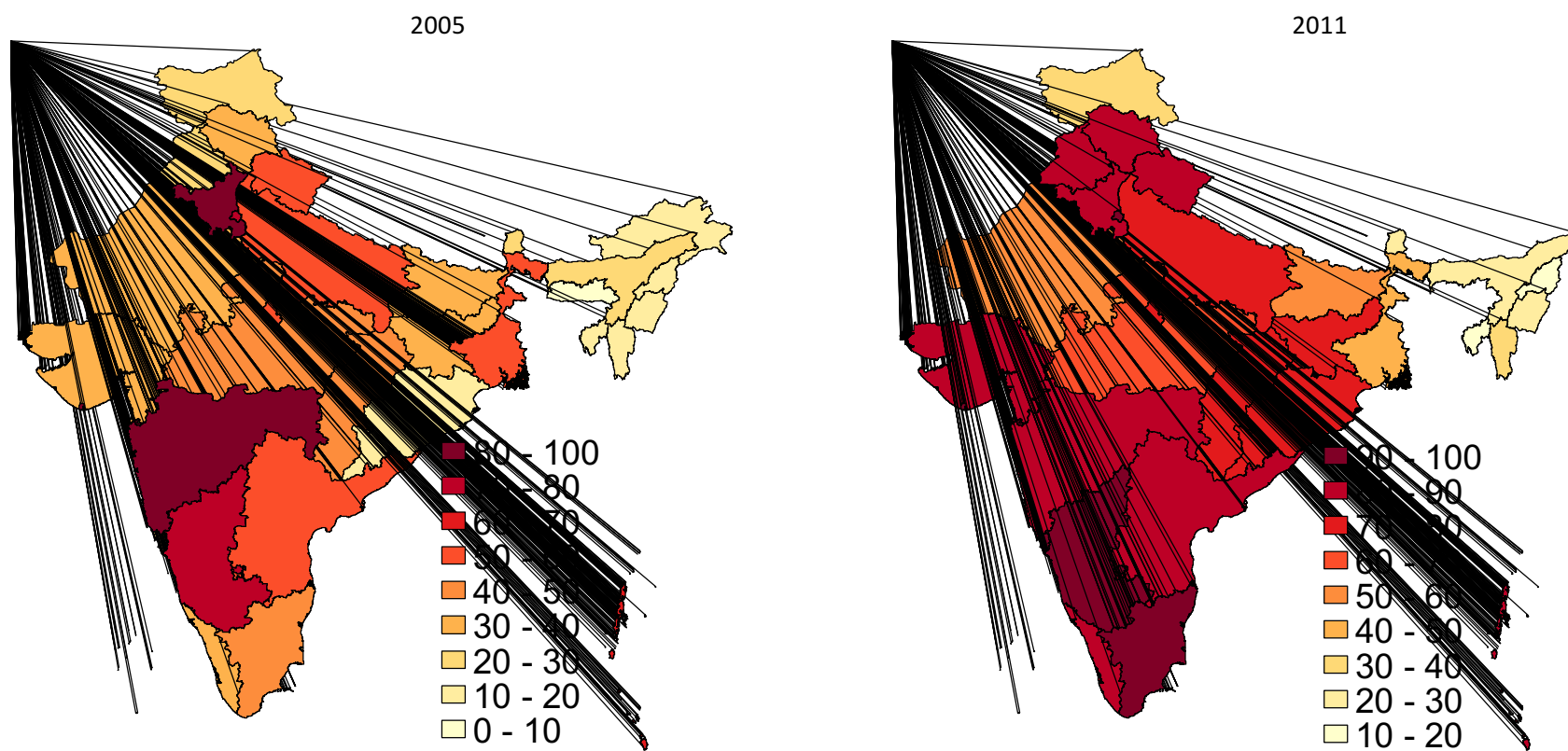
Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation).

