Disaggregated Pattern of Gender Gap in Education in Indian Population: A Fresh Exploration

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September 2004

This paper is the further extension of our earlier paper "Gender Gap in Education: A Fresh Exploration", presented at the UNU/WIDER conference, Helsinki, September 2003. We would like to thank Satish B. Agnihotri, Amitava Sen, and participants of the 'SGP' UNU/WIDER conference for helpful comments and discussion on earlier version of this paper. However usual disclaimer holds.

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ABSTRACT:

Equal access to educational opportunity is a basic human right essential to well being. Yet educational gap at attainment levels between male and female in India is staggering. Reduction in such gap is essential for more than one reason. Latest population census 2001 indicates considerable difference in literacy rate at all India as well as state level between male and female. Furthermore, NSSO 55th round data also strongly substantiate this finding. In this paper we use mapping technique to depict the state level pattern of gender inequality in literacy rate based on Census data. Section III deals with gender gap in average years of schooling on the basis of scholastic attainment data from NSSO 55th round. In the next section we employ Educational Lorenz distribution and Gini coefficient to grasp the distributive dimension of gender inequality in education. Considering equitable educational development as a function of average years of schooling and education Gini coefficient, in the next section we have undergone decomposition of gender gap in equitable educational development, both at the national and at the sub – national level. The results of the decomposition analysis clearly indicate that both in the urban and rural sector, gender gap in equitable educational development are largely due to gender gap in average years of schooling. The gender gap in the educational distribution is much less important. Finally we analyse the relationship between gender gap in equitable educational development and monthly per capita expenditure to examine the relationship between economic affluence and gender equality in education. For the urban population, the analysis shows that economic prosperity can combat gender disparity in educational attainment and the finding is more or less robust. But state level disaggregative analysis, however, does not always confirm the above findings. For the rural population, surprisingly, economic prosperity has significant positive relationship with gender gap in education. The study concludes that prosperity alone can not ensure gender equality in education in Indian societies. Findings of this study may be found to be helpful for researcher, planners and activist in this field.

Key words: *Gender Inequality, Education, Literacy Rate, Average years of schooling, Educational Gini Coefficient, Decomposition, Economic Prosperity*.
JEL Classification code: *J16, D63, J71, I21, D31 etc.*

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It is now well recognized that in developing countries, socio-economic gains from educating females are much greater than the gains from educating females. Educating girls has a catalytic effect on every dimension of economic development including higher productivity and faster growth (Wolferson, 1995). Existence of gender gap in educational attainment thus becomes an important dimension of entitlement failure that threatens sustainable human development.

Like other South Asian developing countries, considerable gender differential in scholastic attainment at all levels has been found in a number of states in India. Latest population census 2001 indicates considerable differences in literacy rate between male and female. Furthermore National Sample Survey 55th round data also strongly substantiate this findings.

Our objective in this paper is very modest. We will explore the empirics of the problem, its spatial pattern, and its relation with economic prosperity. The discussion below is organized as follows. Next section looks at the 2001 Census data to show the pattern of gender disparity in the literacy rate in the urban and rural segments of different states of India. Cluster of states with gender gap in literacy rate, higher than the All India level are mapped out next. Section III and section IV deals gender gap in average years of schooling and gender differential in education Gini, on the basis of scholastic attainment data from NSSO 55th round. Considering Educational Deprivation Index, as a function of average years of schooling and education Gini co-efficient, finally we analyse the relation between theses deprivation index and monthly per capita expenditure to examine the nature of the association between economic affluence and gender inequality in education at All India and also at the State level. The findings of this disaggregated study henceforth contribute towards important policy conclusion. It shows

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that economic prosperity alone can not ensure gender equality in education in Indian societies.

II

The gap between men's and women's literacy rate is a rough but informative indicator of the gender difference in many forms of human capital (Schultz, 2001). Provisional population Census, 2001 shows considerable gap in literacy rate among male and female. At the all India level, the gap is 21.69 (though it decreases marginally from 24.84 in 1991). But the situation will be more revealing if we consider state level decomposition. Following table 1 shows gender disparity in literacy rate by place of residence.

Table 1: Gender Gap In Literacy Rates : All India, 2001

STATES	TOTAL	RURAL	URBAN
Jammu & Kashmir	24	25.2	18.1
Himachal Pradesh	17.9	18.9	6.5
Punjab	12.1	13.8	8.3
Uttaranchal	23.7	27.2	12.4
Haryana	23	26.3	14.5
Rajasthan	32.2	35.3	21.7
Uttar Pradesh	27.2	31.3	16.1
Madhya Pradesh	26	29.1	17.2
Gujarat	21.9	26.5	13.7
Chattisgarh	25.6	27.2	18.3
Orissa	24.9	26.4	15.6
Jharkhand	28.5	31.3	17.0
Bihar	26.7	27.7	15.5
West Bengal	17.4	19.9	10.4
Sikkim	15.2	16.0	8.4
Assam	15.9	16.8	8.9
Meghalaya	5.7	5.9	5.6
Auranachal Pradesh	19.9	20.5	15.0
Nagaland	9.9	9.8	6.9
Manipur	18.2	18.6	17.2
Mizoram	4.5	8.2	1.3
Tripura	16.1	17.9	8.1
Maharashtra	18.8	23.1	12.1
Andhra Pradesh	19.7	21.7	13.9
Karnataka	18.8	22.1	12.0
Goa	13.4	16.1	10.4
Tamil Nadu	17.8	21.7	12.8
Kerala	6.3	6.7	5.2

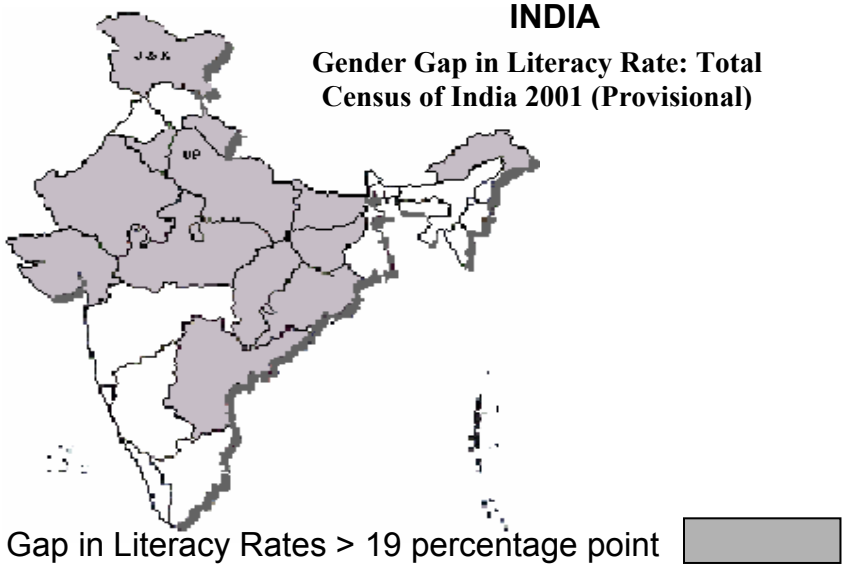
Source: Authors calculation from Census 2001.

At first the spatial pattern of gender inequality is not very clear from this table, but if we sort the table by ascending or descending order then a clear picture emerges. If 19-percentage point[7] of gender disparity in literacy rate is considered as a crucial level, then we found 13 states lie below this level. Among these 13 states the location of 11 states is striking; together they form a contiguous belt (see figure 1).

[7] All India average gender gap in literacy rate (total) is 19 percentage points.

An even more striking spatial contiguity of states has been found for the rural population above the cut-off point of 21 percentage point[8] (Figure 2A) since all of them are located in the northern region. In the urban population, 15 states have gender gap in literacy rate more than the national average. Of these, 12 states form a geographical contiguity (Figure 2B). The pattern of the spatial contiguity for the urban population is much different than that of the rural population. Urban map shows that the problem is no longer confined to the north of Bindhya Parvat (mountain), but has traveled southwards[9].

Such spatial pattern is very much instructive and tells us where the shoe pinches, while analyses with the help of tables, charts only tell us whether it pinches or not (Agnihotri, 2002). Following are some national level GIS maps. Mapping is a very powerful tool and does convey "more than a thousand words".

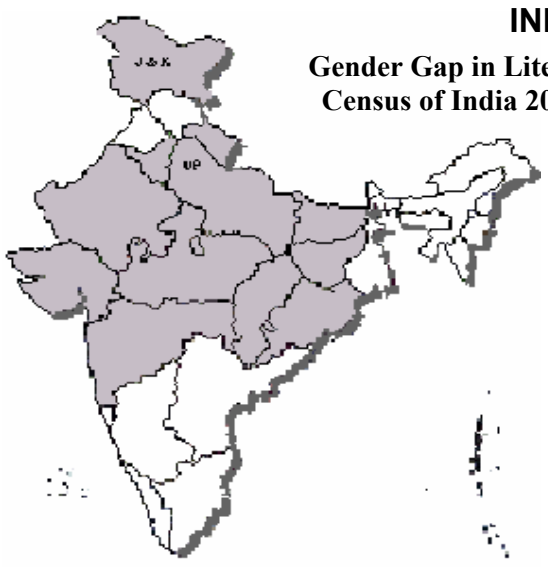


All India Average Gender Gap in Literacy Rate (total) is 19 percentage points

FIGURE – 1

[8] All India Average Gender Gap in Literacy Rate (rural) is 21 percentage points.

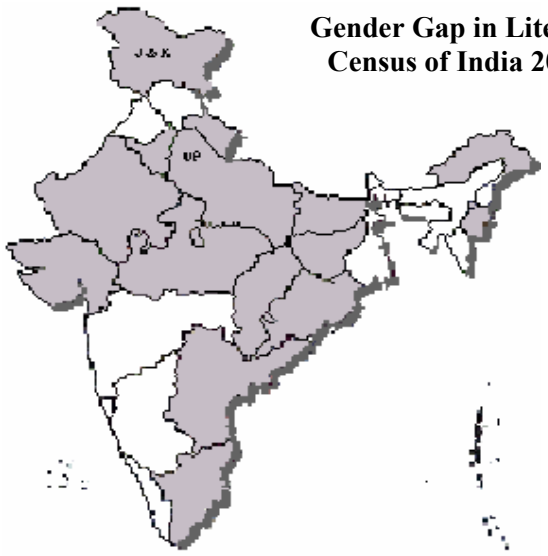
[9] Social Scientists like Dyson, Moore, Miller, Agnihotri argued that the problem of gender discrimination is confined within the North Western part of the country; a trend that has been attributed to the preponderance of regressive culture in the North Western region.



States with Gender Gap in Literacy Rates > 21 percentage point

All India Average Gender Gap in Literacy Rate (rural) is 21 percentage points

FIGURE – 2A



States with Gender Gap in Literacy Rates > 12.2 percentage point

All India Average Gender Gap in Literacy Rate (urban) is 12.2 percentage points

FIGURE – 2B

Instead of taking state as a unit of analysis, we could consider district as unit. Such district level analysis will reveal considerable spatial inequality in educational achievement even within a state, but they have not been reported in this paper for want of spaces.

III

Literacy rate, as already stated, is a crude indicator; average years of schooling and educational Gini may be more in depth in nature. Educational attainment measured by average years of schooling is an important indicator of level of development (Arriagada, 1986). This section examines the pattern – variability in average years of schooling and its gender gap at the national and also at the state level. We consider NSSO 55th round data on 'Literacy and levels of Education' as it is a large sample survey (number of sample person is 311602).

Analysis of 55th round data shows considerable spatial variability in average years of schooling among the male and female population of urban and rural sectors. Following tables show ranking of the states in terms of the average years of schooling for male and female population.

Table 2a: Average years of Schooling: All India (Rural), 1999-2000

	Rural Male		Rural Female	
States	**Average years of schooling**	**Rank**	**Average years of schooling**	**Rank**
Jammu & Kashmir	4.88	8	2.83	14
Himachal Pradesh	5.36	5	3.78	6
Punjab	4.23	15	3.18	8
Haryana	4.58	9	2.53	15
Rajasthan	3.5	20	1.06	25
Uttar Pradesh	3.88	17	1.74	21
Madhya Pradesh	3.20	24	1.37	23
Gujarat	4.35	11	2.44	17
Orissa	3.65	19	2.07	20
Bihar	3.25	23	1.23	24
West Bengal	3.77	18	2.38	18
Sikkim	4.23	16	3.25	7
Assam	4.39	10	3.15	10
Meghalaya	3.29	22	3.16	9
Arunachal Pradesh	3.47	21	2.35	19
Nagaland	5.47	3	4.18	4
Manipur	5.43	4	4.03	5
Mizoram	5.27	6	4.96	3
Tripura	4.34	12	3.02	12
Maharashtra	5.02	7	3.06	11
Andhra Pradesh	3.12	25	1.7	22
Karnataka	4.23	14	2.45	16
Goa	6.81	1	4.99	2
Tamil Nadu	4.29	13	2.88	13
Kerala	6.32	2	5.75	1
India	3.98		2.21	

Source: NSSO 55th round data on 'Literacy & Levels of Education'

Implies values less than national average

Table 2b: Average years of Schooling: All India (Urban), 1999-2000

	Urban Male		Urban Female	
States	**Average years of schooling**	**Rank**	**Average years of schooling**	**Rank**
Jammu & Kashmir	7.03	12	4.97	19
Himachal Pradesh	8.15	2	7.3	1
Punjab	6.26	22	5.61	13
Haryana	6.28	21	4.98	18
Rajasthan	6.71	17	4.26	24
Uttar Pradesh	5.9	25	4.43	22
Madhya Pradesh	6.47	19	4.58	21
Gujarat	7.02	13	5.52	15
Orissa	6.05	24	4.43	23
Bihar	6.16	23	4.19	25
West Bengal	6.84	16	5.5	16
Sikkim	6.3	20	5.72	11
Assam	7.31	9	6.01	8
Meghalaya	7.73	3	6.54	5
Arunachal Pradesh	7.69	4	5.65	12
Nagaland	7.58	5	6.39	7
Manipur	8.39	1	6.7	4
Mizoram	7.36	8	6.95	2
Tripura	6.85	15	5.37	17
Maharashtra	7.26	10	5.9	10
Andhra Pradesh	6.67	18	4.63	20
Karnataka	7.4	7	5.91	9
Goa	7.45	6	6.42	6
Tamil Nadu	7.01	14	5.57	14
Kerala	7.25	11	6.88	3
India	6.79		5.28	

Source: NSSO 55th round data on 'Literacy & Levels of Education'

Implies values less than national average

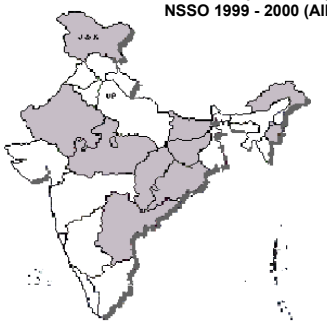
The gap between male and female average years of schooling is an important indicator of development differential. The 55th round data shows interesting geographical pattern of gender gap of average years of schooling. For the urban population, 8 states have gender gap in average years of schooling higher than the national average (Figure 3a). Among them Rajasthan, Madhya Pradesh, Orissa & Bihar form a contiguous strip. A more

prominent spatial contiguity has been observed for the rural population (Figure 3b).

Figure – 3a

INDIA

Gender Gap in Average years of Schooling: NSSO 1999 - 2000 (All India), Urban



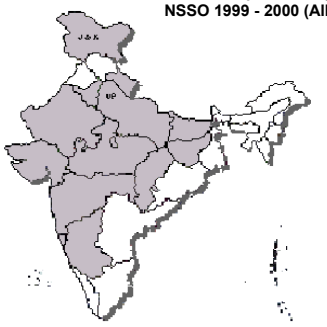
States with Gender Gap in Average years of Schooling ≥ 1.5 years of schooling

All India Average Gender Gap in Average years of Schooling is1.5

Figure – 3b

INDIA

Gender Gap in Average years of Schooling: NSSO 1999 - 2000 (All India), Rural



States with Gender Gap in Average years of Schooling ≥ 1.77 years of schooling

All India Average Gender Gap in Average years of Schooling is1.77

IV

Gender gap in average years of schooling is necessary but not sufficient to reflect the characteristics of gender differential in education. To grasp the distributional dimension of education and its gender perspective, this section develops way to measure gender inequality in education with the help of sex specific Lorenz curves and corresponding Gini coefficients.

Distributional dimension are extremely important for welfare consideration and also for production. Educational development like the concept of development depends not only on average level but also on its distribution. Furthermore gender disparity in educational distribution is another semantic issue of development. Using a collection of data, from different developing countries, Schultz 2001, showed that the effect of female education on economic growth is far more than that of educating a male. The gender gap in educational distribution may haunt the family in particular and nations in general. In order to capture, such normative approach of economic development we need to look beyond the absolute level.

Generally standard deviation and Gini coefficient are often used to measure inequality. Standard deviations of school attainment are used in a few studies (Ram 1990, Londono 1990). Ram, Londono used standard development of schooling to investigate absolute dispersion of human capital. But for measuring relative gender inequality, construction and use of educational Gini are very much needed. Wang and Fan, others have recently developed educational Lorenz and Gini coefficient on the basis of attainment data. But the concept of gender gap in educational Lorenz distribution is new and we introduce this concept and use it as an indicator of relative gender deprivation.

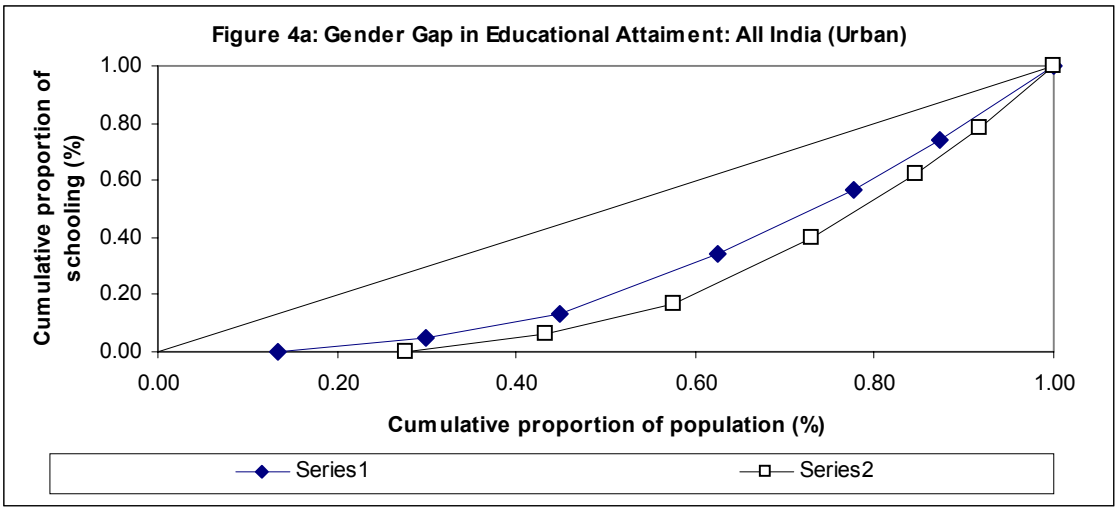
On the basis of NSSO 55^{th} round data, we construct Educational Lorenz Distribution and corresponding deprivation coefficient in the following manner. Instead of showing different levels of education, we have tried to represent, percentage of people below different scholastic attainment level. A handy device for representing this data is sex specific Lorenz distribution of scholastic attainment level. The education Lorenz curve is constructed by putting the cumulative proportion of population on the horizontal axis, and

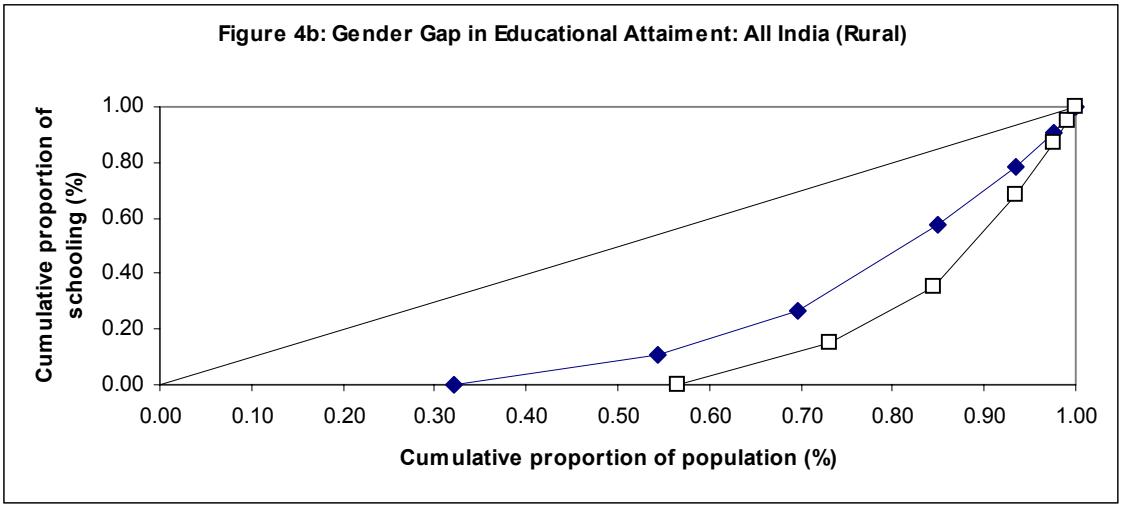
by putting the cumulative proportion of schooling on vertical axis. The cumulative proportion of population at each level is given by[10]:
Illiterate: Q1 = p1
Partial-Primary: Q2 = p1 + p2
Complete-Primary: Q3 = p1 + p2 + p3
……
Complete-Tertiary: Q7 = p1 + p2 + p3 + p4 + p5 + p6 + p7 = 100%
The cumulative proportion of schooling at each level of schooling is as follows.
Illiterate: S1 = (p1 y1) / μ =0
Partial-Primary: S2 = (p1 y1 + p2 y2) / μ
Complete-Primary S3 = (p1 y1 + p2 y2 + p3 y3) / μ
……
Complete-Tertiary: S7 = (p1 y1 + p2 y2 + p3 y3 + p4 y4 + p5 y5 + p6 y6 + p7 y7) / μ
= μ / μ = 100%

Use of Lorenz curves for males and females in the same diagram, - a pictographic representation of data is useful in this particular context, since these two Lorenz curves never cross for the simple reason that, gender deprivation in education persists for al levels of scholastic attainment. Secondly a convenient measure of the area between the two curves is the half of the difference in educational Gini coefficient for males and females.

