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# **Studies on the Causes and Factors Affecting the Rural-Rich Intelligence Gap**

## *The Rural-rich intelligence Gap*

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### ABSTRACT

It is a known fact that inequality exists in every society and so is true in terms of the education availability, infrastructure etc. This difference would be wider in developing countries. For countries like India with a population of 1.3 B billion this divide is more significant and requires attention. Our study evaluates several factors that affect the intelligence gap between the rural and urban populations. If we improve upon even a single factor it can play a huge role in bridging the divide between the prosperous upper class, the working/middle class and the lower classes and may bring in the growth for the country and its people. The authors hypothesize that by providing a child with a clean environment, devoid of any noise and clutter, with supportive parents who can support their child with their studies, this child has a high chance of achieving a great IQ. All the aforementioned factors heavily contribute positively or negatively to a person's IQ, as you shall find in the paper. We can draw several conclusions from this paper but in short, we see that socio-economic factors play a huge role in affecting IQ. We also find how a calm mindset is imperative for better concentration and how pollution detracts your IQ. Our study shows all the various factors affecting IQ and establishes co-relations amongst them and their impact on individuals. This can also be used for prioritizing the factors which can be improved upon as short term and long-term goals.

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### INTRODUCTION

In today's world, the divide between the prestigious urban section and the lower underprivileged lower class is huge, in terms of intelligence, infrastructure, facilities, monetary value and so much more. Especially in developing countries, we see this divide even larger. In this paper, we have taken India as a focused country due to its large population and rural-urban divide. The objective is to bridge the gap between the rural and urban populations which can make all the difference in a country's economy. Let's take the example of India. The main reason how a nation progresses is due to its citizens. Approximately 898 million people [1] live in Rural India. This is approximately 65% of India's current population. With about every 1 in 5 Indians being Skilled, only 21.2% of India is skilled according to the Human Development Report 2020 [2]. This means that about 78% of India is unskilled. And that percentage is dominated mostly by people who live in rural areas. Despite all this, India is still the 6th largest economy in the world, and it continues to grow. Reducing the gap between the people who are skilled i.e., those who live in urban areas and those who are most skilled i.e., those who live in rural areas will, in turn, have a massive positive impact on India as a whole. This is also one of the reasons why a country such as the USA is one of the top countries in today's world, with its skilled labour force being at a whopping 96.5% according to the Human Development Report 2020 [2]. In this paper, we use the Intelligent Quotient(IQ) to measure how smart a person is. An IQ test is an assessment of your cognitive skills and shows you whether you are above or below your age group. To clarify, IQ is not a measure of your intelligence or success, it merely shows you whether you have the potential to be a successful person, whether you are lagging behind your age group and act as a motivational factor to work harder. In essence, it doesn't prove anything about you but just shows you that you have the potential. In this research paper, we see how parents have a hugely positive impact on your IQ. Both educationally and monetary wise. Pollution and noise are extremely detrimental to you, and your mental condition. An unhealthy mind also proves harmful to your IQ but having a clean and green environment has been proved to have a hugely positive impact on the brain.