Figure R.13: DISE: Percentage of Classrooms in Good Condition



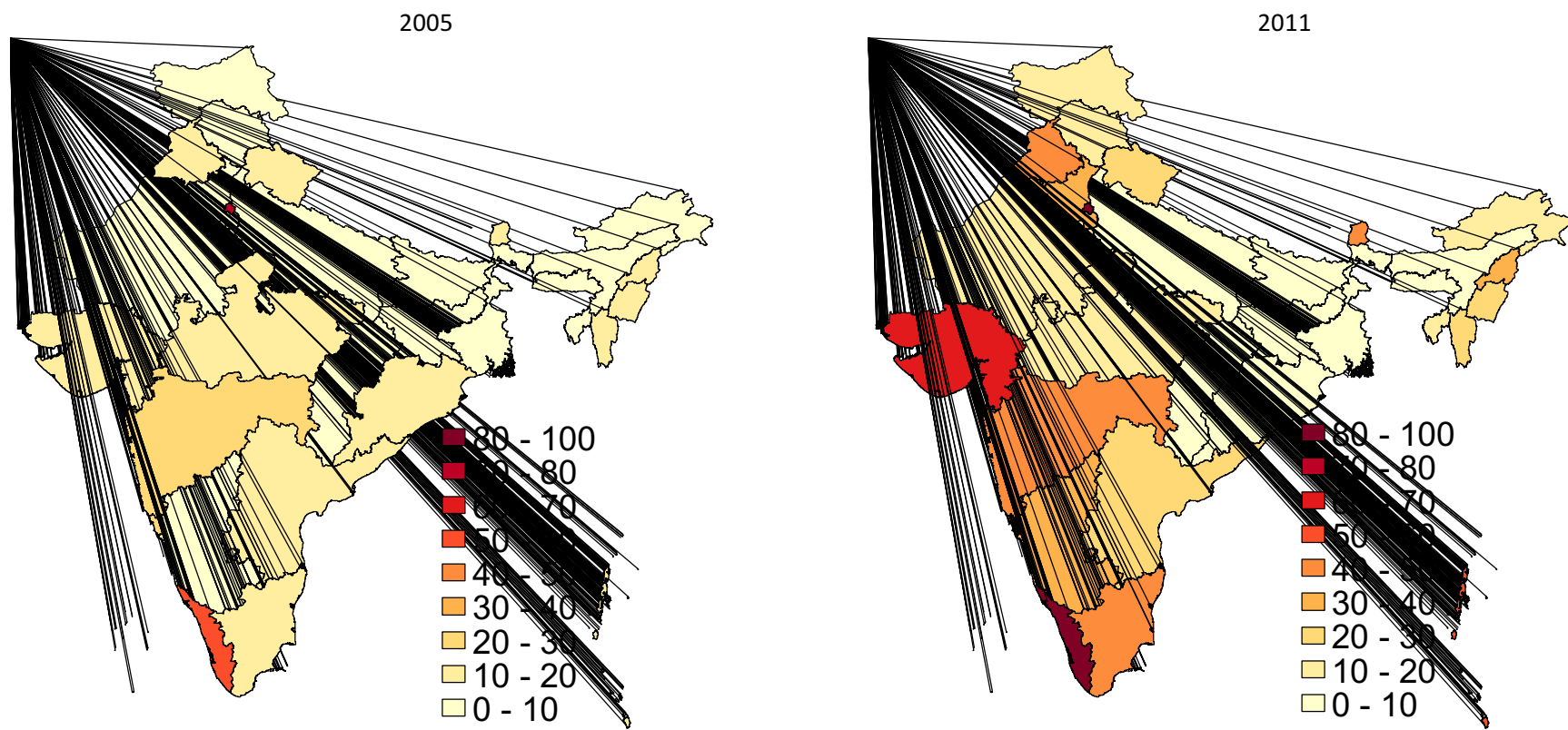
Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation).