Following figures 4A and 4B are for urban and rural areas respectively. Figures show higher gender deprivation in educational attainment among the rural population than that of urban segments.

[10] P_i denotes proportion of population in each educational level, given in Appendix II.





All India level inequality in educational attainment is instructive, but for effective state level policy prescription dis-aggregation is necessary. India is a country with wide regional inequality in many sphere of Social development. On one hand we have the states like Madhya Pradesh, Orissa, and Rajasthan, where the level of Per Capita income is somewhat comparable with countries of Sub Saharan Africa. On the other hand Per Capita N.S.D.P of Punjab, Gujarat, Karnataka and Maharashtra are as high as some developed countries. Levels of health development are also not very uniform among the different states of India. In a previous study[11] we found high levels of health development (proxied by low value of IMR) in Kerala,

[11] Siddhanta & Nandy, "Levels of Health Development in Rural India: An Exploration with Infant Mortality Rate"

North Eastern region, Karnataka and Gujarat whereas states like Madhya Pradesh, Rajasthan have very low level of health development (IMR>14).

Gender disparity is also not unvarying within different states in India. Filmer, King, Pritchett (1998), had argued that there are much greater differences in gender disparity among the states of the India than in the countries in the rest of the world. The standard deviation, they found was almost twice for Indian states than for the non-South Asian countries. Some Indian states have quite low mortality differentials; actually slightly favouring females while many other Indian states have ratios higher than any other countries of the world. Filmer et al. also found wide gender differential in educational achievement among the states of India. They stated "India has states with no gender disparity at all (Kerala) and states in which girls are only half as likely to attain school (e.g., Rajasthan). Such regional inequality in many spheres of social development compels us to undertake state level disaggregated analysis to focus the specific states or sub regions where such disturbing phenomenons are observed. State level gender specific analyses clearly show varying level of relative gender deprivation in educational attainment[12]. Area representing gender deprivation in education is considerably high among the rural population. Rajasthan on one hand has the highest deprivation and Mizoram has the lowest 'Lorenz Difference'. In order to measure relative gender deprivation in educational attainment we use Fan, Wang's formula on education Gini. The educational Gini formula used in this paper is shown in equation –

$$E_L = 1/\mu \sum_{i=2}^{n} \sum_{j=1}^{i-1} P_i \, | y_i - y_j | \, P_j$$

where,

E_L is the educational Gini based on educational attainment distribution, large sample.

μ is the average years of schooling for the concerned population.

P_i, P_j stands for the proportion of population with certain levels of schooling.

Y_i ,y_j are the years of schooling at different educational attainment levels.

N is the number of levels/categories.

[12] State level gender specific educational Lorenz curve for both the rural and urban population are given in Appendix I

Using this formula we calculate education Gini coefficient for male and for female. Expansion of the equation and the formula for calculating the years of schooling are appended herewith (Appendix –II).

Obtaining the educational Gini for male and female, we can readily classify the states in four different categories.

Table 3a: 2 × 2 State Classification on the basis of Male & Female Educational Gini: All India (Rural), 1999 – 2000

	High Female Educational Gini (More than national average)	Low Female Educational Gini (Less than or equal to national average)
High Male Educational Gini (More than national average)	Rajasthan, Uttar Pradesh, Madhya Pradesh, Orissa, Bihar, Andhra Pradesh	Arunachal Pradesh
Low Male Educational Gini (Less than or equal to national average)		Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Gujarat, West Bengal, Sikkim, Assam, Meghalaya, Nagaland, Manipur, Mizoram, Tripura, Maharashtra, Karnataka, Goa, Tamil Nadu, Kerala

Table 3b: 2 × 2 State Classification on the basis of Male & Female Educational Gini: All India (Urban), 1999 – 2000

	High Female Educational Gini (More than national average)	Low Female Educational Gini (Less than or equal to national average)
High Male Educational Gini (More than national average)	Haryana, Rajasthan, Uttar Pradesh, Madhya Pradesh, Orissa, Bihar, Andhra Pradesh	Jammu & Kashmir
Low Male Educational Gini (Less than or equal to national average)	Punjab	Himachal Pradesh, Gujarat, West Bengal, Sikkim, Assam, Meghalaya, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Maharashtra, Karnataka, Goa, Tamil Nadu, Kerala

The difference between male and female Gini coefficient is considered as the relative gender deprivation in education attainment – an indicator of entitlement failure. Calculating the deprivation coefficient in the above manner, if we sort the states according to their coefficient values, we get a geographical contiguity where relative gender inequality in education is considerably high. Following tables confirm spatial contiguity in relative gender inequality in education.

Table 4: Relative Gender Deprivation in Education Attainment: All States 1999-2000 (Urban And Rural)

State	*RGDE urban*	State	*RGDE rural*
MIZORAM	-0.01	MIZORAM	0.01
KERALA	0.03	MEGHALAYA	0.05
MEGHALAYA	0.06	ARUNACHAL PRADESH	0.06
NAGALAND	0.06	KERALA	0.06
HIMACHAL PRADESH	0.06	TRIPURA	0.06
ASSAM	0.07	MANIPUR	0.09
ARUNACHAL PRADESH	0.07	NAGALAND	0.09
GOA	0.08	ASSAM	0.09
SIKKIM	0.08	SIKKIM	0.10
WEST BENGAL	0.09	PUNJAB	0.10
PUNJAB	0.09	WEST BENGAL	0.11
TAMIL NADU	0.09	ANDHRA PRADESH	0.11
MANIPUR	0.09	GOA	0.13
KARNATAKA	0.09	MADHYA PRADESH	0.13
TRIPURA	0.10	HIMACHAL PRADESH	0.13
MAHARASHTRA	0.10	BIHAR	0.14
GUJARAT	0.11	TAMIL NADU	0.15
UTTAR PRADESH	0.12	KARNATAKA	0.15
ANDHRA PRADESH	0.13	ORISSA	0.15
MADHYA PRADESH	0.13	MAHARASHTRA	0.16
HARYANA	0.13	HARYANA	0.16
ORISSA	0.13	UTTAR PRADESH	0.17
BIHAR	0.14	RAJASTHAN	0.18
J&k	0.15	GUJARAT	0.19
RAJASTHAN	0.18	J&k	0.22

Note: shaded cells show Relative Gender Deprivation in Education Attainment ≥ 0.10 percentage point.

Source: Authors calculation from NSSO 55th Round data on 'Literacy and Levels of Education in India, 1999–2000"

V

Above two sections do point out persistence of gender gap in education at the national and at the sub-national level. The analysis, however, is not confined within gender gap in literacy rate, but also considers average years of schooling & distributional aspect of educational attainment. Like concept of development, equitable educational development does not depend only on average years of schooling, but also on the educational Gini coefficient. Combining these two aspects we can form a welfare function – Equitable Educational Development[13] (EED) = f (μ, G) where $\partial EED/\partial \mu > 0$ and $\partial EED/\partial G < 0$. [μ = Average years of schooling, G = Educational Gini coefficient].

Gender gap in EED differs due to the difference in the average years of schooling and due to the difference in educational distribution. In order to analyse the difference in EED, following decomposition analysis is undertaken. Such decomposition of educational development has not been exercised in past. Here, probably we conduct for the first time a gender decomposition of equitable educational development at the national and at the state level. We decompose gender gap in EED and measure how much of it is due to gender gap in average years of schooling and how much of it is due to gender gap in educational Gini.

EED depends on average years of schooling, minimum educational benchmark level and educational Gini coefficient; i.e.,

$EED = E(\mu, G, \beta)$ Where μ: average years of schooling
G: educational Gini coefficient
β: minimum educational benchmark

Minimum educational benchmark is the basic right for all. So β can be assumed to be constant. Then the function can be restated as,
$EED = E(\mu, G)$. Let us assume that the EED for male is $EED_m = E(\mu_m, G_m)$, similarly for female $EED_f = E(\mu_f, G_f)$. As the average years of schooling and educational Gini coefficient is not affected by absolute number of people, EED_m and EED_f are independent of population size. Gender gap in EED is simply $\Delta EED = E(\mu_m, G_m) - E(\mu_f, G_f)$.

Gender gap in EED occurs, because of the gender disparity in average years of schooling and gender gap in educational Gini. The decomposition helps

[13] EED, henceforth

us to understand how much of the total difference can be attributed to gender gap in average years of schooling and how much is due to gender gap in education Gini.

For decomposition first we need to construct hypothetical educational development levels. E (μ_m,G_f) tells us the EED for female if average years of schooling for the female have been the average years of schooling for male without any change in distribution of education. Similarly E (μ_f,G_m) tells us the EED for female if female educational Gini have been the educational Gini of the male, considering average years of schooling to be constant.

Using this hypothetical EED levels, the gender gap in EED can be decomposed in two ways.

1. One way is to first change the female average years of schooling and then distribution of education.
2. Another way is to first change the educational Gini coefficient and then change its average years of schooling.

Since there is no any hard and first rule to prefer one sequence to the other, we can take an average of their components and make the decomposition path independent.

Gender gap in EED arising purely from the gender gap in average years of schooling (setting the effect of gender gap in education Gini constant) is given by

$$\Delta EED\ (\mu) = [\{D\ (\mu_m, G_f) - D\ (\mu_f, G_f)\}/2 + \{D\ (\mu_m, G_m) - D(\mu_f, G_m)\}/2]$$

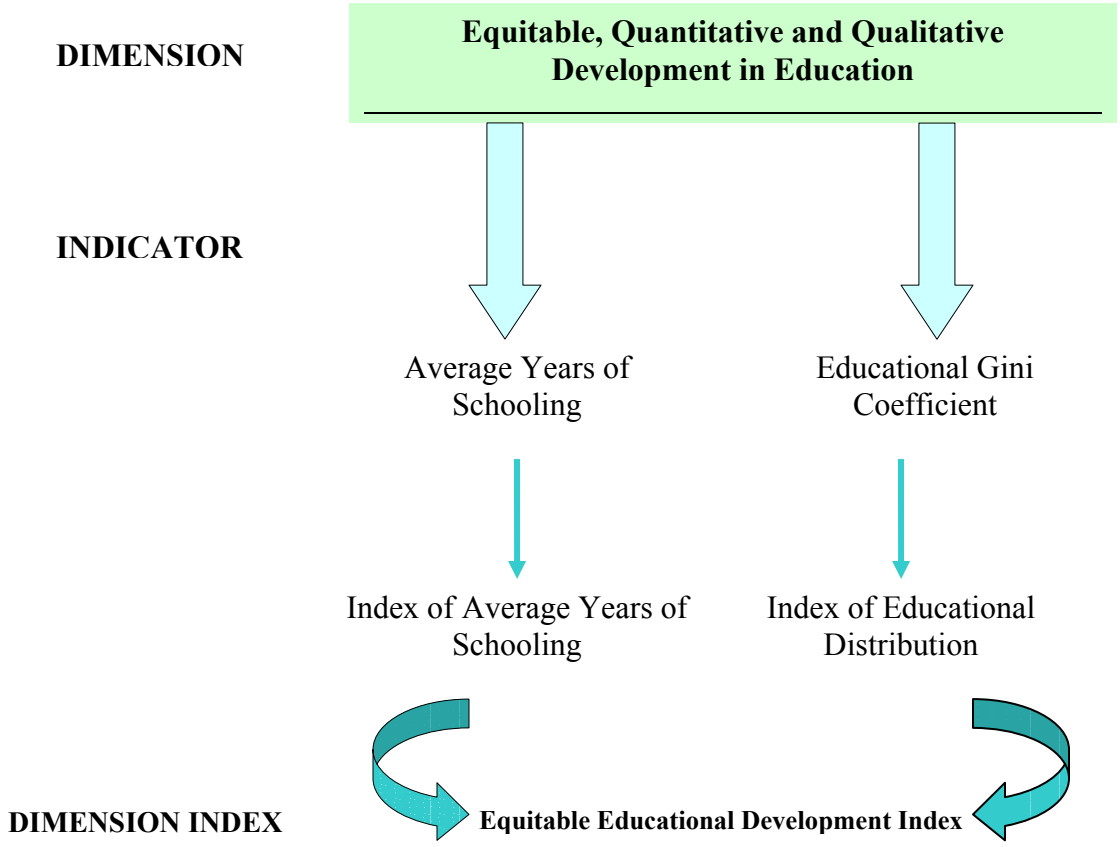
Similarly, gender gap in EED arising purely from the gender gap in education Gini (setting the effect of gender gap in average years of schooling to be constant) is given by

$$\Delta EED\ (G) = [\{D\ (\mu_m, G_m) - D\ (\mu_m, G_f)\}/2 + \{D\ ((\mu_f, G_m) - D(\mu_f, G_f)\}/2]$$

Gender gap in average years of schooling and gender gap in education Gini thus fully explain gender gap in EED, i.e., the decomposition is complete and has no residual. Gender gap in EED, hence, can be decomposed into a mean component and a distribution component.

Gender gap in EED = Gender gap in EED due to Gender gap in average years of schooling + Gender gap in EED due to Gender gap in education Gini.

Following theoretical structure, first we construct EED for male and female, then we measure the gender gap in EED as shown in following table 5a & 5b. The operational formula for equitable educational development used in this paper is:
(Index of Average years of Schooling * Index of Educational Distributional) i.e., $I_{\mu}(1 - G)$[14]. The following diagram offer a clear overview of how the equitable Educational Development Index used in this paper are constructed.



[14] Instead of taking average years of schooling we have instead used an index for average years of schooling following UNDP's methodology. Here

$$\text{Educational Attainment Index} = \frac{(\text{Actual level of Educational Attainment} - \text{Minimum level of Education})}{(\text{Maximum level of Educational Attainment} - \text{Minimum level of Education})}$$

Table 5a: Gender Gap in EED: All India (Rural) 1999-2000

	MALE			FEMALE			
	Index of average years of schooling	Index of educational distribution	EED male	Index of average years of schooling	Index of educational distribution	EED female	Gender gap in EED
Jammu & Kashmir	0.35	0.53	0.18	0.20	0.34	0.07	0.12
Himachal Pradesh	0.38	0.56	0.21	0.27	0.43	0.12	0.10
Punjab	0.30	0.46	0.14	0.23	0.36	0.08	0.06
Haryana	0.33	0.48	0.16	0.18	0.32	0.06	0.10
Rajasthan	0.25	0.42	0.11	0.08	0.18	0.01	0.09
Uttar Pradesh	0.28	0.42	0.12	0.12	0.23	0.03	0.09
Madhya Pradesh	0.23	0.40	0.09	0.10	0.23	0.02	0.07
Gujarat	0.31	0.49	0.15	0.17	0.30	0.05	0.10
Orissa	0.26	0.42	0.11	0.15	0.27	0.04	0.07
Bihar	0.23	0.36	0.08	0.09	0.17	0.02	0.07
West Bengal	0.27	0.46	0.12	0.17	0.35	0.06	0.07
Sikkim	0.30	0.51	0.15	0.23	0.42	0.10	0.06
Assam	0.31	0.51	0.16	0.23	0.40	0.09	0.07
Meghalaya	0.24	0.53	0.13	0.23	0.49	0.11	0.02
Auranachal Pradesh	0.25	0.38	0.09	0.17	0.30	0.05	0.04
Nagaland	0.39	0.59	0.23	0.30	0.51	0.15	0.08
Manipur	0.39	0.53	0.21	0.29	0.43	0.12	0.09
Mizoram	0.38	0.65	0.24	0.35	0.64	0.23	0.02
Tripura	0.31	0.56	0.17	0.22	0.46	0.10	0.07
Maharashtra	0.36	0.54	0.19	0.22	0.38	0.08	0.11
Andhra Pradesh	0.22	0.36	0.08	0.12	0.23	0.03	0.05
Karnataka	0.30	0.45	0.14	0.18	0.30	0.05	0.09
Goa	0.49	0.65	0.32	0.36	0.50	0.18	0.14
Tamil Nadu	0.31	0.49	0.15	0.21	0.35	0.07	0.08
Kerala	0.45	0.67	0.30	0.41	0.61	0.25	0.05
India	0.28	0.44	0.13	0.16	0.28	0.04	0.08

Source: Authors calculation from NSSO 55th Round data on 'Literacy and Levels of Education in India, 1999–2000"

Table 5b: Gender Gap in EED: All India (Urban) 1999-2000

	MALE			FEMALE			
	Index of average years of schooling	Index of educational distribution	EED male	Index of average years of schooling	Index of educational distribution	EED female	Gender gap in EED
Jammu & Kashmir	0.50	0.62	0.31	0.35	0.48	0.17	0.14
Himachal Pradesh	0.58	0.68	0.40	0.52	0.62	0.32	0.07
Punjab	0.45	0.57	0.26	0.40	0.50	0.20	0.05
Haryana	0.45	0.58	0.26	0.36	0.46	0.16	0.10
Rajasthan	0.48	0.59	0.28	0.30	0.41	0.12	0.16
Uttar Pradesh	0.42	0.53	0.22	0.32	0.40	0.13	0.09
Madhya Pradesh	0.46	0.57	0.27	0.33	0.44	0.14	0.12
Gujarat	0.50	0.64	0.32	0.39	0.52	0.21	0.12
Orissa	0.43	0.57	0.25	0.32	0.45	0.14	0.11
Bihar	0.44	0.53	0.24	0.30	0.40	0.12	0.12
West Bengal	0.49	0.61	0.30	0.39	0.52	0.20	0.09
Sikkim	0.45	0.61	0.27	0.41	0.54	0.22	0.05
Assam	0.52	0.65	0.34	0.43	0.56	0.24	0.10
Meghalaya	0.55	0.69	0.38	0.47	0.61	0.29	0.10
Auranachal Pradesh	0.55	0.67	0.37	0.40	0.58	0.24	0.14
Nagaland	0.54	0.68	0.37	0.46	0.61	0.28	0.09
Manipur	0.60	0.70	0.42	0.48	0.58	0.28	0.14
Mizoram	0.53	0.73	0.38	0.50	0.72	0.36	0.02
Tripura	0.49	0.63	0.31	0.38	0.52	0.20	0.11
Maharashtra	0.52	0.66	0.34	0.42	0.56	0.24	0.11
Andhra Pradesh	0.48	0.58	0.27	0.33	0.45	0.15	0.13
Karnataka	0.53	0.64	0.34	0.42	0.55	0.23	0.11
Goa	0.53	0.66	0.35	0.46	0.58	0.27	0.08
Tamil Nadu	0.50	0.64	0.32	0.40	0.54	0.21	0.11
Kerala	0.52	0.71	0.37	0.49	0.67	0.33	0.04
India	0.49	0.61	0.29	0.38	0.49	0.19	0.11

Source: Authors calculation from NSSO 55th Round data on 'Literacy and Levels of Education in India, 1999–2000"

Next we decompose Gender Gap in Equitable Educational Development for urban as well as rural population. Results of the decomposition analysis are reported in following table 6a and 6b.

Table 6a: Decomposition of the Gender Gap in Equitable Educational Development (EED): All India (Rural), 1999-2000

States	Gender gap in EED	Effect of Gender Gap in Educational Distribution	Effect of Gender Gap in Average years of Schooling
Jammu & Kashmir	0.115	0.051	0.064
Himachal Pradesh	0.096	0.040	0.056
Punjab	0.056	0.025	0.031
Haryana	0.100	0.042	0.059
Rajasthan	0.092	0.040	0.052
Uttar Pradesh	0.088	0.039	0.050
Madhya Pradesh	0.070	0.029	0.041
Gujarat	0.100	0.046	0.054
Orissa	0.070	0.031	0.039
Bihar	0.068	0.029	0.038
West Bengal	0.065	0.025	0.040
Sikkim	0.056	0.023	0.032
Assam	0.069	0.029	0.040
Meghalaya	0.016	0.011	0.005
Auranachal Pradesh	0.045	0.017	0.027
Nagaland	0.082	0.031	0.051
Manipur	0.085	0.037	0.048
Mizoram	0.016	0.002	0.015
Tripura	0.073	0.024	0.048
Maharashtra	0.110	0.046	0.064
Andhra Pradesh	0.052	0.022	0.030
Karnataka	0.085	0.037	0.048
Goa	0.139	0.064	0.075
Tamil Nadu	0.079	0.036	0.043
Kerala	0.051	0.025	0.026
India	0.081	0.035	0.046

Legend:

Above 0.081 (national average)	Above 0.035 (national average)	Above 0.046 (national average)

Observations: Different States need to follow different strategies. The effect of gender gap in Average years of schooling is higher than the effect of gender gap in Educational Distribution. Shaded cells contains value higher than the national average

Table 6b: Decomposition of the Gender Gap in Equitable Educational Development (EED): All India (Urban), 1999-2000

States	Gender gap in EED	Effect of Gender Gap in Educational Distribution	Effect of Gender Gap in Average years of Schooling
Jammu & Kashmir	0.143	0.062	0.081
Himachal Pradesh	0.072	0.033	0.040
Punjab	0.054	0.029	0.025
Haryana	0.095	0.048	0.048
Rajasthan	0.161	0.073	0.088
Uttar Pradesh	0.095	0.046	0.049
Madhya Pradesh	0.123	0.055	0.068
Gujarat	0.116	0.054	0.062
Orissa	0.105	0.046	0.059
Bihar	0.117	0.051	0.065
West Bengal	0.092	0.038	0.054
Sikkim	0.051	0.027	0.024
Assam	0.096	0.040	0.056
Meghalaya	0.097	0.042	0.056
Auranachal Pradesh	0.135	0.044	0.092
Nagaland	0.093	0.039	0.054
Manipur	0.145	0.067	0.078
Mizoram	0.024	0.003	0.021
Tripura	0.109	0.048	0.061
Maharashtra	0.107	0.048	0.059
Andhra Pradesh	0.126	0.051	0.075
Karnataka	0.109	0.045	0.063
Goa	0.085	0.039	0.046
Tamil Nadu	0.108	0.048	0.060
Kerala	0.036	0.018	0.018
India	0.107	0.048	0.059

Legend:	Above 0.107 (national average)	Above 0.048 (national average)	Above 0.059 (national average)

Observations: Different States need to follow different strategies. The effect of gender gap in Average years of schooling is higher than the effect of gender gap in Educational Distribution. Shaded cells contains value higher than the national average

In the rural sector, 11 states have gender gap in EED greater than national average. Except Meghalaya[15], all the states of rural India show greater importance of Gender Gap in Average years of Schooling in explaining change in EED.