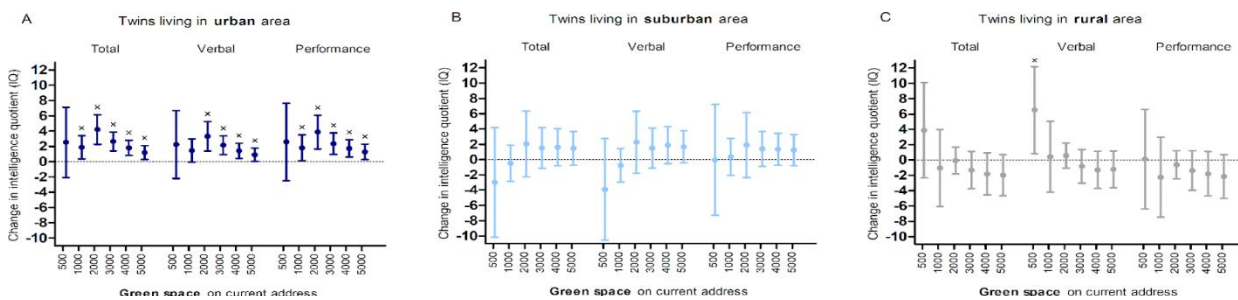
## RESULTS

### Parental Education

Generally, parental education has been proven to have a huge impact on their child’s success [3]. A study [3] surveys first-generation college students and shows that children of college-educated parents are much more likely to pursue and complete an undergraduate degree and have a higher IQ than young people whose parents did not attend college. In a different study [4], we see that 1065 children were kept in an observational study. From this study, we gained 2 separate results. Impacts of mothers and fathers having a formal education. We see that out of all the students interviewed, we see that 162 of them had a High IQ. Out of these, 118 of their mothers (72.4%) were graduates or postgraduates, and only 2(1.2%) students had mothers with no formal education. On the other hand, we see that 137 of them had fathers (84.6%) who were graduates or postgraduates. This means either of the parents was a graduate and this percentage would be above 85% or maybe close to 95%+.

### Impact of Greenery and nature

A study [5] shows the correlation between greener areas and IQ. It analyzed over 600 children aged 10-15 years. When put in a green environment, they showed an increase of 2.6 points in their IQ on average. The study also shows the average IQ of ppl who live in nature-lacking areas is generally around 80. Rural areas are generally associated with more greenery, this point gets reinforced by looking at **Figure 1**. We see the increase in IQ is the highest in rural areas. So green environment which is naturally present in some rural areas has a positive impact on the IQ.



**Figure 1. Approximate change in IQ when living in a green space in A) Urban Area, B) Suburban Area and C) Rural Area. [5]**

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### Impact of Area of Residence

The place where you reside plays a huge role in your IQ. If you reside in an area with an influx of Low-IQ people, then the probability of you also having a low IQ is greatly increased. Whereas if you reside in areas with entrepreneurs, businessmen, scientists etc., it’s obvious that you have a higher chance of having a higher IQ. We see which places should generally have a lower IQ in this study [4]. We can see in **Figure 2**, that only 1.8% of the people who were surveyed had high IQs and resided in a village, 42.3% resided in towns and 55.8% resided in urban areas such as cities. This could also be understood in a way that our social environment has a positive and negative impact on IQ.

Variable	Subvariable	IQ			Total	P
		Low	Normal	High		
Place of residence (n=1065)	Village	51 (21.4)	72 (10.8)	3 (1.8)	126 (11.8)	0.001
	Town	142 (58.8)	286 (43.1)	69 (42.3)	495 (46.5)	
	City	47 (19.7)	306 (46.1)	91 (55.8)	444 (41.7)	

**Figure 2. Number of people with Low, Normal and High IQs residing in Villages, Towns and Cities (n=1065).**

### Cleanliness of the environment

A study [6] found that people with clean houses are healthier than people with messy houses. Participants who kept their homes clean were healthier and more active than those who didn’t. House cleanliness was even more of a predictor of physical health than neighbourhood walkability. In another study [7] researchers found that clutter can make it more difficult to focus on a particular task.

### Impact of noise pollution upon mental workload

Having noisy surroundings is extremely detrimental to your mental health. Especially when you are exposed to constant noise pollution, your mental health degrades as well as levels of aggression and annoyingness increase drastically. This study [8] proves that your visual and auditory levels of attention decrease. All this has a direct impact on your IQ. Not having stable mental health as well as a bad attention span, impacts your intelligence

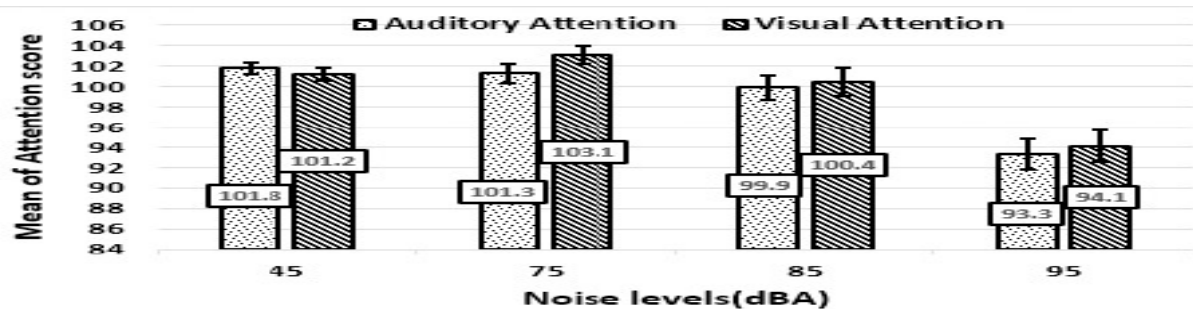
terribly. **Figure 3** shows with increasing noise levels, your mental workload also increases. This study can also bring in a fact for requiring decongested residential areas.