Figure R.14: DISE: Percentage of Schools that Have a Blackboard in Every Classroom



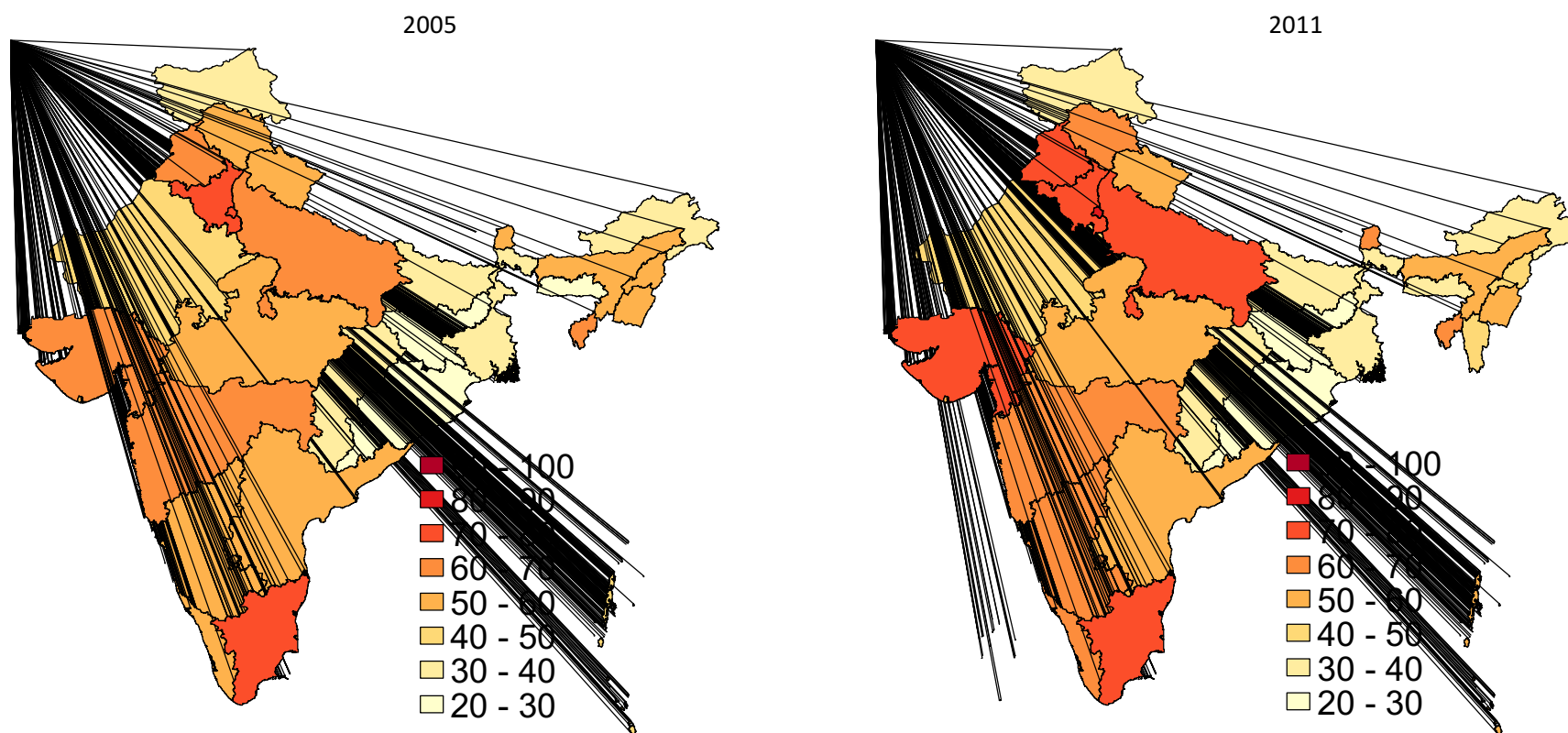
Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation)