For the urban population, Jammu and Kashmir, Rajasthan, Madhya Pradesh, Gujarat, Bihar, Arunachal Pradesh, Manipur, Tripura, Andhra Pradesh, Karnataka and Tamil Nadu have higher gender gap in EED than the all India level. Such higher gender disparity is significant due to the difference in average years of schooling. In Punjab, Haryana and Sikkim gender gap in educational distribution has greater role in explaining total change in EED.

Above national level and state level decomposition exercises show that for a large number cases gender gap in EED is strictly due to the difference between males and females average years of schooling. The effect of educational distribution is much less important.

Thus the section concludes that to combat gender deprivation in EED, improvement in average years of schooling for female in particular and for all in general, might be the effective policy prescription. However the effect of gender gap in average years of schooling on gender gap in EED seems to vary across the states. Effective institutional set up can only combat such spatial variability and also can help the female to exercise their basic human right. The analysis of "Potential role of International Institution in Combating Gender Gap in Education" is beyond the scope of the paper but such analysis is currently in progress.

V

Is there any association between gender inequality and prosperity? Links between prosperity and gender inequality have found mention in the literature. Bardhan (1974) had pointed out how the relatively poorer regions of the country e.g. Kerala appear to treat their daughters better than the relatively more prosperous districts in the North-West part of the country. Recently Premi (2001) & Siddhanta et al (2003) voiced concern about the considerable female deficit among the prosperous states of our country.

[15] It should be noted in this connection, gender gap in EED in Meghalaya is found to be the lowest compared to all other states.

Within a given region, Miller 1981 & Agnihotri 2000[16] have discussed the differences in gender inequality among the propertied classes and others.

Literature on gender inequality and prosperity gives two contradictory arguments. On the one hand Agnihotri (2000), Banister (1995) argues that greater economic development and prosperity may well be associated with increased gender inequality in societies where traditional cultural bias remains entrenched. On the other hand, other school is favouring economic prosperity for combating gender disparity. Possible existence of an inverted U pattern relationship between gender disparity and economic prosperity at the household level (Kanbur and Haddad, 1994) or at societal level (Lentican 1996) comes in this category. Demographic literatures are also optimistic about the eventual gender equality at the higher levels of prosperity (Pissani and Zaba).

The subject of gender disparity has many facets. While in one of the facets increasing per capita income or economic growth may be inversely associated with gender deprivation. In another dimension, it may have positive relationship. Analysis of different facets of gender inequality and its relationship with economic growth is beyond the scope of this paper, but such analysis is currently in progress.

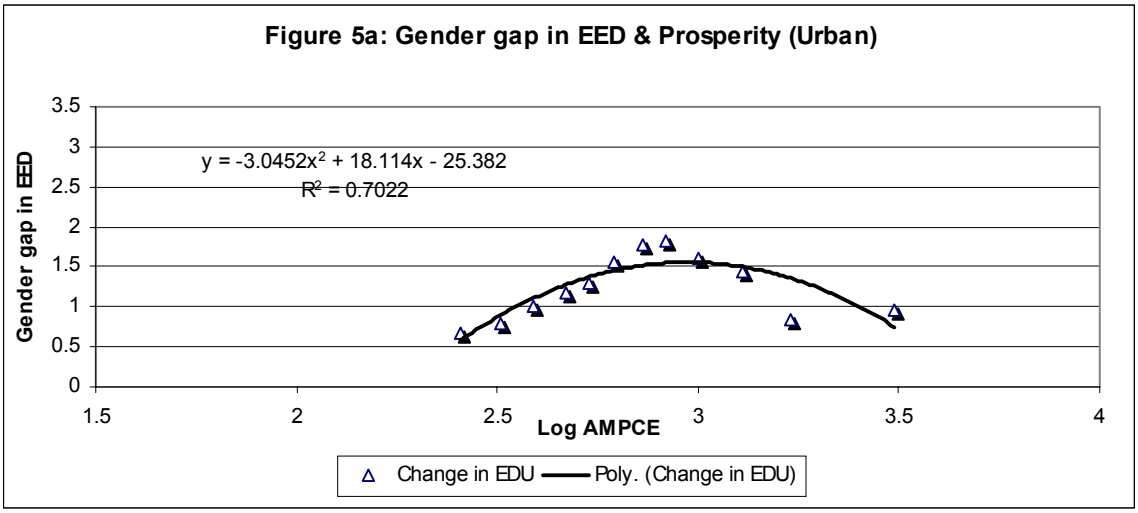
Direct links between economic prosperity and gender disparity in educational attainment have not yet been studied at length. This can be done by analyzing NSSO 55th round data on literacy and levels of education. The household consumption expenditure survey of NSSO does provide data on different levels of educational attainment for the population (7 years and above) by 12 different monthly per capita expenditure (MPCE) classes. The Average monthly per capita expenditure (AMPCE) is not affected by family size and it can be taken as a good surrogate for prosperity.

Analysis of All India level data does reveal (Figure 5a) an inverted U Pattern relationship between Gender Gap in Equitable Educational Development and logarithmic transformation of average monthly per capita expenditure for the urban population. The relationship between the two variables among the urban households can be expressed as a quadratic form:

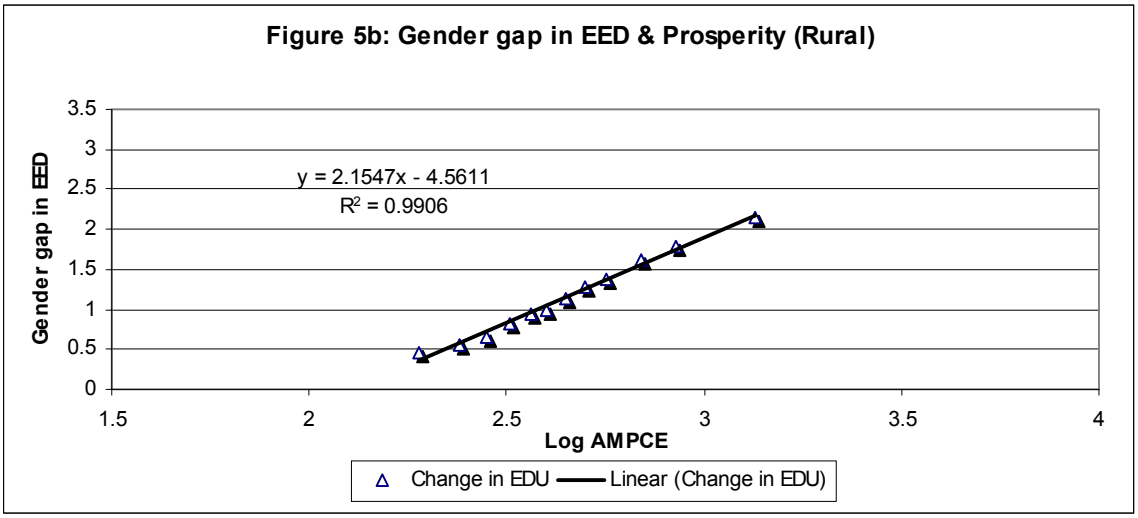
[16] Recently in a number of studies, Agnihotri, Nandy and Siddhanta have also pointed out wide variations in gender ratio within the so-called prosperous states like Gujarat, Maharashtra, Karnataka etc.

Gender Gap in EED = -3.0452 **(log AMPCE)^2** + 18.114 **log AMPCE** - 25.382 R2 = 0.7022

This pattern (as shown in figure 5) clearly indicates inverted U-pattern relationship between gender inequality (measured by gender gap in EED) with log AMPCE.



But, surprisingly, among the rural population improvement in prosperity is associated with the widening of the gender gap in EED.
Gender Gap in EED = 2.1547 **log AMPCE** - 4.5611 R^2 = 0.9906

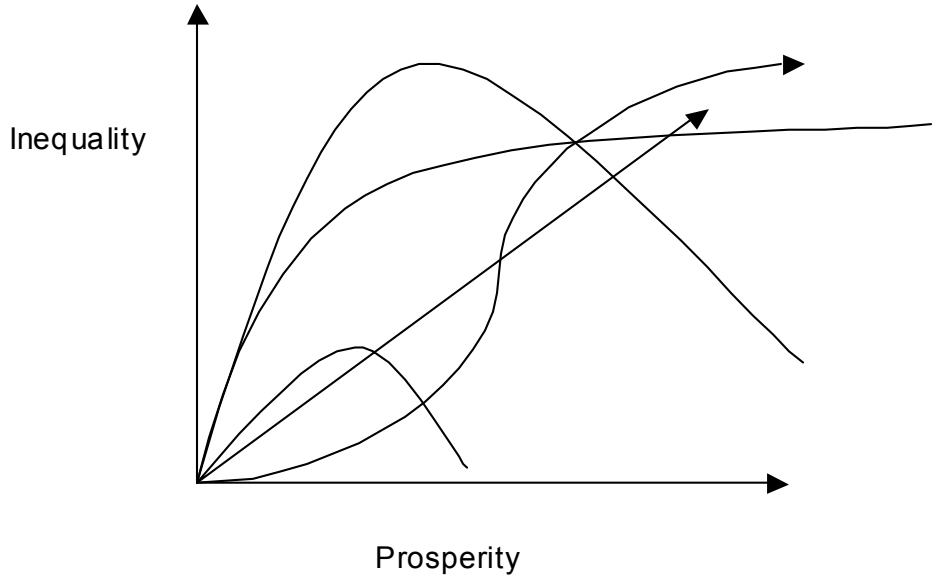


Analysis of All India level is informative but it does not cut much ice as Indian States show considerable development differential[17]. State level

[17] Above analysis though indicate that among the urban population, we have observed, a inverted U-pattern relationship between prosperity and gender inequality in education, the rural sector and surprisingly the urban sector of different states again asked apposite question.

disaggregate analysis shows that a particular level of prosperity may be helpful to combat gender differential in educational attainment for a particular state; but that same level may not reduce such inequality in other states.

Agnihotri 2000, analysed the inner dynamics of the inverted U-pattern relationship between gender equality and economic prosperity on strong logical basis. In his own words, for ascertaining inverted U-pattern relationship, "… two parameters are crucial; prosperity level at the 'turning point' and the extent of inequality at the turning point. ….. At zero prosperity level, there will be no inequality for there is nothing to share. It could increase as prosperity increases. In some cases the turning point is reached faster and the inequality at this point is low. In other cases, it can be reached only at a very high level of prosperity, and the level of inequality may be quite high. There are other intermediate variants possible as shown on the figure.



(Adopted with regards from "Sex Ratio Pattern of Indian Population: A Fresh Exploration" by Satish B. Agnihotri, Sage Publication, New Delhi)

If the turning point prosperity level is too high, the inequality will rise linearly with prosperity".

Pictographic representations of the relationship between gender gap in Education and average monthly per capita expenditure in consumption for each state are depicted in Appendix III.

Among the urban households, while the country level analysis indicates the possible existence of inverted U-pattern relationship between gender gap in EED with log AMPCE, state level disaggregative analysis do not always confirm the same. For states, where such inverted U-pattern relationship exists, prosperity and inequality level at the turning point are varying. In some states, we find linear inverse relationship between the variables, in few cases linear positive relationship exist between the variables and in some cases, no clear relationship has been observed.

Among the rural households, significant positive association between gender gap in EED and economic prosperity has been observed in most of the state even at the state levels. Why this should be so is intuitively not clear. Increasing gender gap in the wake of prosperity implies increasing discrimination against the female members or can be described as the case of men gaining more in the wake of prosperity.

Thus the analysis concludes that rising economic inequality may not attenuate gender inequality in education in Indian societies. For the majority of the population, it shows positive relationship. The convergence of prosperity and anti female bias is a matter of worry and raises questions about the pattern of 'development' we are pursuing. Gender Gap in Equitable Educational Development is a powerful barometer of the path we chose.

VI

This paper considers empirically pros and cons of using a popular summary indicator of economic development. While nobody denies that economic development is a multidimensional phenomenon, there is a strong plea, with a view to seeing the wood out of the forest, for reduction of the complex process of development in a simple indicator of rising trend of per capita income or its reliable surrogate per capita expenditure on consumption. Votaries of this summary indicator go beyond the simple logic of useful reductionism; they insist on an irrevocable co-movement of multiple components of development along with an increasing trend of per capita income. They argue, it is the latter which enforces this co-movement. Hence the argument that theories relating to factors that cause the rising trend of per capita income suffice. Adversaries argue with equal force that realities of economic development posit a conundrum: rising per capita income associates with socially regressive factors and hence is a most unreliable summary indicator of economic development.

However Simon Kuznets reconciled these warring views through a locus, which adduced evidence in favour of how some regressive factors, inspite of an early spurt show a remarkable decline along with an increasing trend of per capita income. We have observed such an inverted U-pattern relationship between gender gap in education with log AMPCE, but we have also observed it's observe.

But first of all let us talk about the regressive feature. Education is a basic human right and literacy is a significant dimension of development. Again reduction of development differential is yet another very significant goal of development. Combining these two, a measure such as equitable educational development has been constructed to give an idea of pattern of development. We use this concept but go beyond. A reduction in gender differential in terms of different achievement / opportunities is also another significant aspect of development.
Our society does not, at least on paper, discriminate against female in respect of educational opportunity. To gauge the difference between intention and consequence, and therefore to understand the nature of entitlement failure we try to see whether the difference between equitable educational development for females and that for male is significant or not as well as whether it has a definite geographical pattern across the country. Our findings show that the gender gap in education is not only significant but also have definite spatial pattern. Such pattern highlights a sad picture of entitlement failure for females, a phenomenon that provokes a deep question about the significance or depth of our development activity.

That brings us to one of the main semantic issues of development. We turn to the claim whether with increase of per capita expenditure on consumption; this regressive feature would lose its grip on our society at large that is whether inverted U relationship holds between gender gap in education and Per capita expenditure on consumption. As stated above whereas among the urban population, we have observed such a curve, the rural sector again ask apposite question.

To sum up, empirically in nature, this paper focuses how difference in gender gap in education, an indicator of entitlement failure for females, persists across the sub – continent, the depth of the problem in specific areas and whether rising per capita income / expenditure is a panacea for all. A technical working paper, this small efforts serves to highlight where the shoe pinches and how much.

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Appendix - I

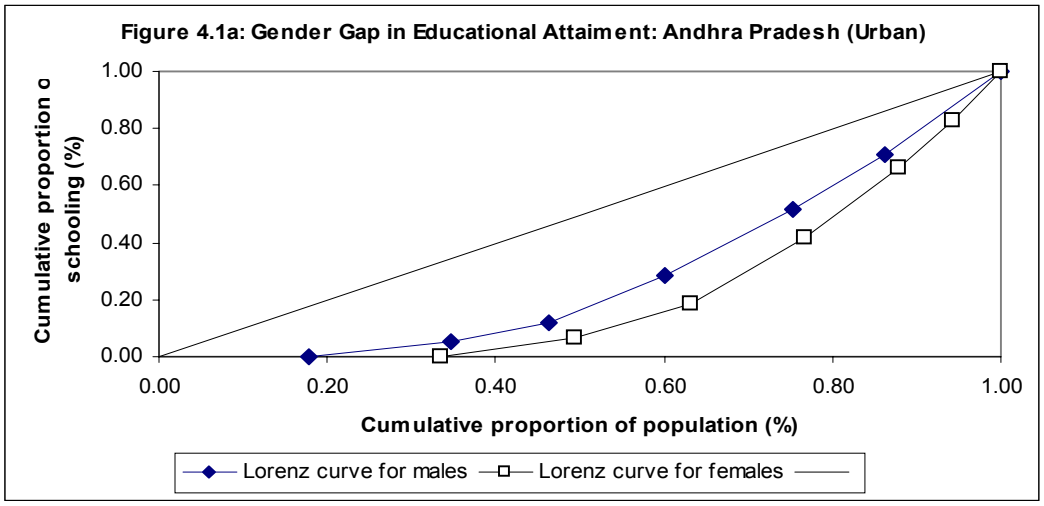


Figure 4.1a: Gender Gap in Educational Attaiment: Andhra Pradesh (Urban)
Cumulative proportion o schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

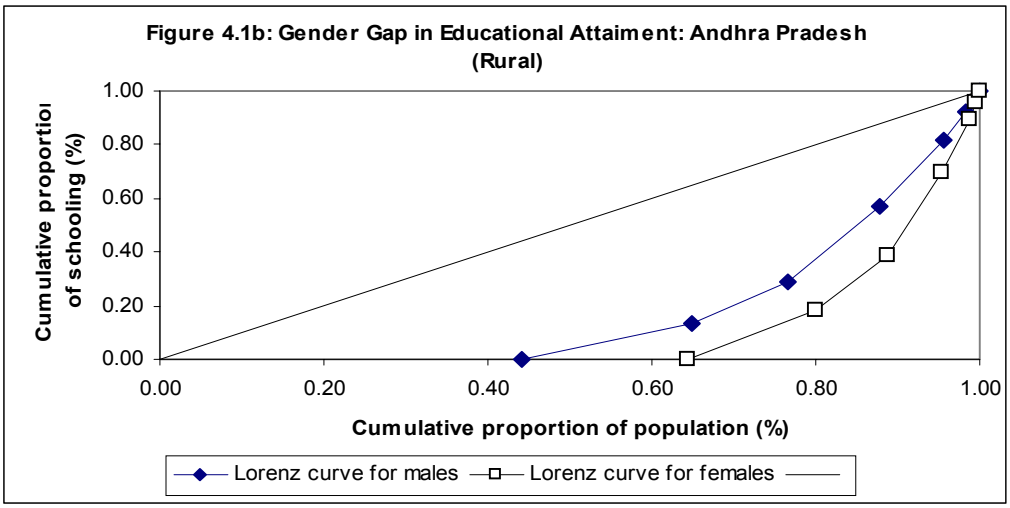


Figure 4.1b: Gender Gap in Educational Attaiment: Andhra Pradesh (Rural)
Cumulative proportio of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

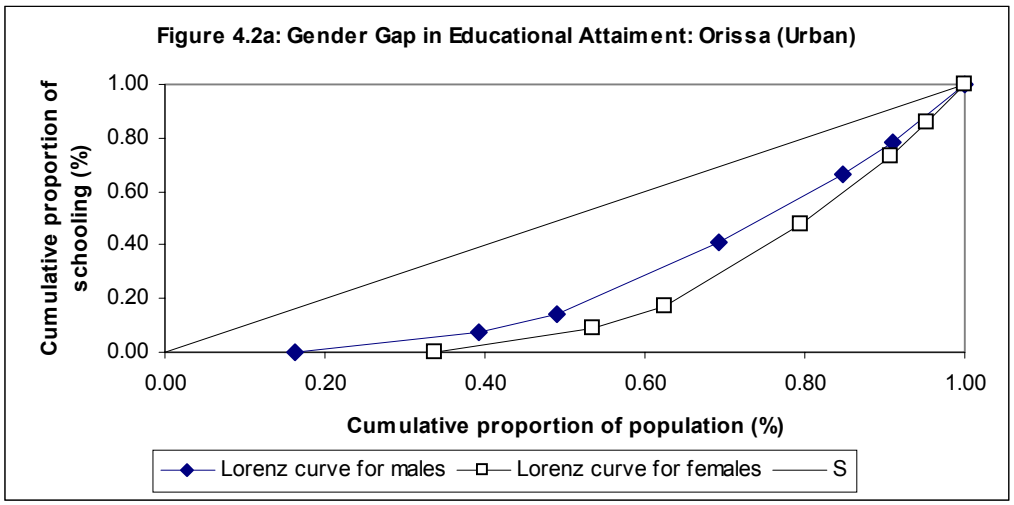


Figure 4.2a: Gender Gap in Educational Attaiment: Orissa (Urban)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females
S

