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Differences in cognitive ability, per capita income, infant mortality, fertility and latitude across the states of India

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ABSTRACT

Regional differences in cognitive ability are presented for 33 states and union territories of India. Ability was positively correlated with GDP per capita, literacy and life expectancy and negatively correlated with infant and child mortality, fertility and the percentage of Muslims. Ability was higher in the south than in the north and in states with a coast line than with those that were landlocked.

1. Introduction

There have been several studies of regional differences in intelligence within countries and their association with per capita income, educational attainment, infant mortality, life expectancy and other socio-economic phenomena. The first of these studies gave data for intelligence differences in 13 regions of the British Isles in the mid-twentieth century and reported that the highest IQ was in London and the south east, and the lowest IQs were in Scotland, Northern Ireland and the Republic of Ireland (Lynn, 1979). These regional IQs were positively correlated with per capita income ($r = .73$), with intellectual achievement indexed by fellowship of the Royal Society ($r = .94$), and negatively with infant mortality ($r = -.78$).

Similar results have been found in France, where regional differences in intelligence were reported for the mid-1950s by Montmollin (1958). IQs were obtained from 257,000 18 year old male conscripts into the armed forces, and mean IQs were given for the 90 French departments. The highest IQs were obtained by conscripts from the Paris region and the lowest by conscripts from Corsica. As in the British Isles, it was shown that these departmental IQs were positively correlated with average earnings ($r = .61$), with intellectual achievement indexed by membership of the Institut de France ($r = .26$), and negatively with infant mortality ($r = .30$) (Lynn, 1980).

An association between regional IQs and per capita income has been reported in the United States by McDaniel (2006) who calculated the IQs of the populations of the American states and found that these were highest in the north-eastern states of Massachusetts (104.3), New Hampshire (104.2) and Vermont (103.8), and lowest in the southern states of Mississippi (94.2) and Alabama (95.7), and in California (95.5). The average state IQs were positively correlated with gross state product per capita (a measure of per capita income) ($r = .28$) and with health ($r = .75$), and negatively with violent crime ($r = -.58$).

Further regional differences in IQs have been reported for twelve regions of Italy and their significant correlations with several socio-economic variables including per capita income ($r = .94$), stature ($r = .93$) and infant mortality ($r = -.86$) (Lynn, 2010a). This study has generated a number of critical papers and replies by Lynn (2010b) and Piffer and Lynn (2014). Differences in IQs have been reported for five regions of

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Portugal, where the IQ and per capita income were highest in central Lisbon than in the provinces (Almeida, Lemos, & Lynn, 2011). Differences in IQs have been reported for eighteen regions of Spain and significant correlations with per capita income ($r = .40$), life expectancy ($r = .75$), employment ($r = .80$) and literacy ($r = .81$) (Lynn, 2012). Differences in IQs have been reported for thirty-one regions of China with significant correlations with per capita income ($r = .42$) and years of education ($r = .69$) (Lynn & Cheng, 2013). Regional differences in IQ have been estimated for forty seven regions of Japan and significant correlations reported with per capita income ($r = .51$), lower rates of homicide ($r = .60$) and lower rates of divorce ($r = .69$) (Kura, 2013). Differences in IQs have been reported for four regions of Finland with a positive correlation with per capita income ($r = .67$) and a negative correlation with infant mortality ($r = -.79$) (Dutton & Lynn, 2014).

In this paper we present data for regional differences in intelligence, per capita income, literacy, life expectancy, infant and child mortality, and latitude in India.

2. Method

India has 30 states and 6 union territories. There were 29 states until June 2, 2014, when a new state called Tilangana was split from Andhra Pradesh. In the present study, data are given for 28 states and 5 union territories because no relevant data are available for the state of Assam and the union territory of Lakshdweep. The difference between states and union territories is that states have their own governments and administrations units while union territories are administered by the central government.