Figure R.15: DISE: Percentage of Schools with a Library



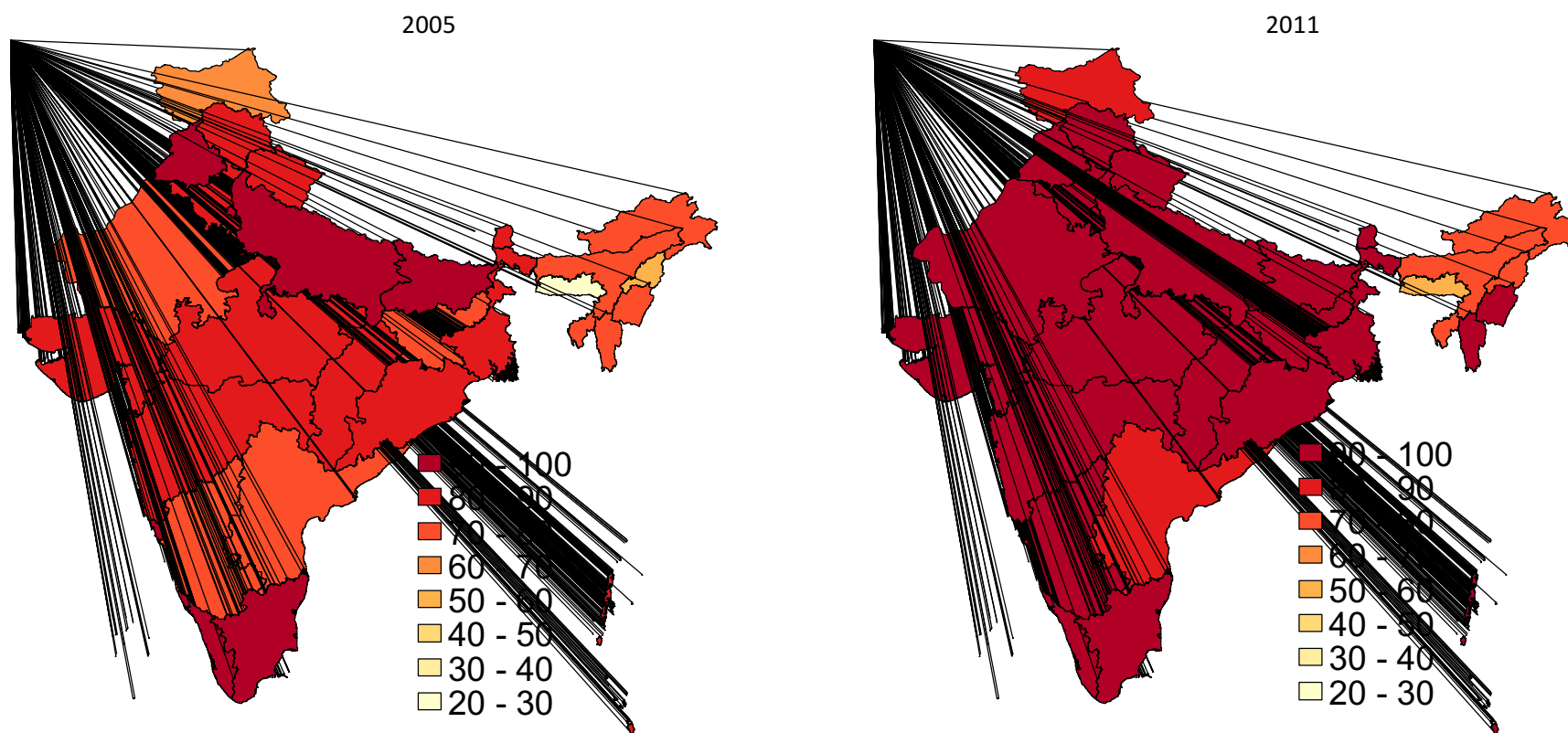
Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation).