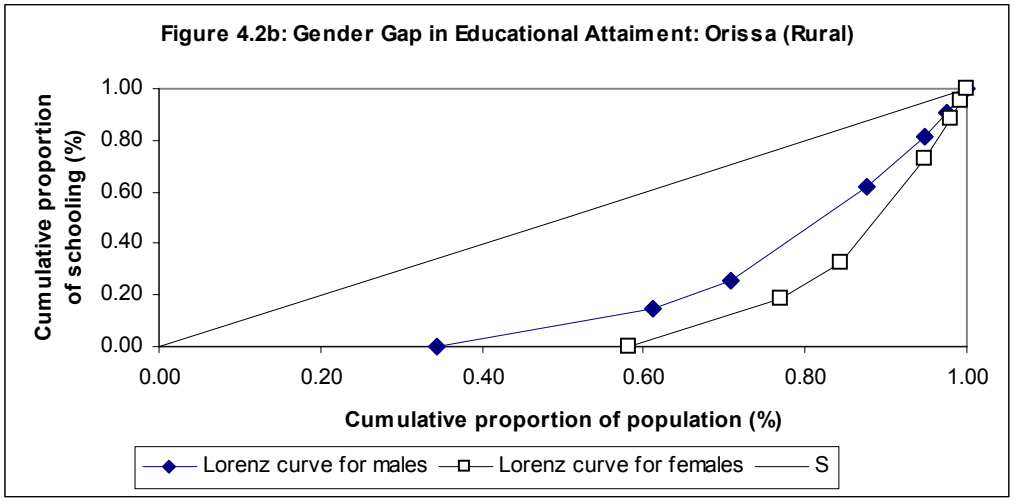


Figure 4.2b: Gender Gap in Educational Attaiment: Orissa (Rural)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females
S

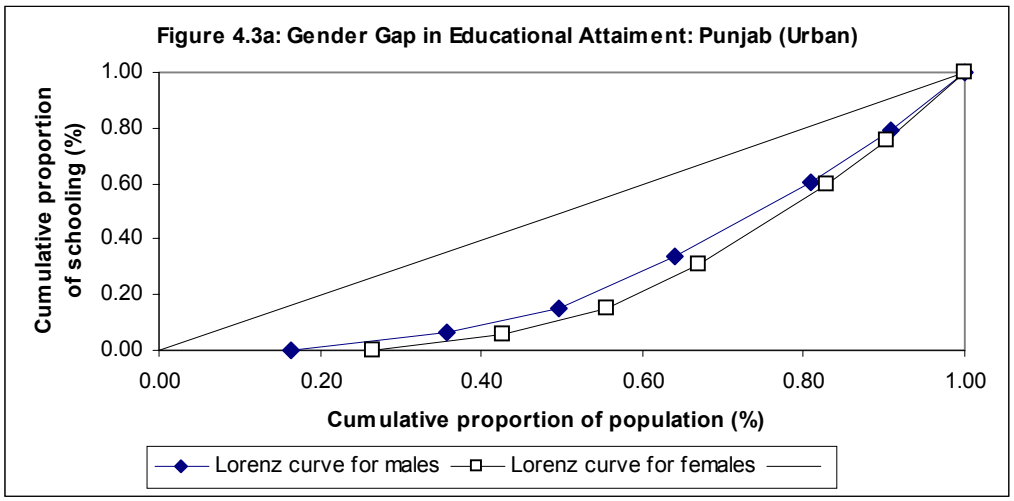


Figure 4.3a: Gender Gap in Educational Attaiment: Punjab (Urban)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

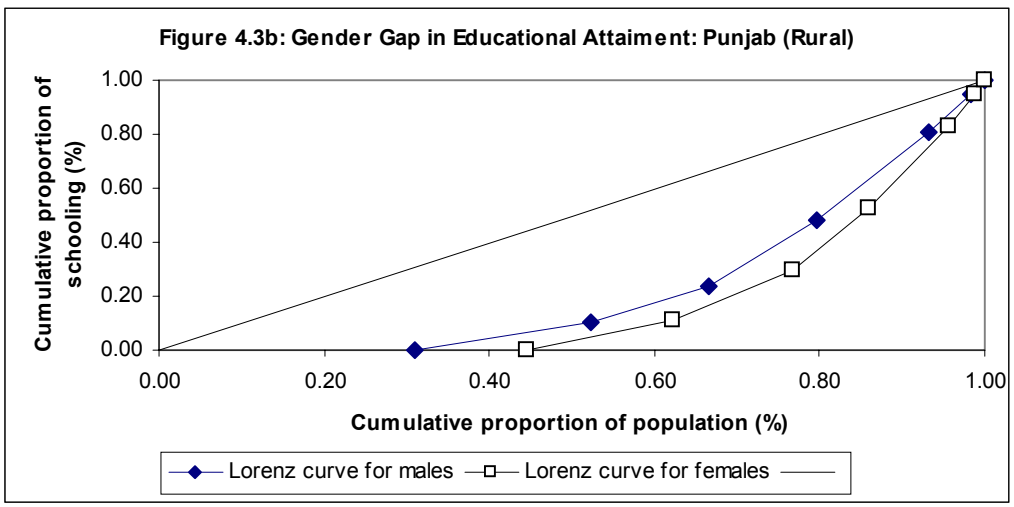


Figure 4.3b: Gender Gap in Educational Attaiment: Punjab (Rural)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

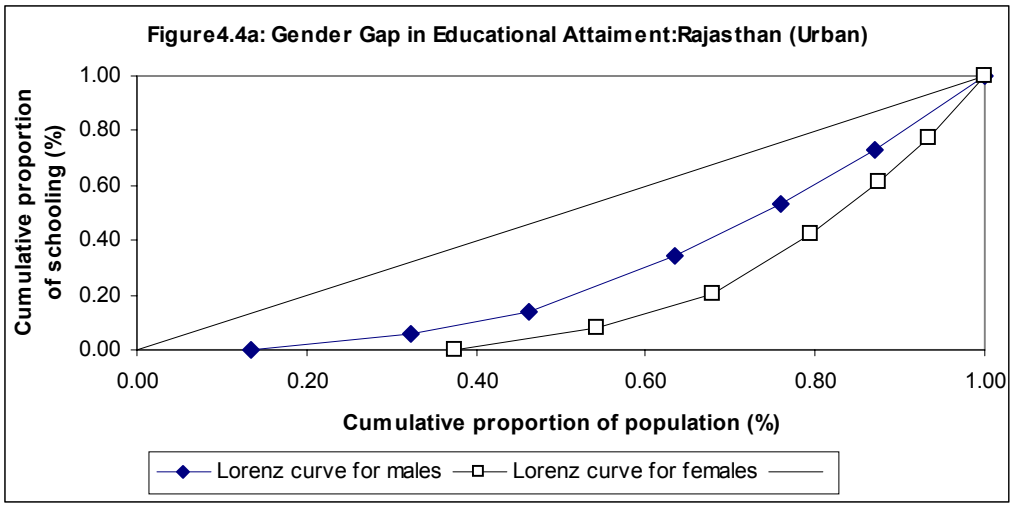


Figure4.4a: Gender Gap in Educational Attaiment:Rajasthan (Urban)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

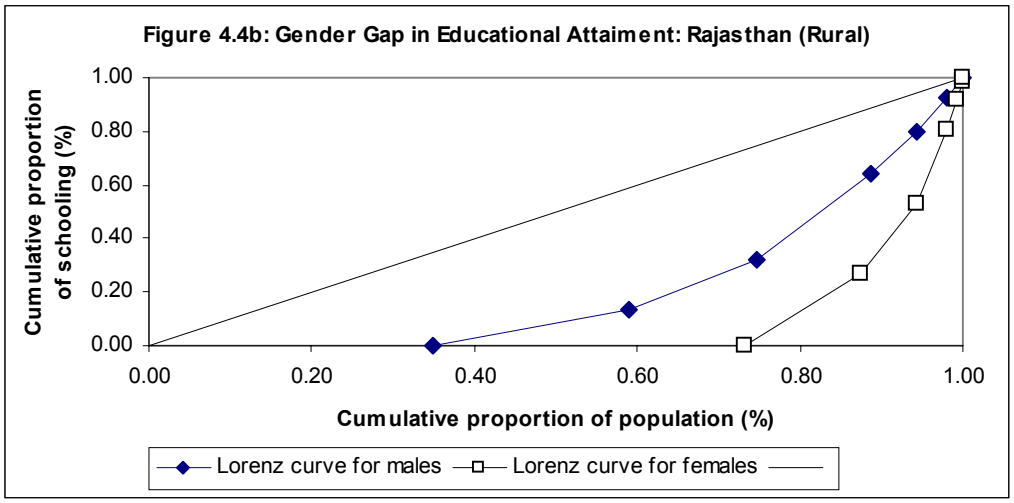


Figure 4.4b: Gender Gap in Educational Attaiment: Rajasthan (Rural)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

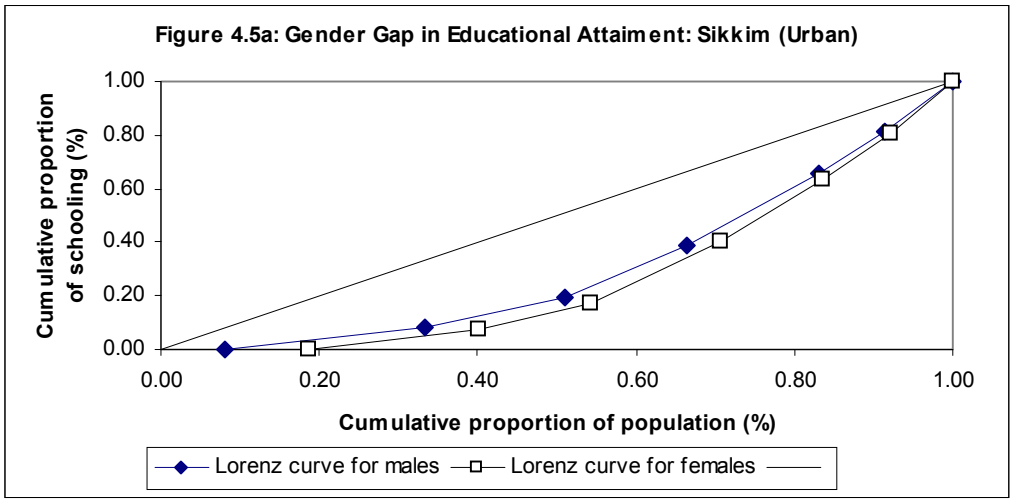


Figure 4.5a: Gender Gap in Educational Attaiment: Sikkim (Urban)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

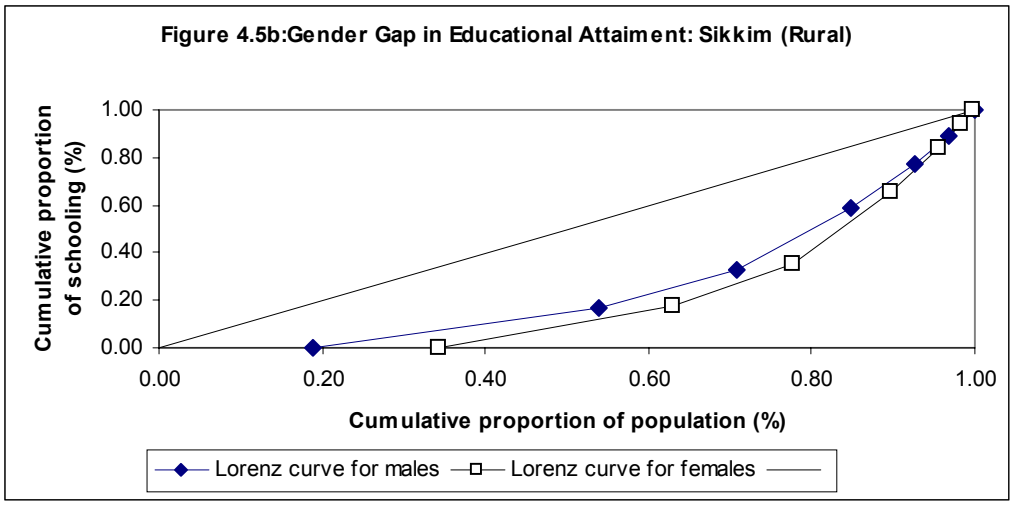


Figure 4.5b:Gender Gap in Educational Attaiment: Sikkim (Rural)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

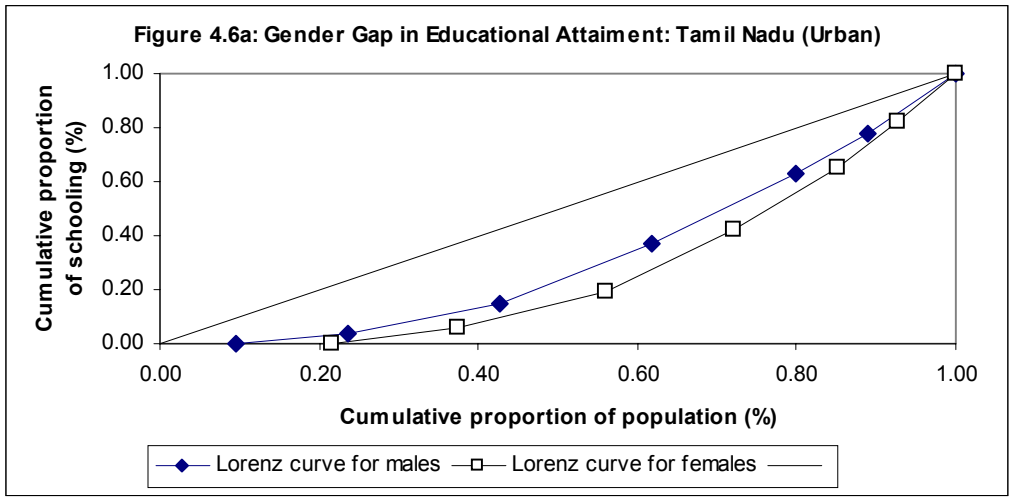


Figure 4.6a: Gender Gap in Educational Attaiment: Tamil Nadu (Urban)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

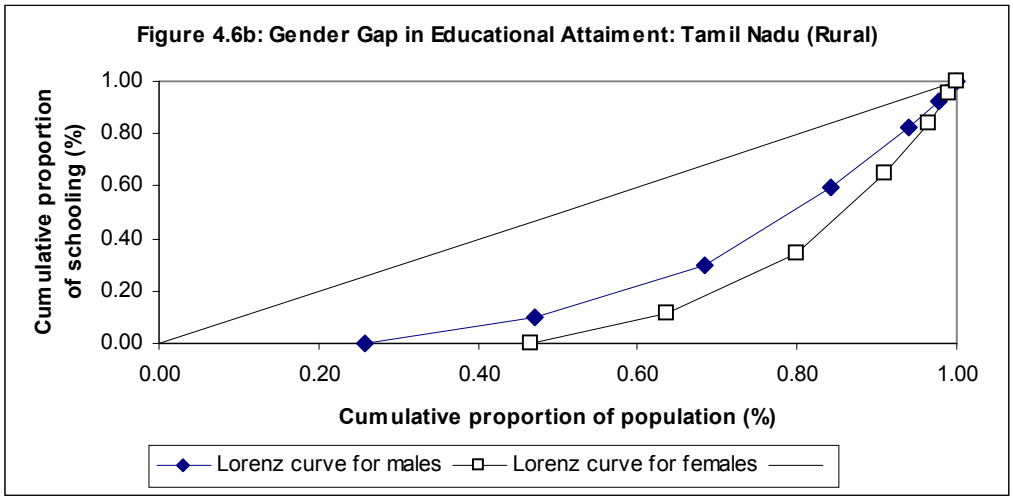


Figure 4.6b: Gender Gap in Educational Attaiment: Tamil Nadu (Rural)
Cumulative proportion of schooling (%)
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.20
0.40
0.60
0.80
1.00
Cumulative proportion of population (%)
Lorenz curve for males
Lorenz curve for females

Figure 4.7a: Gender Gap in Educational Attaiment: Tripura (Urban)

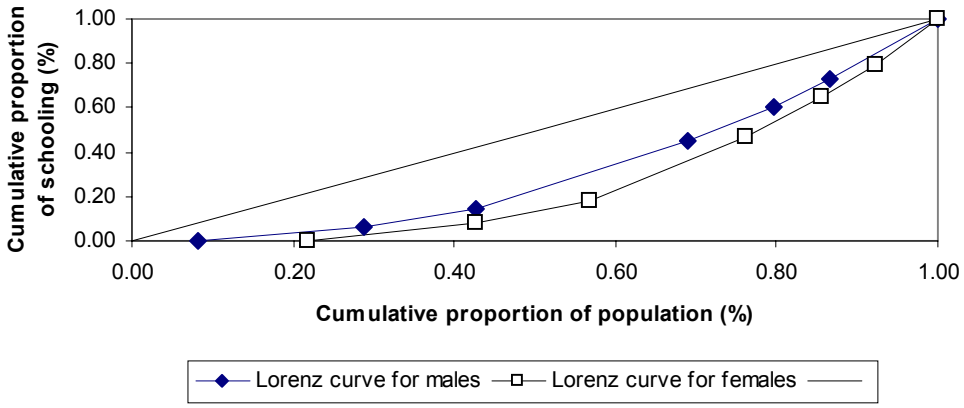


Figure 4.7b: Gender Gap in Educational Attaiment: Tripura (Rural)

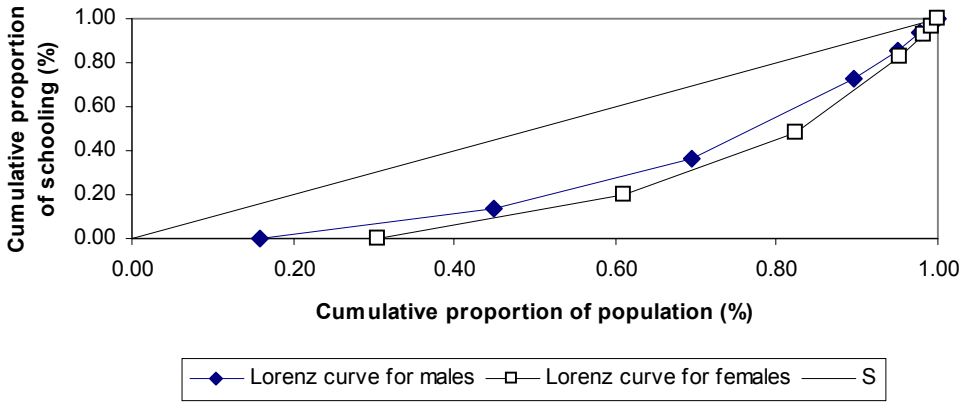


Figure 4.8a: Gender Gap in Educational Attaiment: West Bengal (Urban)

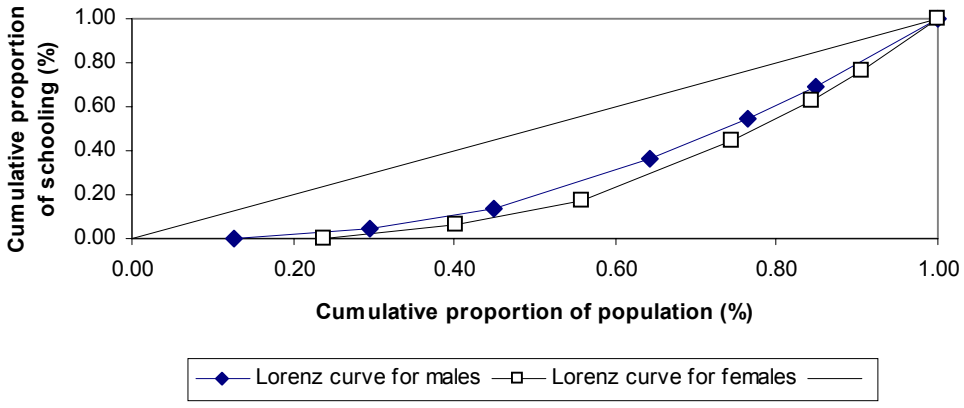


Figure 4.8b: Gender Gap in Educational Attaiment: West Bengal (Rural)

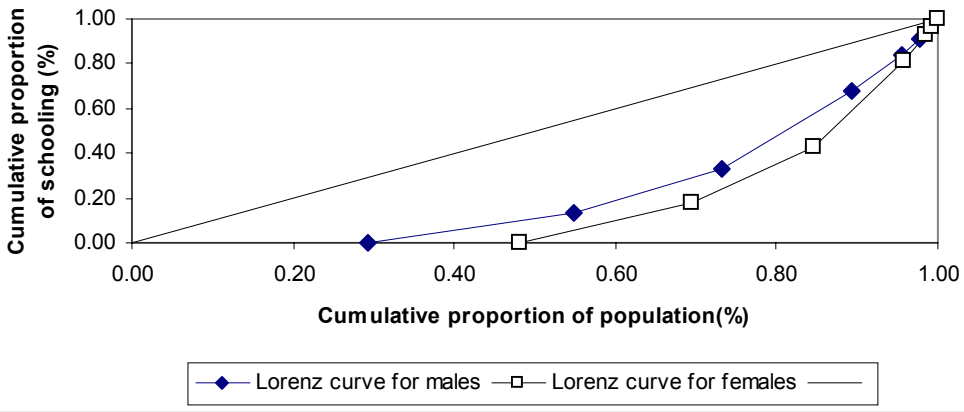


Figure 4.9a: Gender Gap in Educational Attaiment: Uttar Pradesh (Urban)