**Figure 3.** Graph displaying the change in Mental Workload with increasing Noise Levels.

#### *Impact of noise pollution upon your cognitive abilities*

The same study also shows how increasing voice levels affect your attention span, which ultimately affects your IQ. We can see from **Figure 4** that, with increasing noise levels, we see a huge dip in attention levels. A decrease in attention levels, along with an increase in mental workload is ultimately negative for your IQ and hinders it greatly.



**Figure 4.** Graph displaying the changes in Auditory and Visual Attention, as well as the mean attention score along with increasing noise levels.

#### *Impact of Pollution*

Pollution is extremely prevalent in today's world, where nearly all countries have large pollution levels. A recent study [9] conducted, shows that large pollution levels have a severe negative impact on cognitive levels.

#### *Invisible Factors*

There are plenty of invisible factors that are non-quantifiable yet still need to be mentioned. The huge rural-rich gap is impacted by factors we have all heard about. These include corruption, social pressure, inequality, superstitions, mindset and many such factors. Corruption in various places is something that is widely criticized and a well-known cause. Corrupt people having tax evasion and other sources of revenue for the government hinder the rural areas' growth and development projects. Superstitions and the olden mindset of people are still a social evil and also cause large hindrances in the development of the rural areas. For example, a lot of residents of villages in India still believe to date that women should not be granted education and are unequal, which again obstructs the growth of the area. Social Pressure is an extremely complicated factor that can have several different outcomes but is also extremely volatile. Generally, there is huge social pressure in urban areas as parents encourage children to achieve higher, whereas in the rural areas' parents are not extremely inclined towards studies, hence the pressure upon the students is not too much, leading them not to strive too far in their studies. This also leads to another social divide

## DISCUSSION

#### *Parental Education*

We see from the studies on parental education the huge influence of parents upon their children. It was already common knowledge that how parents have a huge impact on the grooming of their child, this study re-instates that fact, as well as further strengthens it by showing how the impact is so huge that they help increase the IQ of their child indirectly. Parents can do this by either putting the child through social pressure and tuition, which in most cases, motivates or makes the child study harder, which in return also helps their IQ. Money also plays a huge role in this case. Getting degrees is not a cheap feat, paying for schools, and then colleges are of course expensive. Even though the option of scholarships is provided, it's only to a minority of the total people who join the institution. This can be one of the main reasons why people in rural areas have lower IQs since most parents do not give particular importance to education. Another reason can be superstitions and an olden mindset. Some villages still believe that women are inferior to

men, and hence do not allow women/mothers to take up education whereas we can see through our study that 72.8% of the children who had high IQs, had mothers with a degree or formal education, hence this can also be a huge factor.

#### ***Impact of Greenery and nature***

We see through this study the massive impact of the environment upon an individual. We have heard about the healing effect of nature, but here we can see the impact of nature on a person's IQ. By placing children in a nature-rich area for a few days, we see a huge improvement of 2.6 points. If these children were placed in such an environment for a few more months, the improvement should be much larger. Rural Areas are generally rich in nature, and hence, going with conclusions drawn by this experiment, the IQ in rural areas should generally be high. This leads us to two conclusions: the first being there might be more important factors which have a higher impact, or the nature is one of the biggest factors on the IQ of people living in rural areas and due to it, the current IQ level in rural areas is where it is. Its impact is also very prevalent in urban areas, according to *Figure 1*. We can see the huge improvements in the IQs of the people. This could probably support and act as an enhancing factor for IQ and boosts it. Taking an example of both New York City (NYC) and Los Angeles (LA), we see that NYC is the city with the most greenery and LA is the city with the least greenery [10]. We see that NYC has an average IQ of 100.5 whilst LA has an average IQ of 95.5 [11]. These two cities are not too different to each other in terms of economic equality and a lot of other factors, yet the difference of about 5 points is huge between the two cities which differ in greenery. Hence, we can conclude the impact of greenery

#### ***Impact of Area of Residence***

This study shows the effect of the area you reside in upon your IQ. We see from *Figure 2* the huge differences between the people with high IQ residing in villages and those who reside in towns and other urban areas. Rural Villages show that only 1.8% of the people surveyed are of high IQ and when we look at towns and cities, we see 42.3% and 55.8% respectively. This can also be related to the previous factor, greenery. We can also relate residence with money. Urban areas of course cost more money, therefore not affordable for everyone. Rural areas are cheaper and so are their living conditions, which may play an important role. This also may relate to the cleanliness of the environment, since rural areas tend to be dirtier as compared to urban areas.