Figure R.16: DISE: Percentage of Schools with a Computer



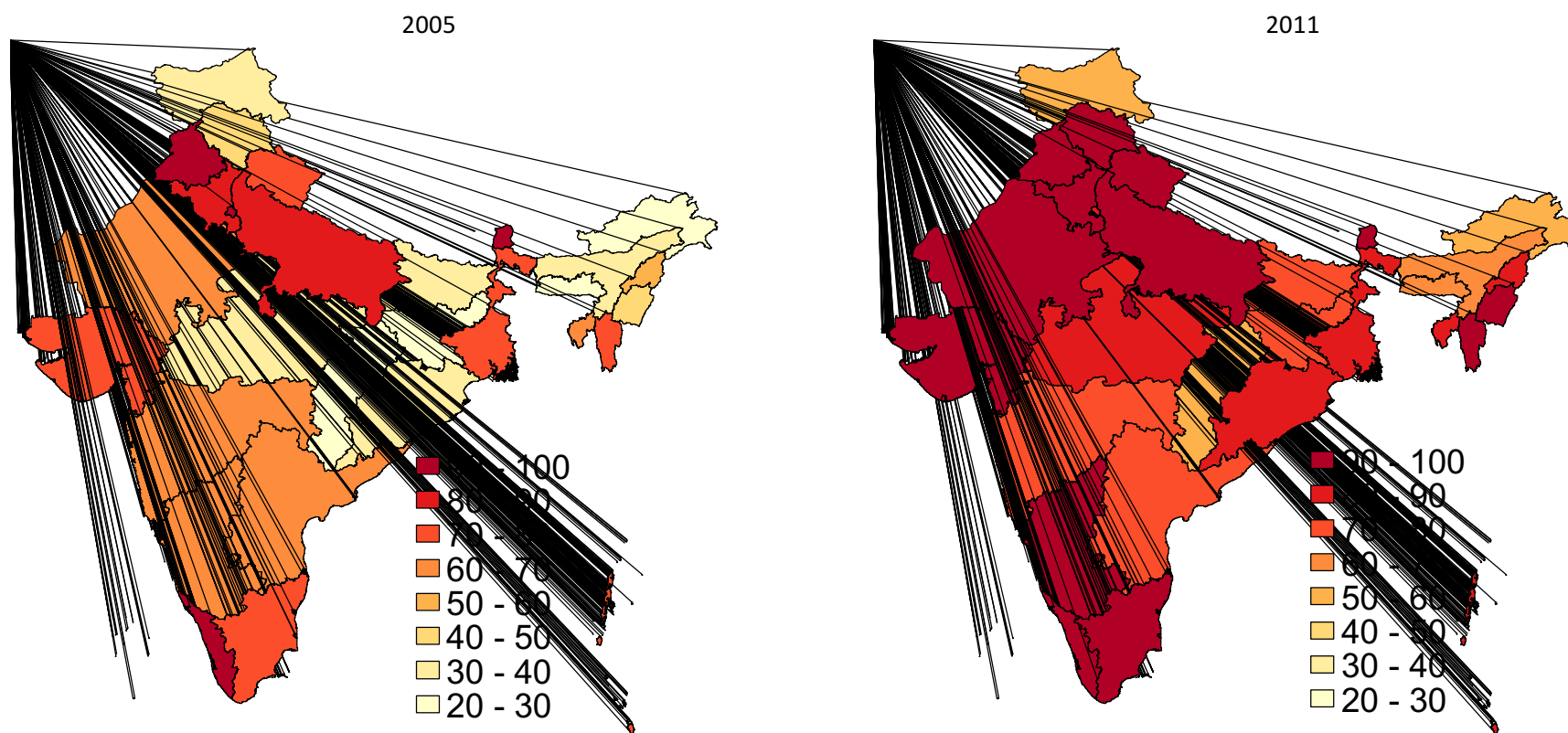
Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation).