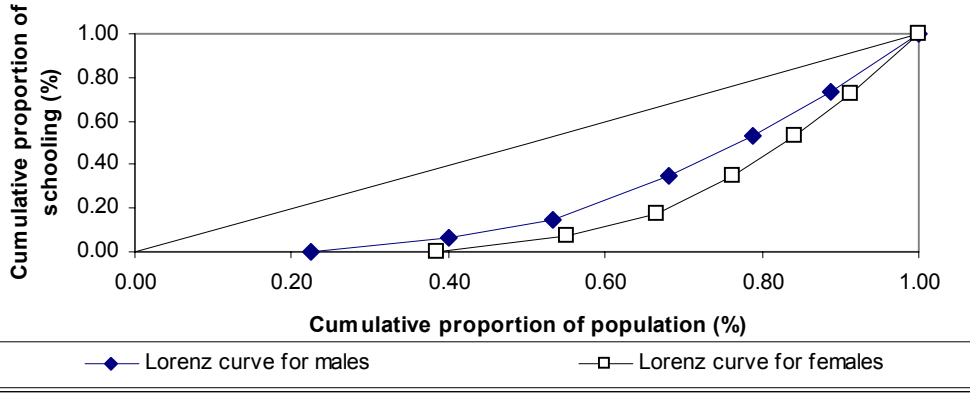


Figure 4.9b: Gender Gap in Educational Attaiment: Uttar Pradesh (Rural)

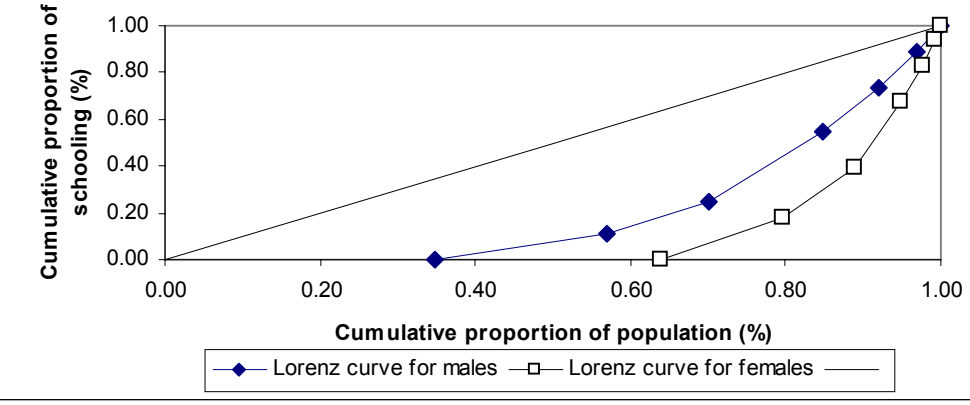


Figure 4.10a: Gender Gap in Educational Attaiment: Nagaland (Urban)

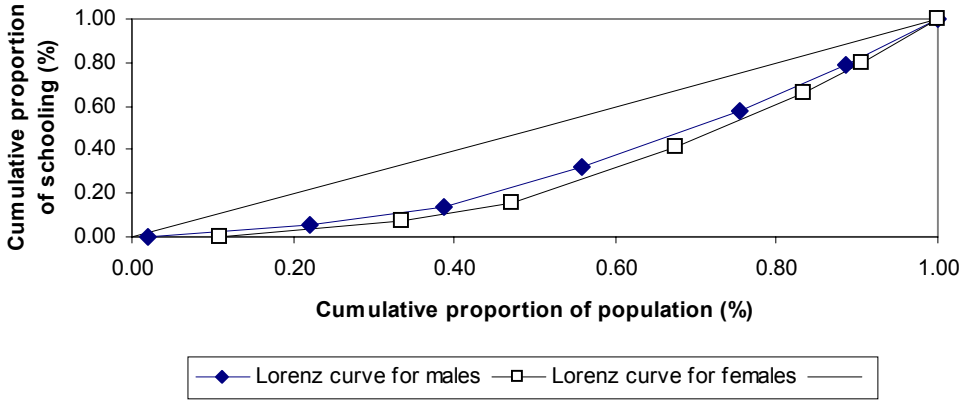


Figure 4.10b: Gender Gap in Educational Attaiment: Nagaland (Rural)

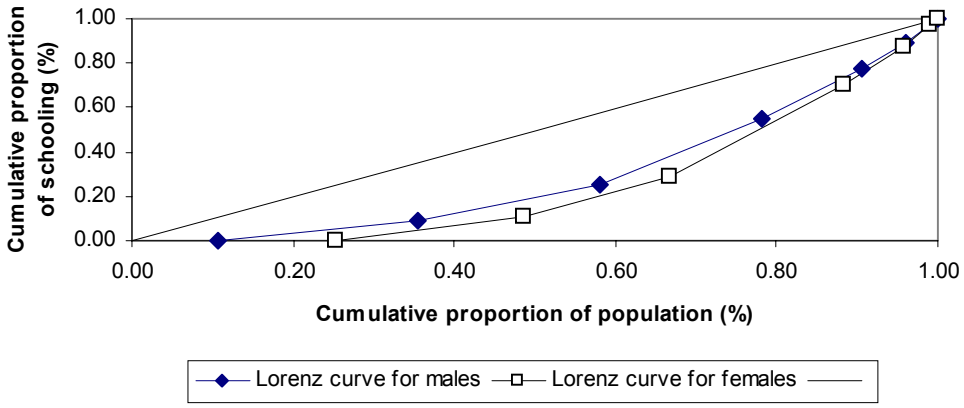


Figure 4.11a: Gender Gap in Educational Attaiment: Mizoram (Urban)

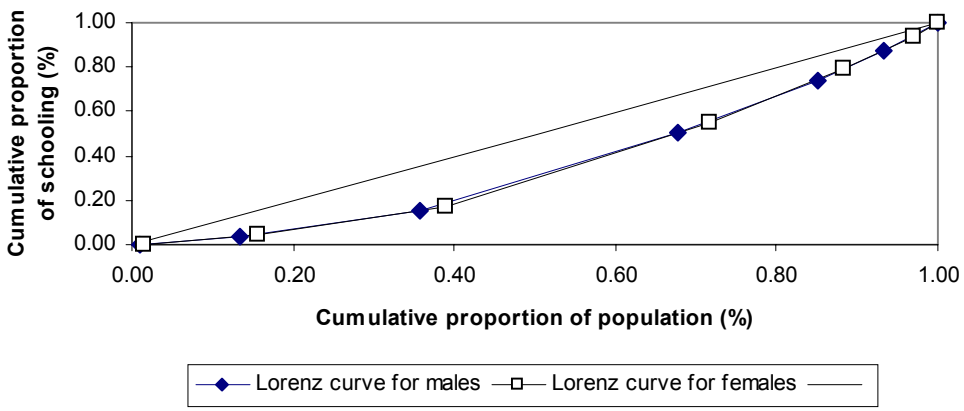


Figure 4.11b: Gender Gap in Educational Attaiment: Mizoram (Rural)

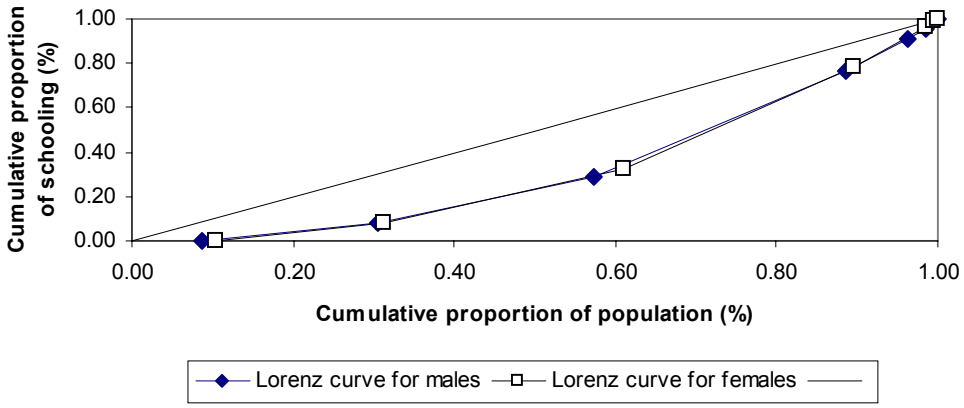


Figure 4.12a: Gender Gap in Educational Attaiment: Meghalaya (Urban)

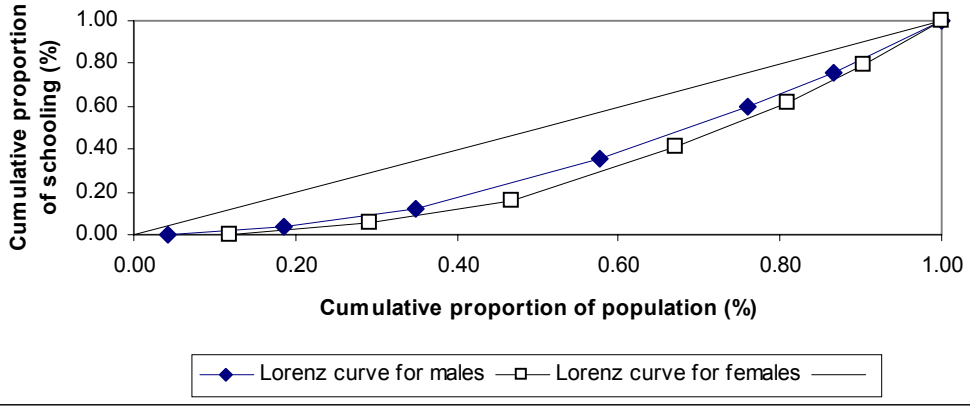


Figure 4.12b: Gender Gap in Educational Attaiment: Meghalaya (Rural)

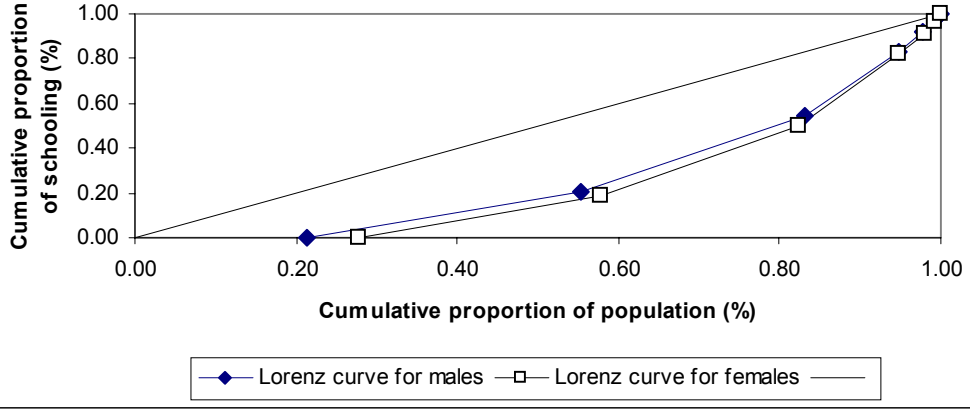


Figure 4.13a: Gender Gap in Educational Attaiment: Manipur (Urban)

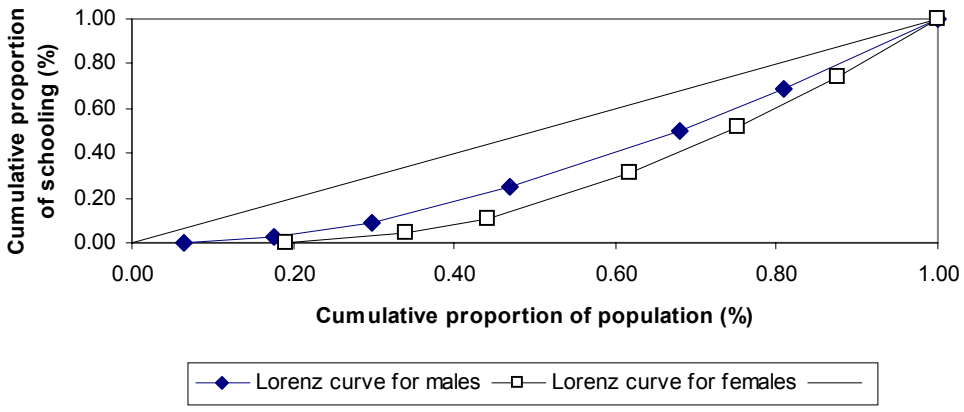


Figure 4.13b: Gender Gap in Educational Attaiment: Manipur (Rural)

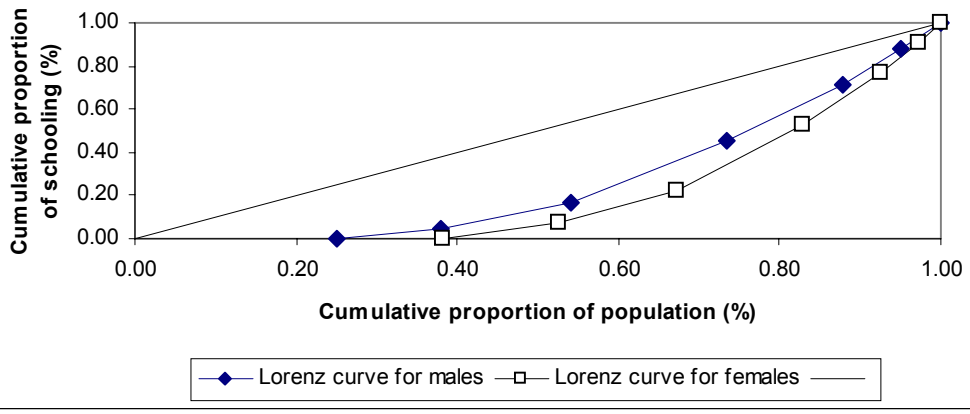


Figure 4.14a: Gender Gap in Educational Attaiment: Maharashtra (Urban)

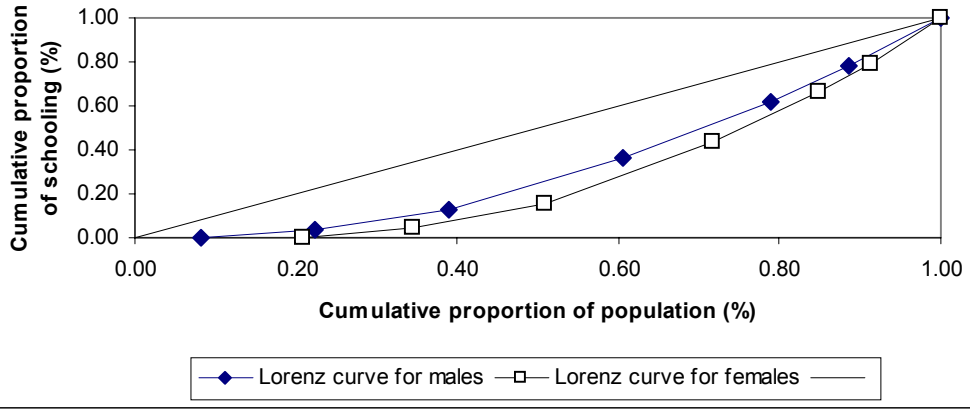


Figure 4.14b: Gender Gap in Educational Attaiment: Maharashtra (Rural)

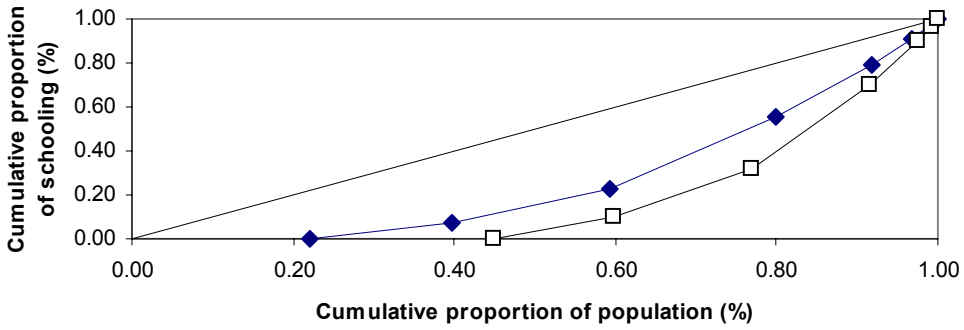


Figure 4.15a: Gender Gap in Educational Attaiment: Madhya Pradesh (Urban)

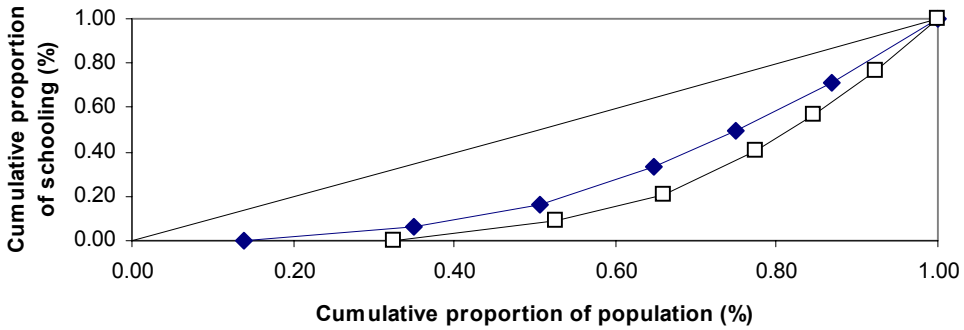


Figure 4.15b: Gender Gap in Educational Attaiment: Madhya Pradesh (Rural)

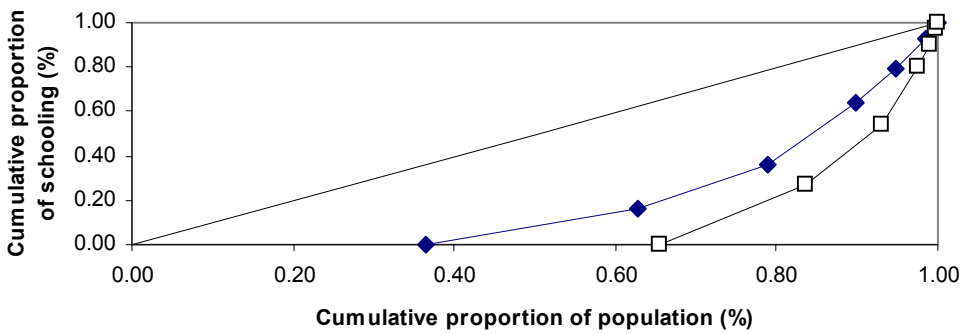


Figure 4.16a: Gender Gap in Educational Attaiment: Kerala (Urban)

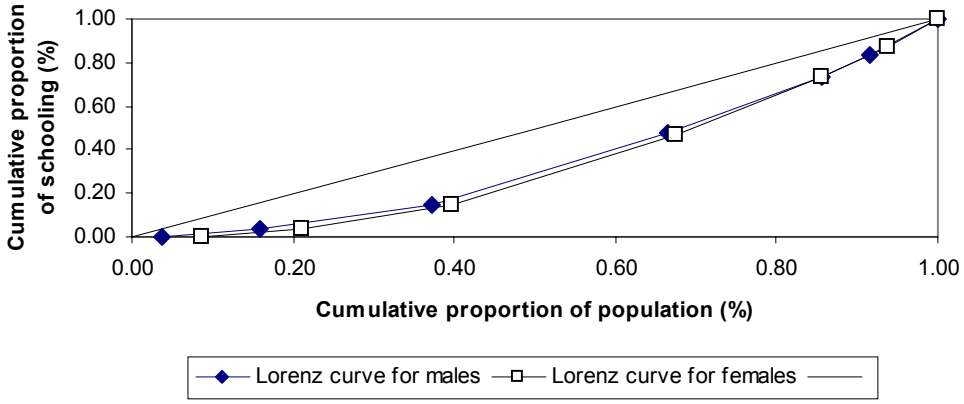


Figure 4.16b: Gender Gap in Educational Attaiment: Kerala (Rural)

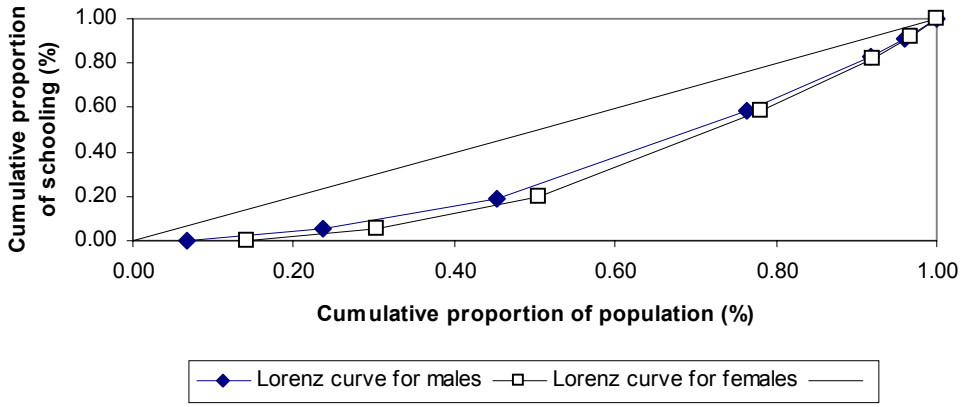


Figure 4.17a: Gender Gap in Educational Attaiment: Karnataka (Urban)

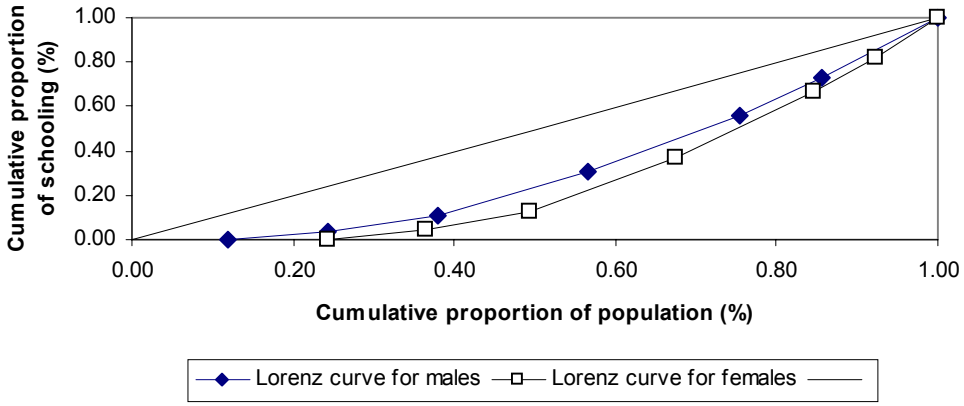


Figure 4.17b: Gender Gap in Educational Attaiment: Karnataka (Rural)