Five measures of cognitive ability were obtained in 2012 for 28 states and 5 union territories (UTs). These were

1. Language Scores Class III (T1). These data consisted of the language scores of class III 11–12 year old school students in the National Achievement Survey (NAS) carried out in Cycle-3 by the National Council of Educational Research and Training (2013). The population sample comprised 104,374 students in 7046 schools across 33 states and union territories (UTs). The sample design for each state and UT involved a three-stage cluster design which used a combination of two probability sampling methods. At the first stage, districts were selected using the probability proportional to size (PPS) sampling principle in which the probability of selecting a particular district depended on the number of class 5 students enrolled in that district. At the second stage, in the chosen districts, the requisite number of schools was selected. PPS principles were again used so that large schools had a higher probability of selection than smaller schools. At the third stage, the required number of students in each school was selected using the simple random sampling (SRS) method. In schools where class 5 had multiple sections, an extra stage of selection was added with one section being sampled at random using SRS.
   The language test consisted of reading comprehension and vocabulary, assessed by identifying the word for a picture. The test contained 50 items and the scores were analyzed using both Classical Test Theory (CTT) and Item Response Theory (IRT). The scores were transformed to a scale of 0–500 with a mean of 250 and standard deviation of 50. There were two forms of the test, one in English and the other in Hindi.
2. Mathematics Scores Class III (T2). These data consisted of the mathematics scores of Class III school students obtained by the same sample as for the Language Scores Class III described above. The test consisted of identifying and using numbers, learning and understanding the values of numbers (including basic operations), measurement, data handling, money, geometry and patterns. The test consisted of 50 multiple-choice items scored from 0 to 500 with a mean score was set at 250 with a standard deviation of 50.
3. Language Scores Class VIII (T3). These data consisted of the language scores of class VIII (14–15 year olds) obtained in the NAS (National Achievement Survey) a program carried out by the National Council of Educational Research and Training, 2013) Class VIII (Cycle-3).The sampling methodology was the same as that for class III described above. The population sample comprised 188,647 students in 6722 schools across 33 states and union territories. The test was a more difficult version of that for class III, and as for class III, scores were analyzed using both Classical Test Theory (CTT) and Item Response Theory (IRT), and were transformed to a scale of 0–500 with a mean 250.
4. Mathematics Scores Class VIII (T4). These data consisted of the mathematics scores of Class VIII (14–15 year olds) school students obtained by the same sample as for the Language Scores Class VIII described above. As with the other tests, the scores were transformed to a scale of 0–500 with a mean 250 and standard deviation of 50.
5. Science Scores Class VIII (T5). These data consisted of the science scores of Class VIII (14–15 year olds) school students obtained by the same sample as for the Language Scores Class VIII described above. As with the other tests, the scores were transformed to a scale of 0–500 with a mean 250 and standard deviation of 50. The data were obtained in 2012.
6. Teachers' Index (TI). This index measures the quality of the teachers and was taken from the Elementary State Education Report compiled by the District Information System for Education (DISE, 2013). The data were recorded in September 2012 for teachers of grades 1–8 in 35 states and union territories. The sample consisted of 1,431,702 schools recording observations from 199.71 million students and 7.35 million teachers. The teachers' Index is constructed from the percentages of schools with a pupil–teacher ratio in primary greater than 35, and the percentages single-teacher schools, teachers without professional qualification, and female teachers (in schools with 2 and more teachers).
7. Infrastructure Index (II). These data were taken from the Elementary State Education Report 2012–13 compiled by the District Information System for Education (2013). The sample was the same as for the Teachers' Index described above. This index measures the infrastructure for education and was constructed from the percentages of schools with proper chairs and desks, drinking water, toilets for boys and girls, and with kitchens.
8. GDP per capita (GDP per cap). These data are the net state domestic product of the Indian states in 2008–09 at constant prices given by the Reserve Bank of India (2013). Data are not available for the Union Territories.