Figure R.17: DISE: Percentage of School with a Playground



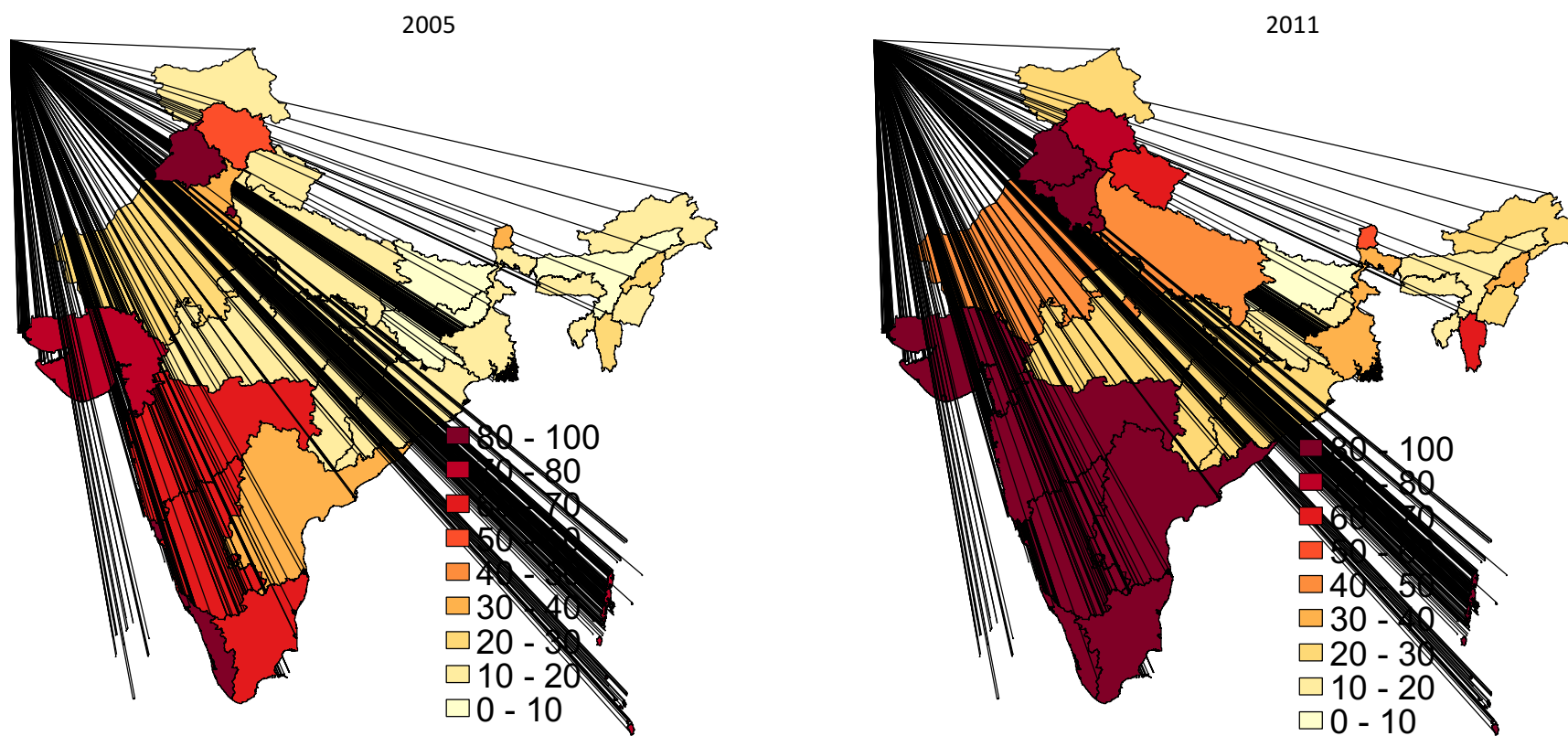
Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation).