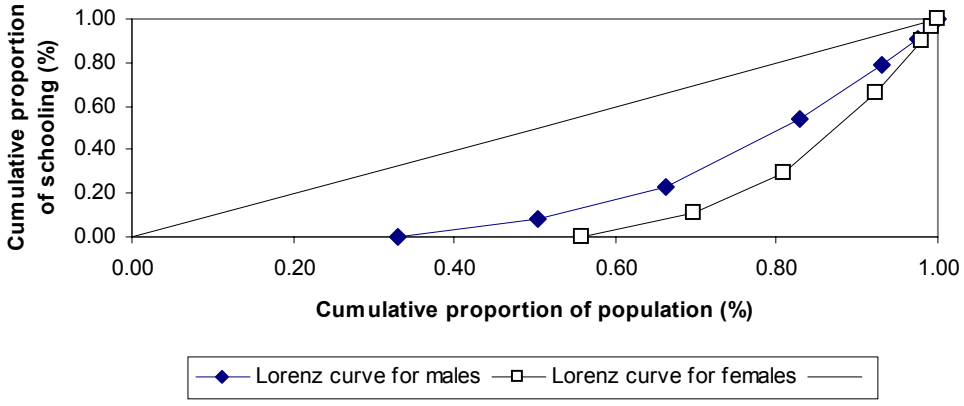


Figure 4.18a: Gender Gap in Educational Attaiment: Jammu & Kashmir (Urban)

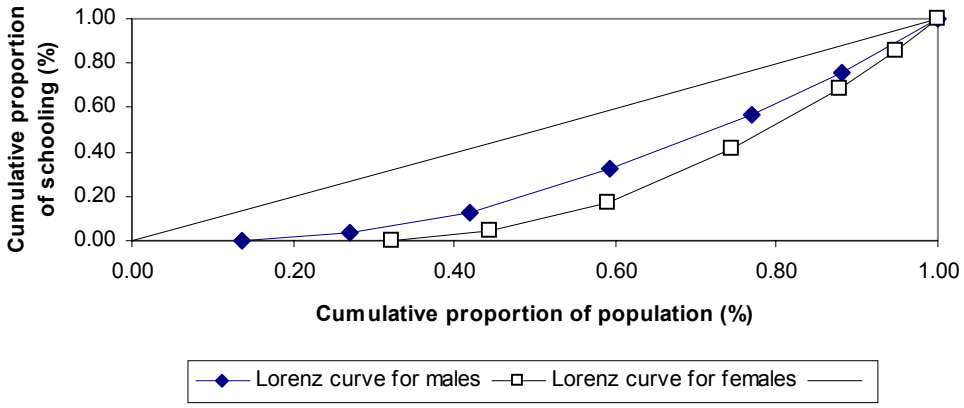


Figure 4.18b: Gender Gap in Educational Attaiment: Jammu & Kashmir (Rural)

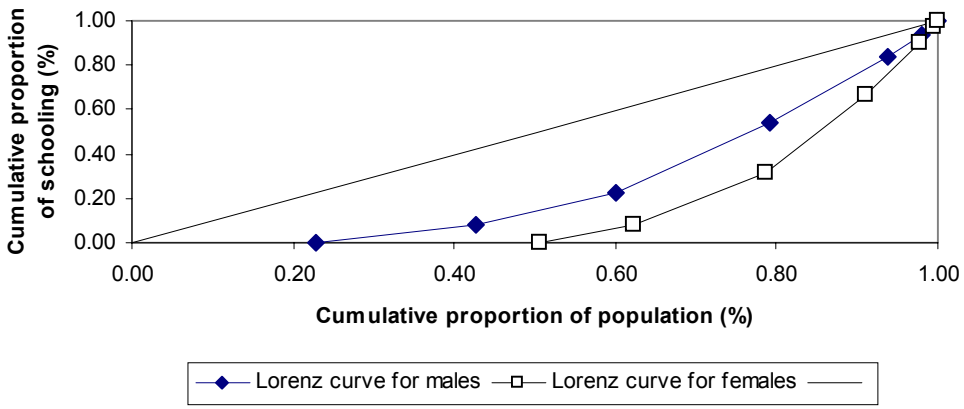


Figure 4.19a: Gender Gap in Educational Attaiment: Himachal Pradesh (Urban)

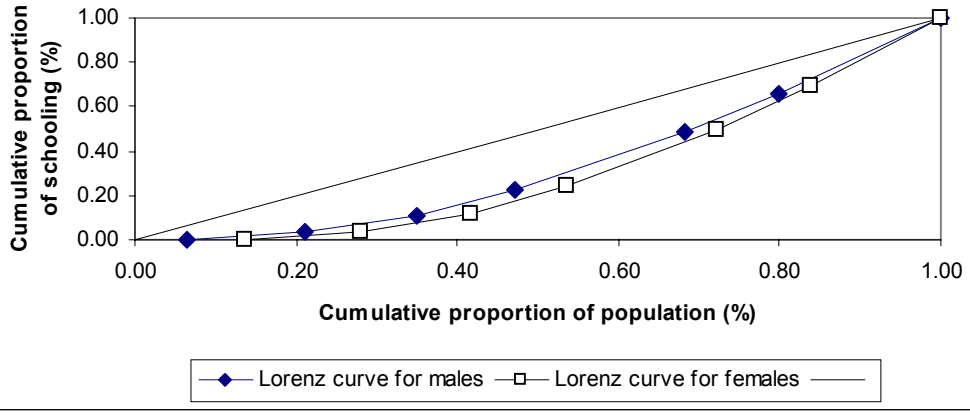


Figure 4.19b: Gender Gap in Educational Attaiment: Himachal Pradesh (Rural)

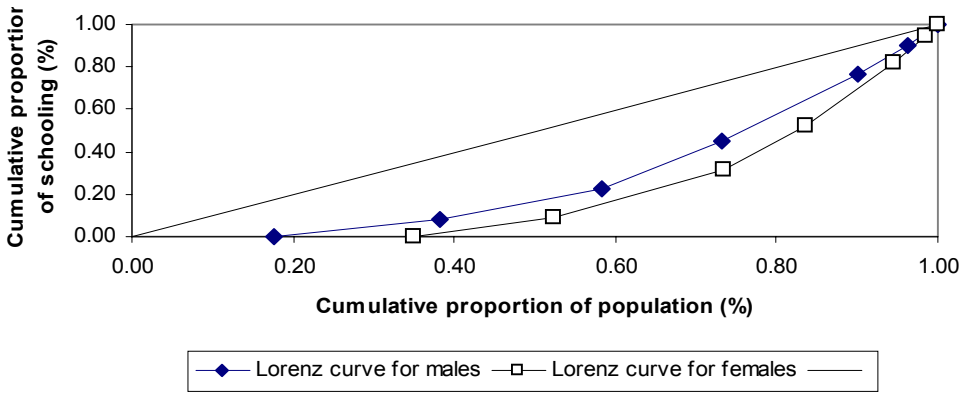


Figure 4.20a: Gender Gap in Educational Attaiment: Haryana (Urban)

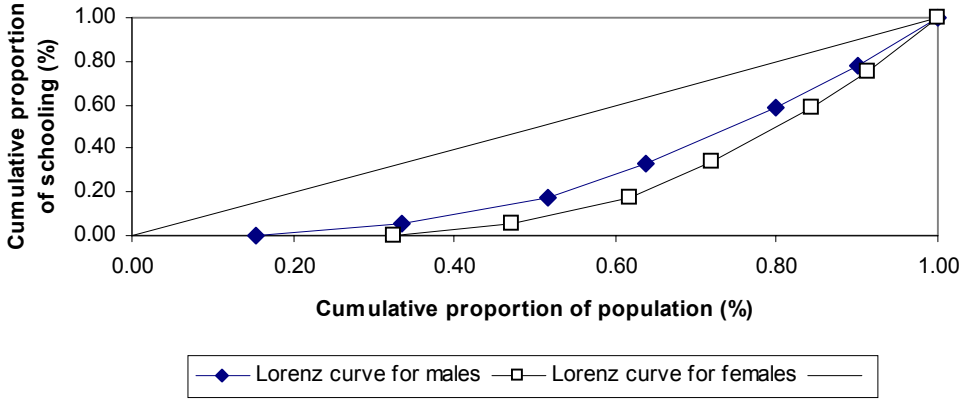


Figure 4.20b: Gender Gap in Educational Attaiment: Haryana (Rural)

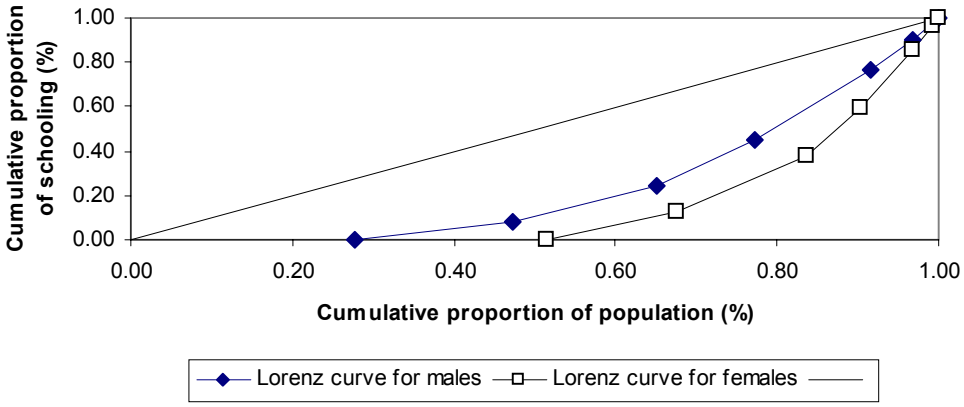


Figure 4.21a: Gender Gap in Educational Attaiment: Gujarat (Urban)

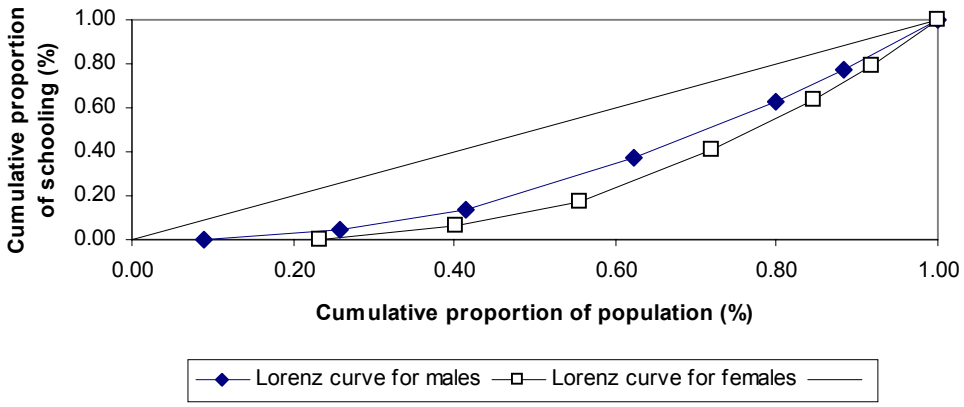


Figure 4.21b: Gender Gap in Educational Attaiment: Gujarat (Rural)

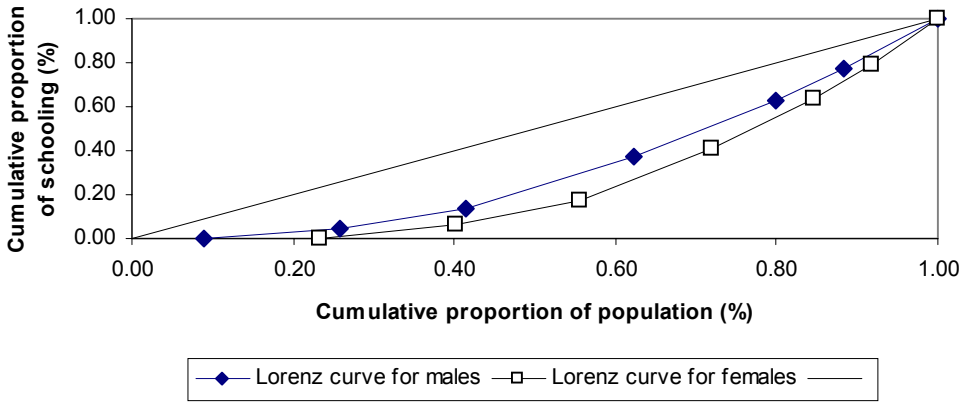


Figure 4.22a: Gender Gap in Educational Attaiment: Goa (Urban)

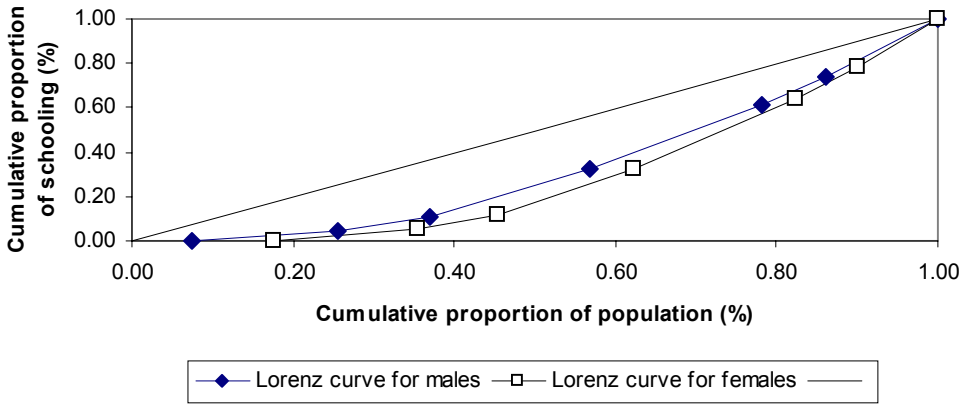


Figure 4.22b: Gender Gap in Educational Attaiment: Goa (Rural)

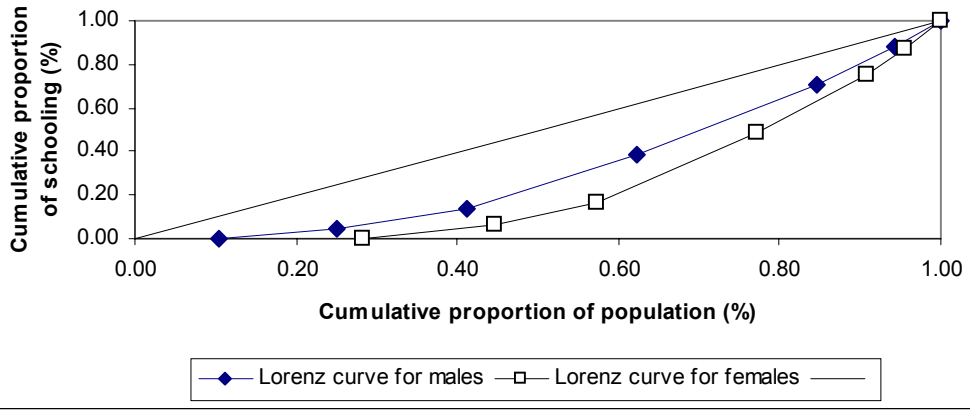


Figure 4.23a: Gender Gap in Educational Attaiment: Bihar (Urban)

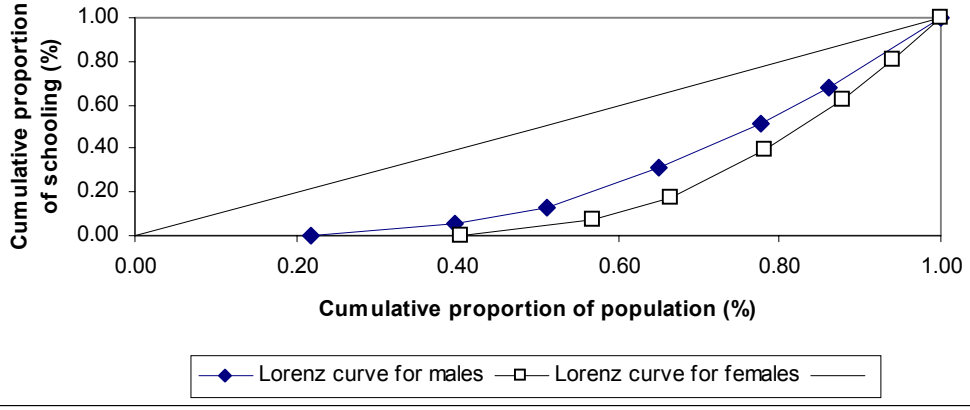


Figure 4.23b: Gender Gap in Educational Attaiment: Bihar (Rural)

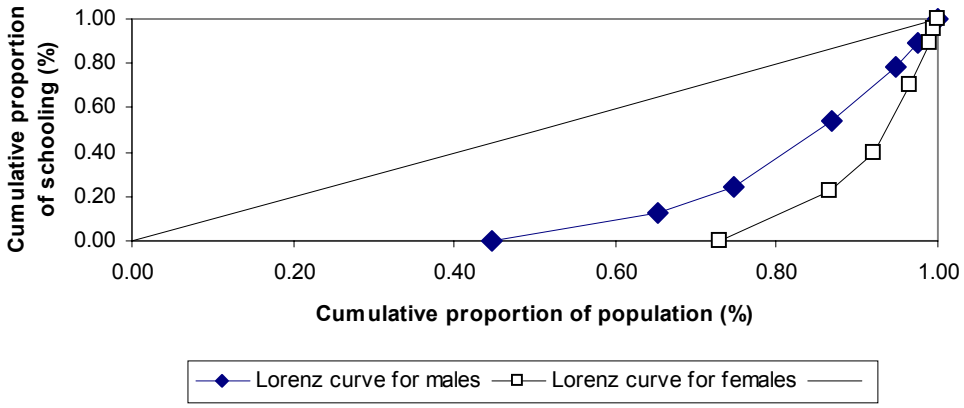


Figure 4.24a: Gender Gap in Educational Attaiment: Assam (Urban)

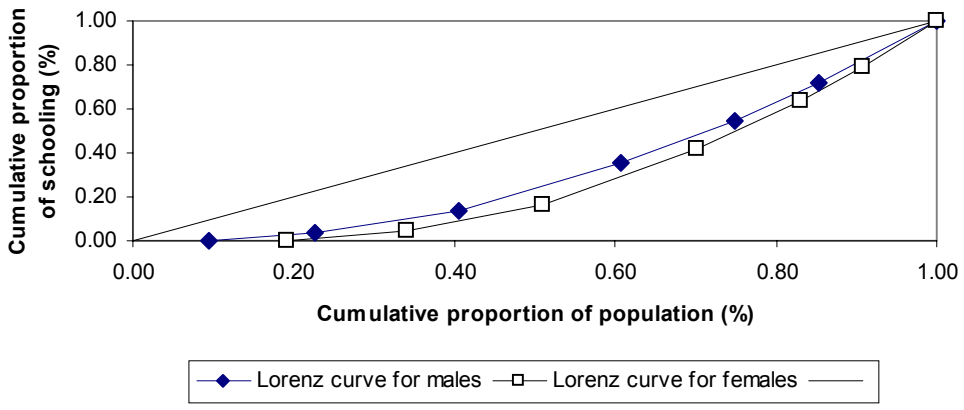


Figure 4.24b: Gender Gap in Educational Attaiment: Assam (Rural)

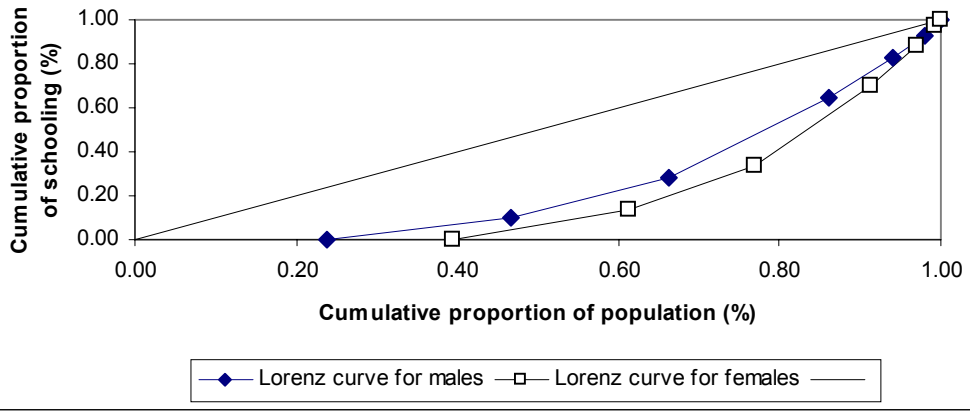


Figure 4.25a: Gender Gap in Educational Attaiment: Arunachal Pradesh (Urban)