#### ***Cleanliness of the environment***

This is an extremely important factor as we find out how cleanliness impacts your concentration and mental workload, in turn, affecting your IQ. We see from the study that cleaner environments prove to help you remain healthy and more physically active. We also saw how it helps neighbourhood cleanliness as well. These studies proved that when the environment around you is unclean, it overwhelms your visual cortex (in simple terms, the brain), by focusing on too many task-irrelevant objects. This makes it harder to concentrate on the task at hand and complete it with efficiency. This eventually leads to an unhealthy lifestyle and a greater mental workload. Having more mental workload has been proven harmful to your IQ (explained in detail in the next few factors). As for unhealthy lifestyles, according to a study [12], we see that higher IQ is generally related to better well-being and a healthy lifestyle. Better the lifestyle, the higher the probability of increased intelligence and success.

#### ***Impact of noise pollution upon mental workload***

Noise pollution is all around us and detracts our IQ in many ways. From *Figure 3*, we see that at 45 dBA, your mental workload score is around 56. It dips at 75 dBA and then linearly increases from then onwards. A mental Workload Score sums up how well you can concentrate on a task. The higher the score, the worse the impacts. A mental Workload score has a direct impact on your IQ, and your mental condition. Mental workload is also linked with anxiety and aggression. These altogether have negative impacts on your IQ. Noise pollution is extremely prevalent in urban areas as compared to rural areas, which perhaps helps boost the IQ in rural areas as they have peace of mind. Noise pollution is generally due to construction, which is extremely less in rural areas, due to which there is more greenery and nature. Mental Workload is also increased due to unclean environments, and therefore it makes it even more imperative to keep your environment clean.

#### ***Impact of noise pollution upon your cognitive abilities***

The same study also shows the impact on your cognitive abilities and how they link up with attention spans. *Figure 4* shows us that our cognitive levels decrease with increasing noise pollution as well as also decreasing our attention spans. The causes and links made for the previous factors are relevant for this as well.

#### ***Impact of Pollution***

The study shows that large pollution levels have a severe negative impact on cognitive levels. The impact is so much that it is equivalent to losing a complete academic year. This result is in line with conclusions regarding the relationship between the greenness of the environment and your cognitive abilities and IQ. Pollution is also heavily linked to increasing mental stress and mental disorders. This, again, is in line with conclusions between increased stress levels and mental workload and your IQ.

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## **MATERIALS AND METHODS**

### ***Parental Education, Impact of Area of Residence***

In this cross-sectional observational study [4,] 1065 schoolchildren between the ages of 12 and 16 were recruited from two government and thirteen private schools in five towns, six cities, and two villages across India. All of the children were given a questionnaire that included information about their parents' education, occupation, income, and physical activity levels. Ravens Standard Progressive Matrices were used to calculate IQ scores.

Using Raven's test results, an approximate IQ score was calculated. IQ scores were divided into three categories: low IQ (0–79), normal IQ (80–119), and high IQ (120+). SPSS software was used to analyze the data.

#### ***Impact of Greenery and nature***

This study includes 620 children aged 7 to 15 years. Green space indicators were assigned using prenatal and childhood residential addresses that were geocoded. Mixed modeling was used to investigate the relationship between green space and intelligence and behavior while controlling for potential confounding factors such as gender, age, parental education, neighbourhood household income, year of assessment, and zygosity and chronicity.

#### ***Impact of noise pollution upon mental workload, Impact of noise pollution upon your cognitive abilities***

This experimental study included a total of 54 young subjects [8]. The participants' mental workload and attention were assessed under various noise levels, including background noise, 75, 85, and 95 dBA noise levels. The EEG signals of the study subjects were recorded for 10 minutes while they were performing the IVA test. The EEG signals were used to calculate the relative strength of their brain frequency bands.

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