Figure R.18: DISE: Percentage of Schools with Access to Drinkable Water



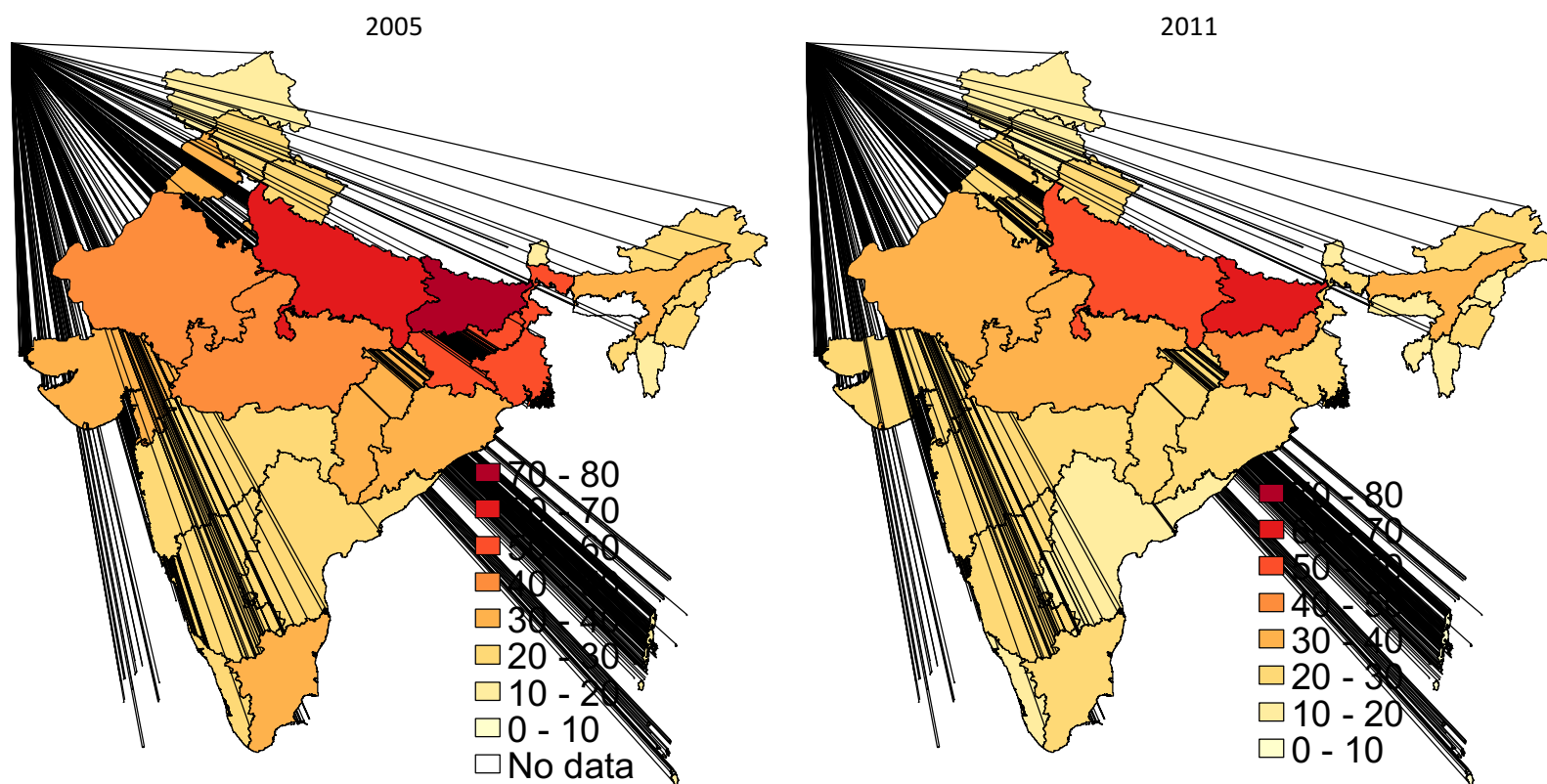
Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation).

Figure R.19: DISE: Percentage of Schools with a Toilet



Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation)

Figure R.20: Percentage of Schools Connected to the Electric Grid



Source: DISE, 2005-06 and 2011-12 academic year waves (authors' calculation).

Figure R.21: Student-Teacher Ratio

Table R.1: DISE: School's Inputs: National Average

| Year | 2005 | 2011 |
|---|------|------|
| % of Teachers with Graduate Degree | 0.47 | 0.56 |
| Student-Teacher Ratio | 41 | 33 |
| % of Classrooms in Good Condition | 0.65 | 0.77 |
| % of Schools Connected to Electric Grid | 0.31 | 0.50 |
| % of Schools with No Classroom | 0.09 | 0.03 |
| % of Schools with a Toilet | 0.59 | 0.84 |
| % of Schools with a Library | 0.48 | 0.69 |
| % of Schools with a Playground | 0.53 | 0.56 |
| % of Schools with a Blackboard in Every Classroom | 0.81 | 0.86 |
| % of Schools with Drinkable Water | 0.85 | 0.95 |
| % of schools with a Computer | 0.11 | 0.21 |