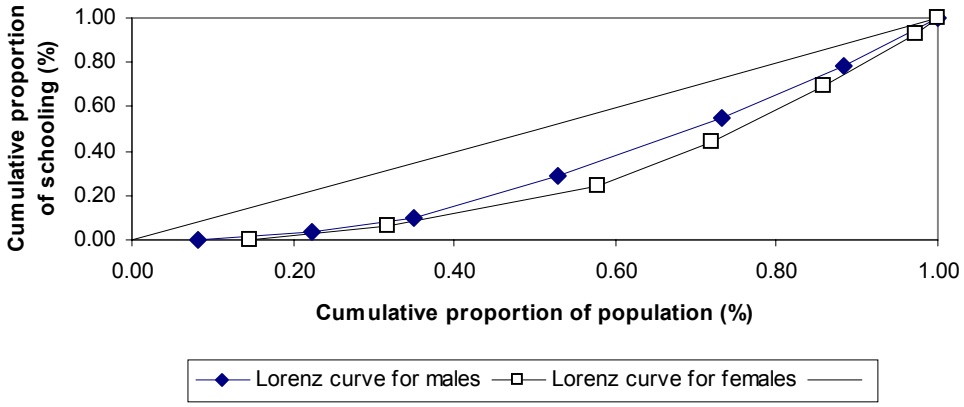
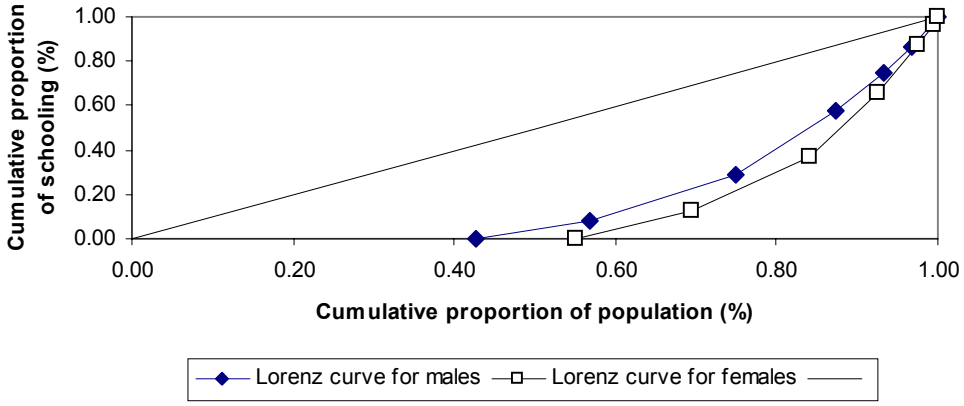


Figure 4.25b: Gender Gap in Educational Attaiment: Arunachal Pradesh (Rural)



Appendix - II

Lee (1991) divided the population into seven categories including no-schooling (or illiterate), partial primary, complete primary, partial secondary, complete secondary, partial tertiary, and complete tertiary. The seven groups are both mutually exclusive and collectively inclusive for the concerned population.
Gini formula, shown in equation

$$E_L = (1/\mu)\,[\,p2\,(y2-y1)\,p1 + p3\,(y3-y1)\,p1 + p3\,(y3-y2)\,p2 + \ldots\ldots.$$
$$+ p7\,(y7-y1)\,p1 + p7\,(y7-y2)\,p2 + p7\,(y7-y3)\,p3 + p7\,(y7-y4)\,p4 + p7\,(y7-y5)\,p5 + p7\,(y7-y6)\,p6]$$

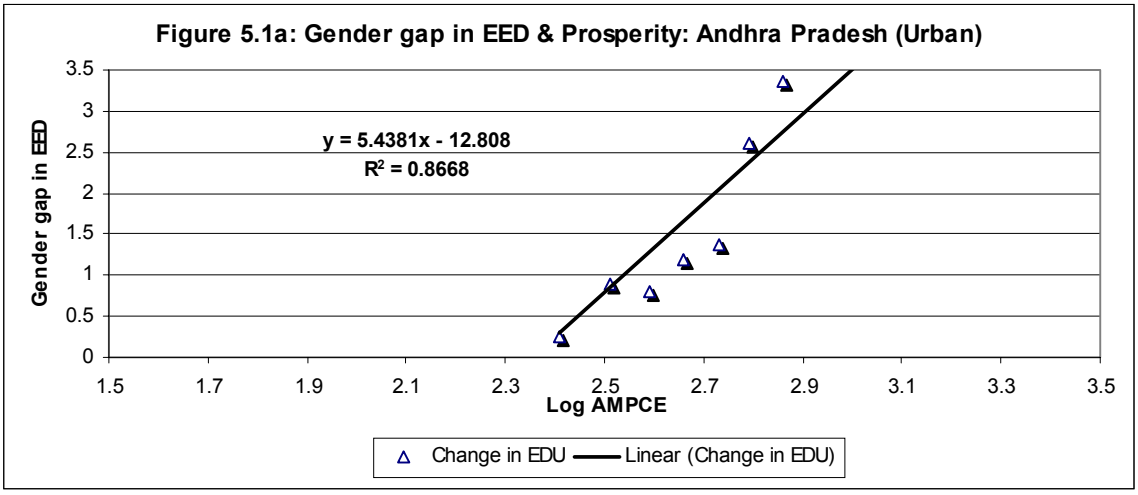
Where,
p1 is the proportion of population with no schooling,
p2 is the proportion of population with partial primary education;
……..
p7 is the proportion of population with complete tertiary education.
y1 is years of schooling for an individual with no schooling, y1=0;
y2 is years of schooling for an individual with partial primary education;
……..
y7 is years of schooling for an individual with complete tertiary education.

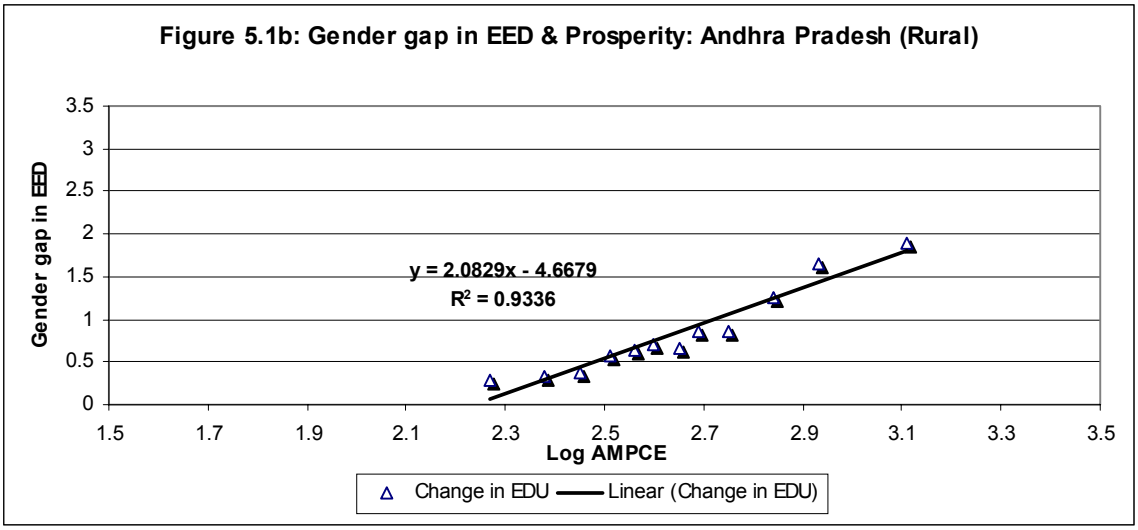
The formula for calculating the years of schooling at the seven levels of education:

Illiterate: y1 = 0
Partial-Primary: y2 = y1 + 0.5Cp = 0.5Cp
Complete-Primary: y3 = y1 + Cp = Cp
Partial-Secondary: y4 = y3 + 0.5Cs = Cp + 0.5Cs
Complete-Secondary: y5 = y3 + Cs = Cp + Cs
Partial-Tertiary: y6 = y5 + 0.5Ct = Cp + Cs + 0.5Ct
Complete-Tertiary: y7 = y5 + Ct = Cp + Cs + Ct
Where,
Cp is the cycle of the primary education;
Cs is the cycle of the secondary education; and
Ct is the cycle of the tertiary education.

E_L (Male) is the Education Gini for males and E_L (Female) is the Education Gini for females. Our GDE (i.e. Gender Deprivation in Education Attainment) is therefore the difference between E_L (Female) and E_L (Male).

Appendix – III





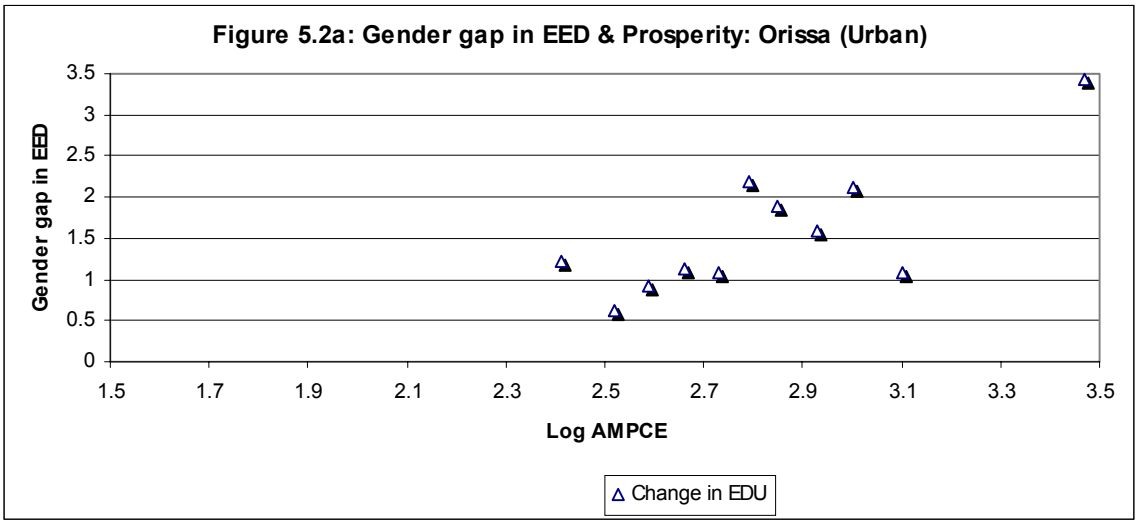


Figure 5.2a: Gender gap in EED & Prosperity: Orissa (Urban)
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU

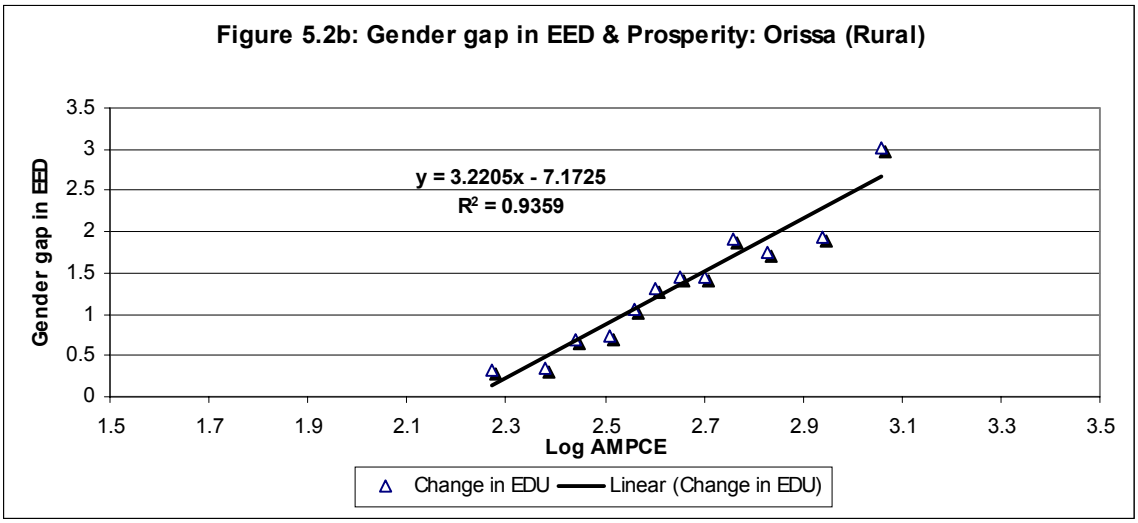


Figure 5.2b: Gender gap in EED & Prosperity: Orissa (Rural)
Gender gap in EED
y = 3.2205x - 7.1725
R² = 0.9359
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU
Linear (Change in EDU)

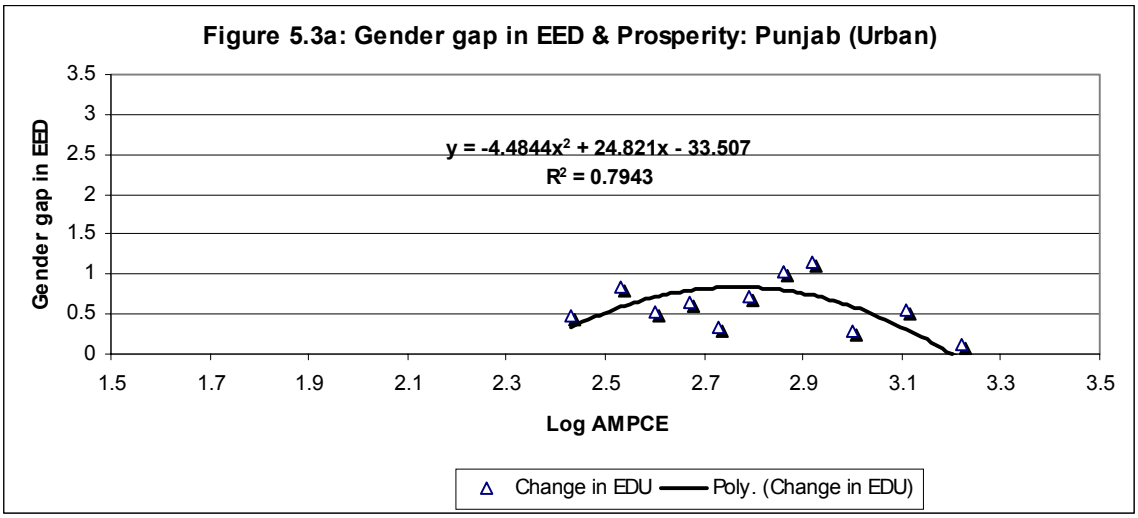


Figure 5.3a: Gender gap in EED & Prosperity: Punjab (Urban)
y = -4.4844x² + 24.821x - 33.507
R² = 0.7943
Gender gap in EED
Log AMPCE
Change in EDU
Poly. (Change in EDU)

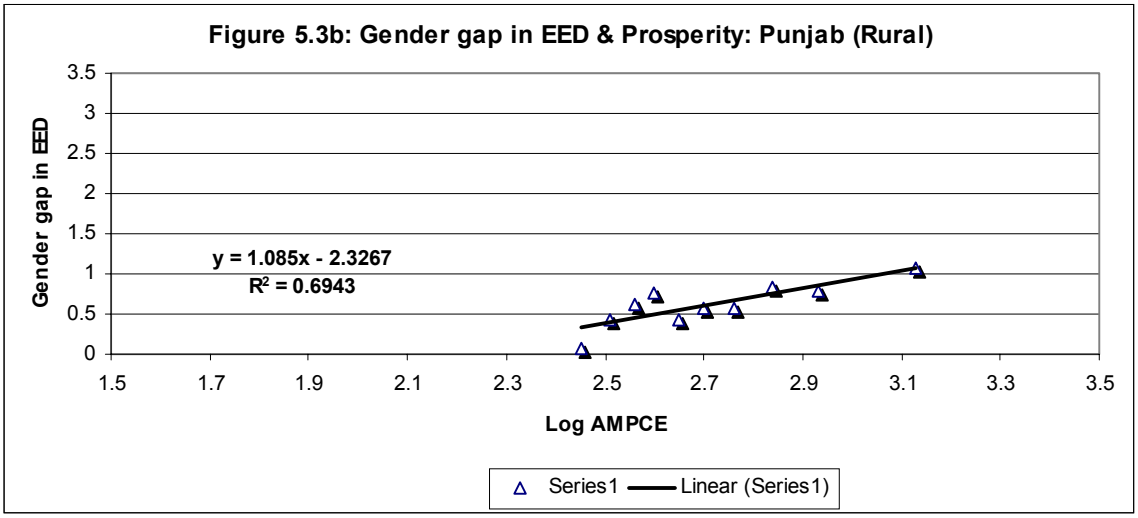


Figure 5.3b: Gender gap in EED & Prosperity: Punjab (Rural)
y = 1.085x - 2.3267
R² = 0.6943
Gender gap in EED
Log AMPCE
Series1
Linear (Series1)

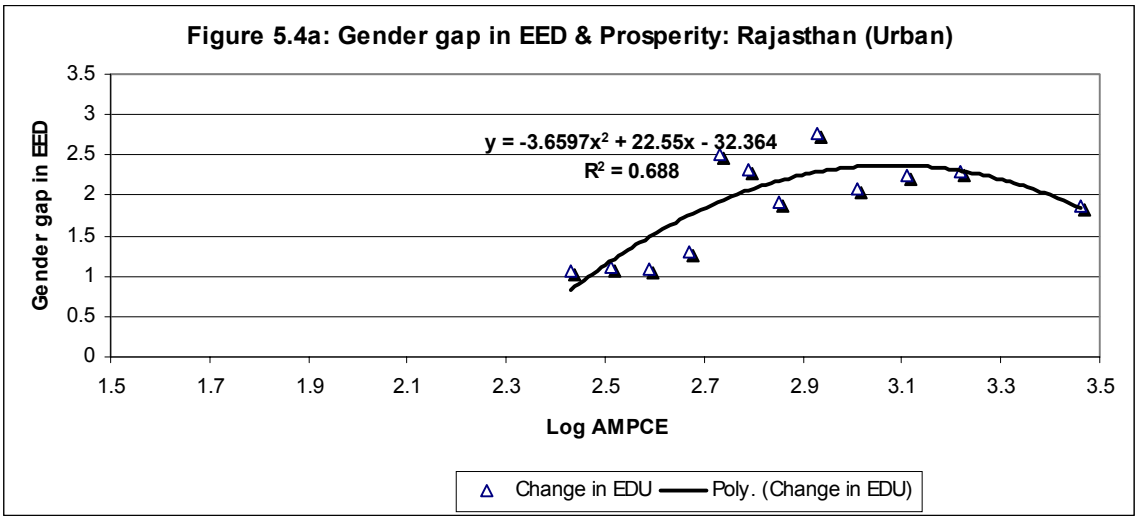


Figure 5.4a: Gender gap in EED & Prosperity: Rajasthan (Urban)
y = -3.6597x² + 22.55x - 32.364
R² = 0.688
Gender gap in EED
Log AMPCE
Change in EDU
Poly. (Change in EDU)

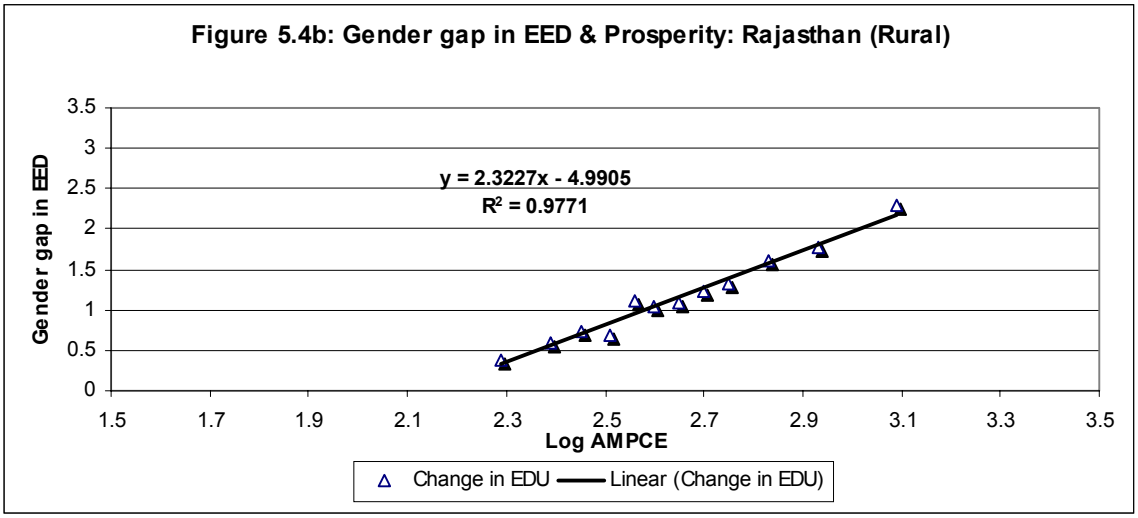


Figure 5.4b: Gender gap in EED & Prosperity: Rajasthan (Rural)
y = 2.3227x - 4.9905
R² = 0.9771
Gender gap in EED
Log AMPCE
Change in EDU
Linear (Change in EDU)

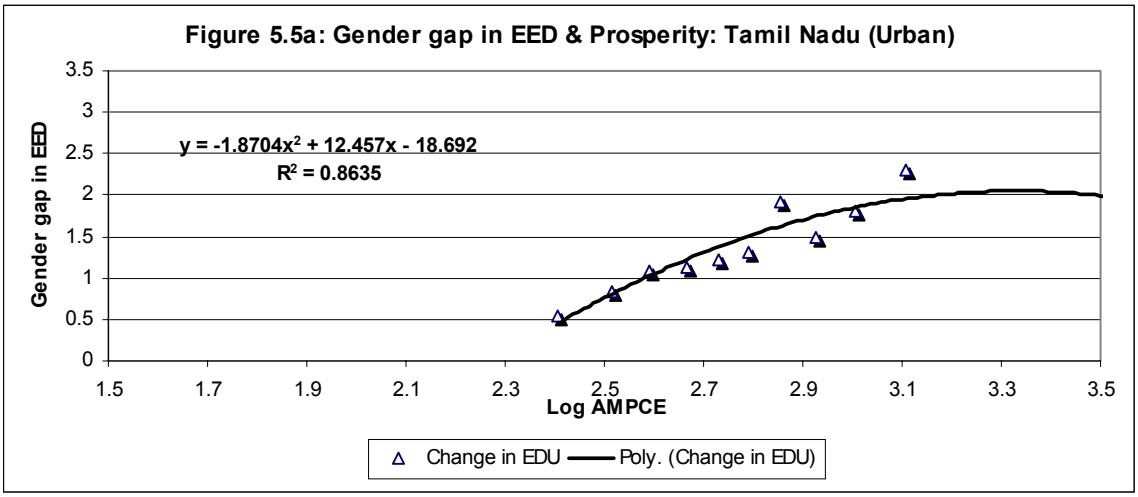


Figure 5.5a: Gender gap in EED & Prosperity: Tamil Nadu (Urban)
y = -1.8704x² + 12.457x - 18.692
R² = 0.8635
Gender gap in EED
Log AMPCE
Change in EDU
Poly. (Change in EDU)

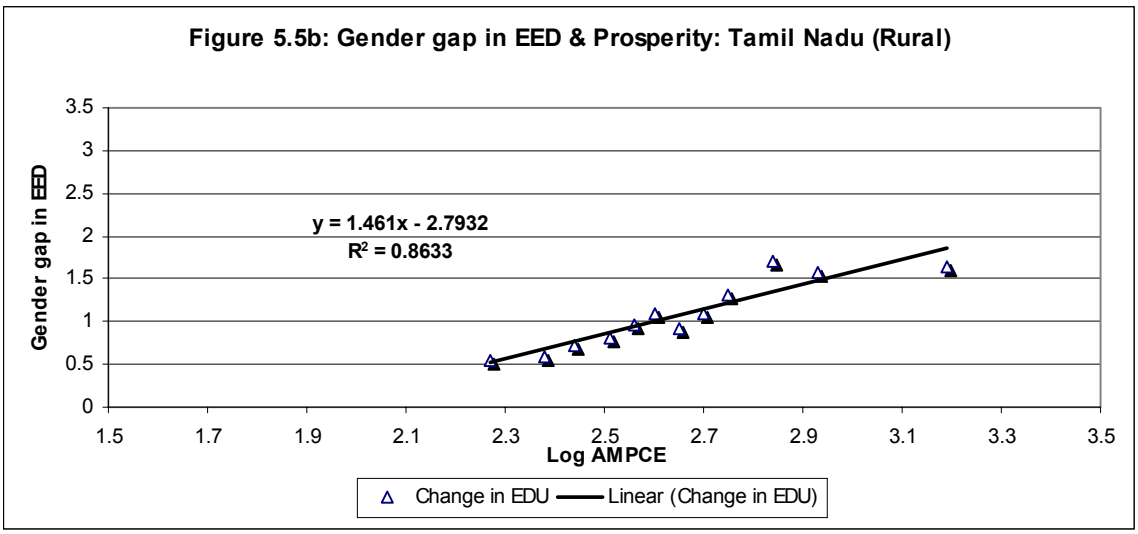


Figure 5.5b: Gender gap in EED & Prosperity: Tamil Nadu (Rural)
y = 1.461x - 2.7932
R² = 0.8633
Gender gap in EED
Log AMPCE
Change in EDU
Linear (Change in EDU)

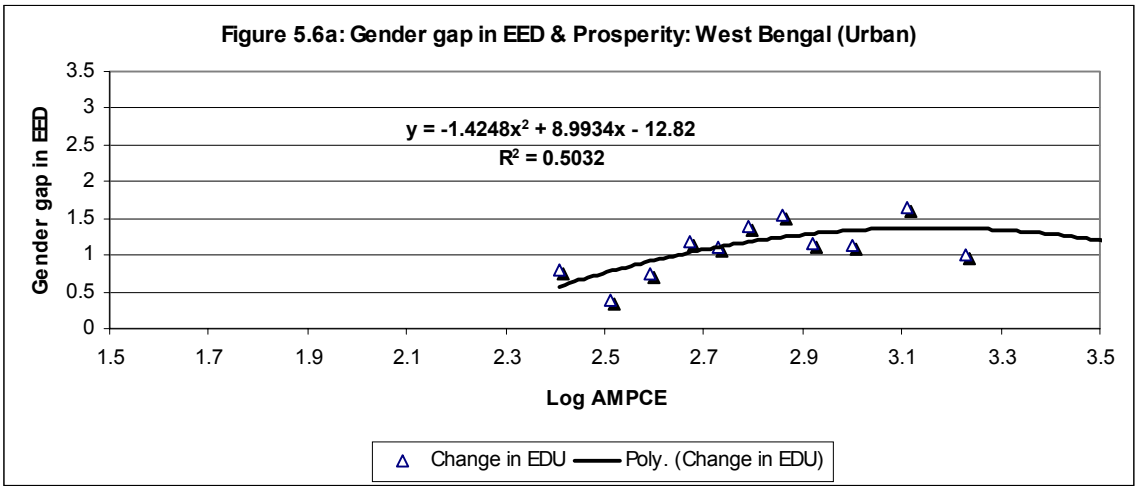


Figure 5.6a: Gender gap in EED & Prosperity: West Bengal (Urban)
y = -1.4248x² + 8.9934x - 12.82
R² = 0.5032
Gender gap in EED
Log AMPCE
Change in EDU
Poly. (Change in EDU)

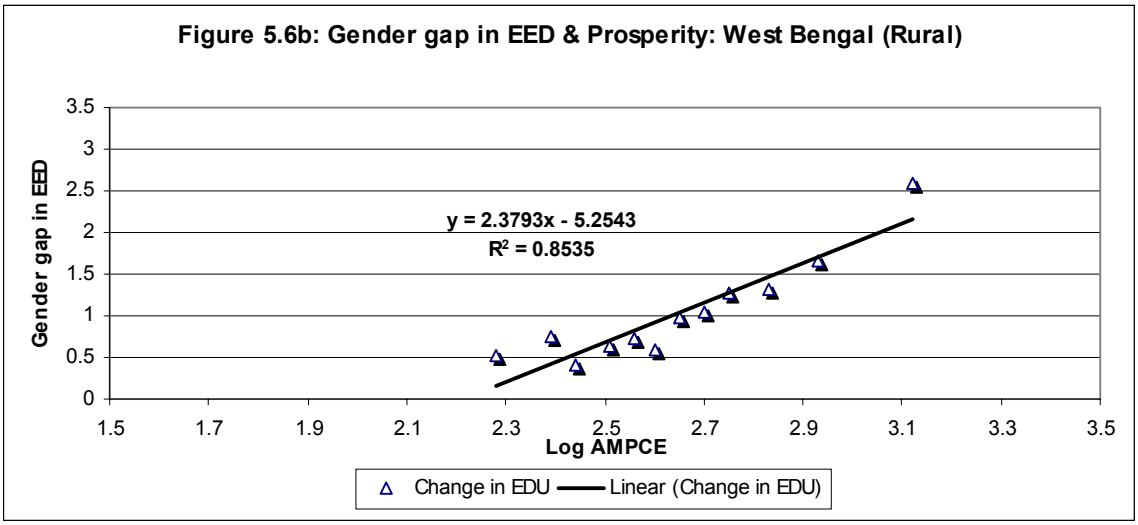


Figure 5.6b: Gender gap in EED & Prosperity: West Bengal (Rural)
y = 2.3793x - 5.2543
R² = 0.8535
Gender gap in EED
Log AMPCE
Change in EDU
Linear (Change in EDU)

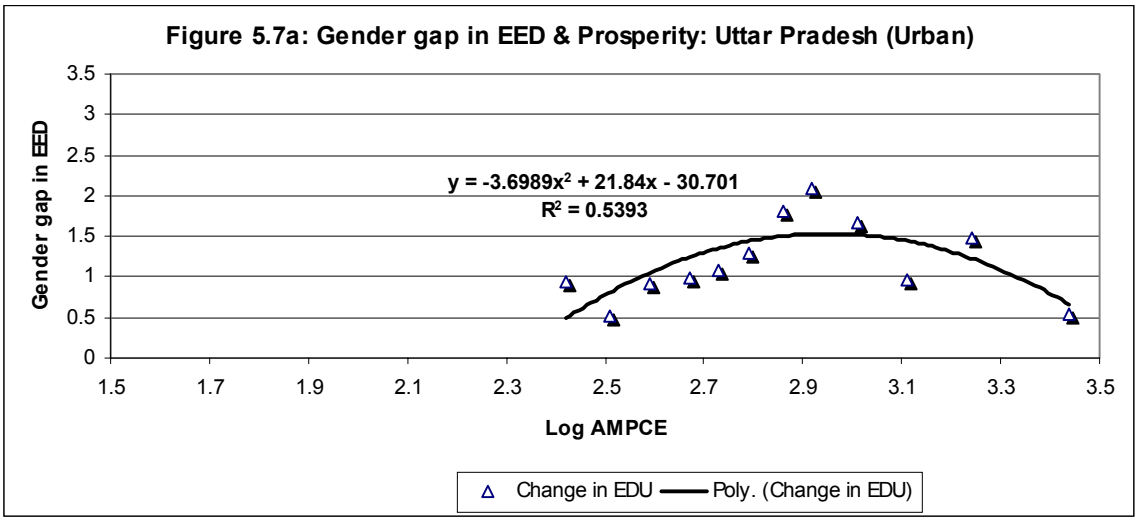


Figure 5.7a: Gender gap in EED & Prosperity: Uttar Pradesh (Urban)
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
y = -3.6989x² + 21.84x - 30.701
R² = 0.5393
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU
Poly. (Change in EDU)

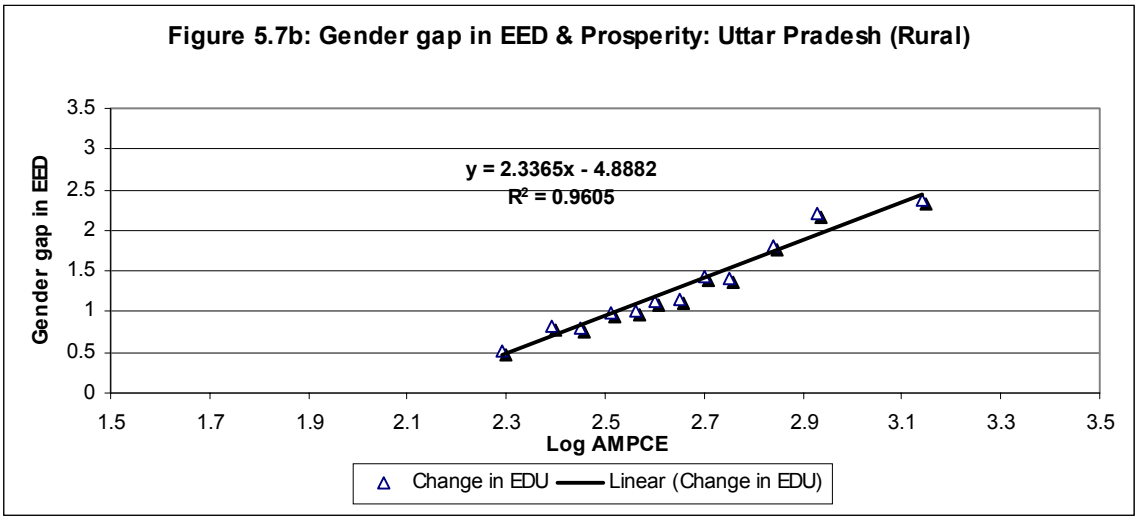


Figure 5.7b: Gender gap in EED & Prosperity: Uttar Pradesh (Rural)
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
y = 2.3365x - 4.8882
R² = 0.9605
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU
Linear (Change in EDU)

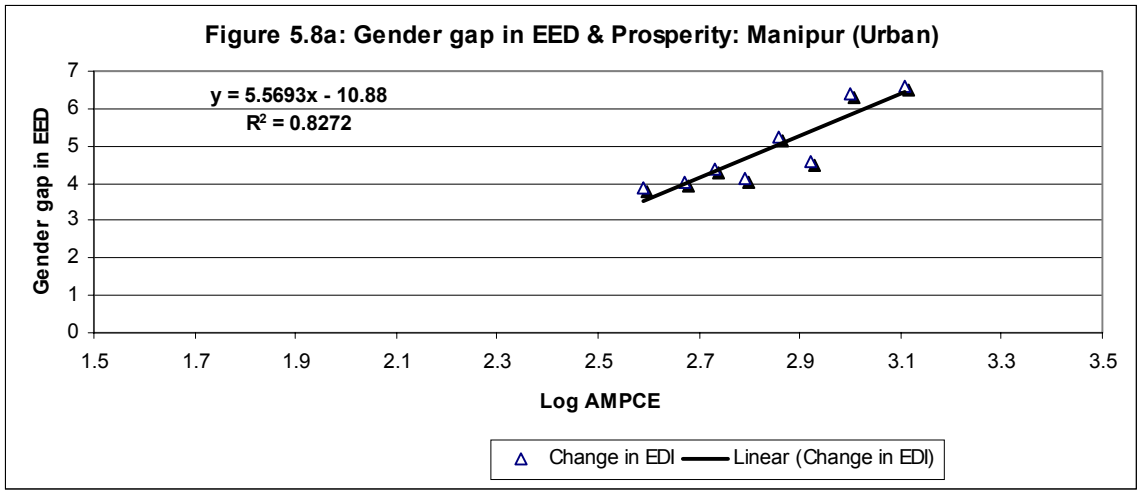


Figure 5.8a: Gender gap in EED & Prosperity: Manipur (Urban)
y = 5.5693x - 10.88
R² = 0.8272
Gender gap in EED
Log AMPCE
Change in EDI
Linear (Change in EDI)

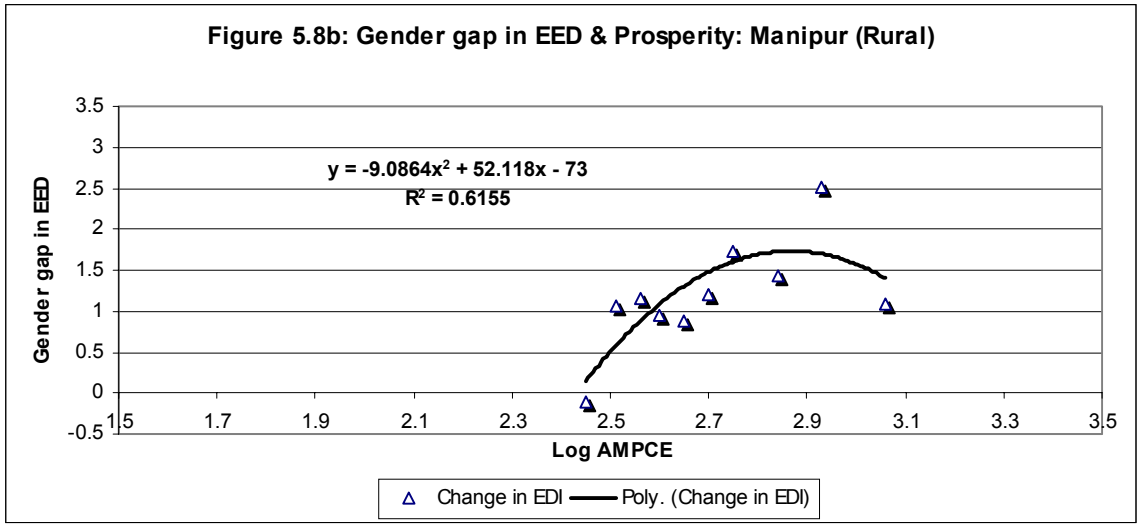


Figure 5.8b: Gender gap in EED & Prosperity: Manipur (Rural)
y = -9.0864x² + 52.118x - 73
R² = 0.6155
Gender gap in EED
Log AMPCE
Change in EDI
Poly. (Change in EDI)

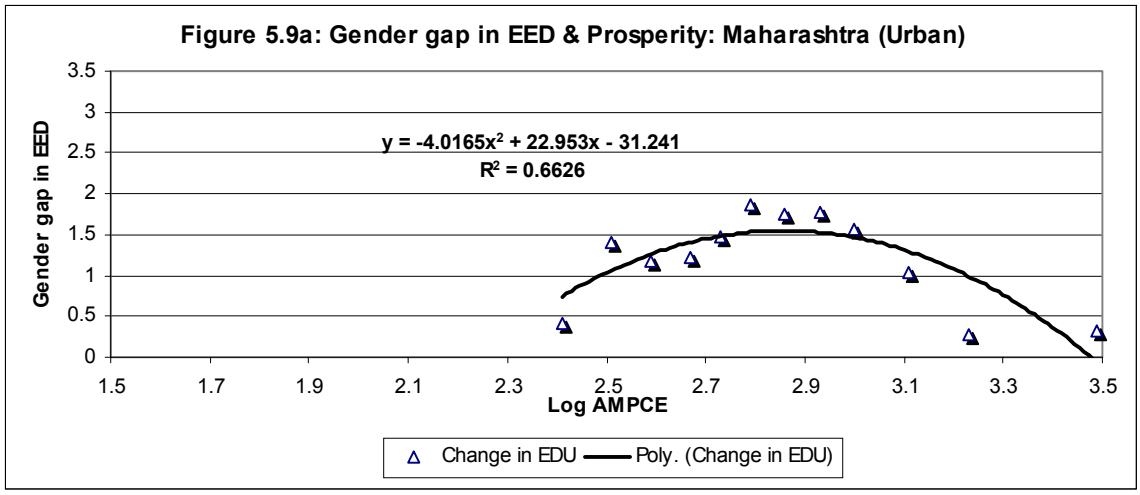


Figure 5.9a: Gender gap in EED & Prosperity: Maharashtra (Urban)
y = -4.0165x² + 22.953x - 31.241
R² = 0.6626
Gender gap in EED
Log AMPCE
Change in EDU
Poly. (Change in EDU)

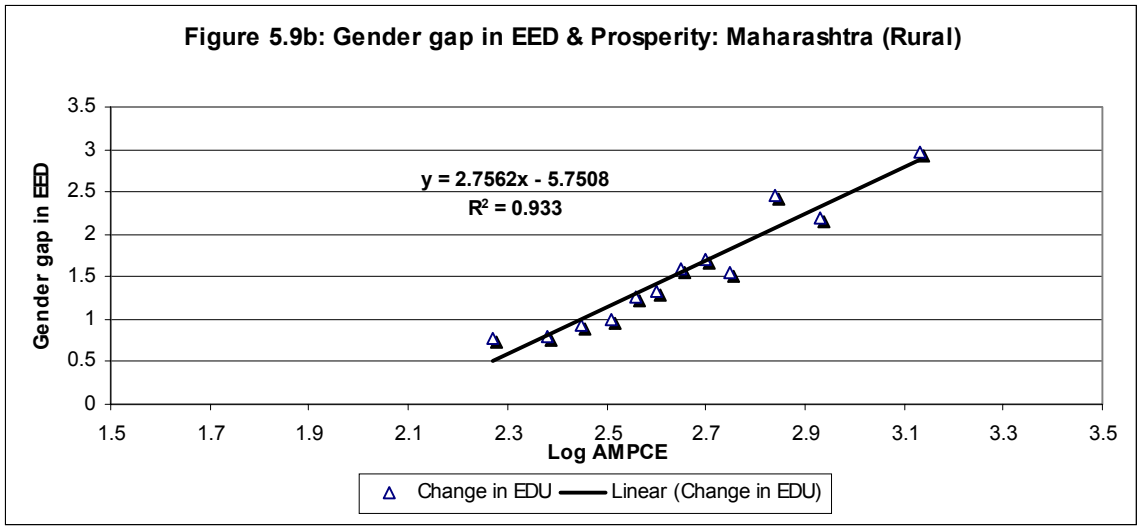


Figure 5.9b: Gender gap in EED & Prosperity: Maharashtra (Rural)
y = 2.7562x - 5.7508
R² = 0.933
Gender gap in EED
Log AMPCE
Change in EDU
Linear (Change in EDU)

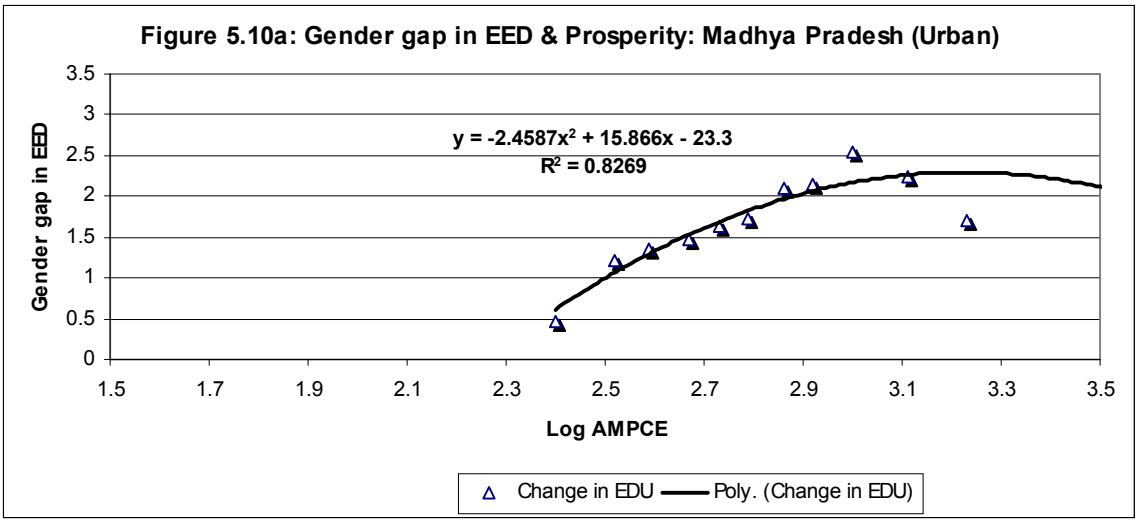


Figure 5.10a: Gender gap in EED & Prosperity: Madhya Pradesh (Urban)
y = -2.4587x² + 15.866x - 23.3
R² = 0.8269
Gender gap in EED
Log AMPCE
Change in EDU
Poly. (Change in EDU)

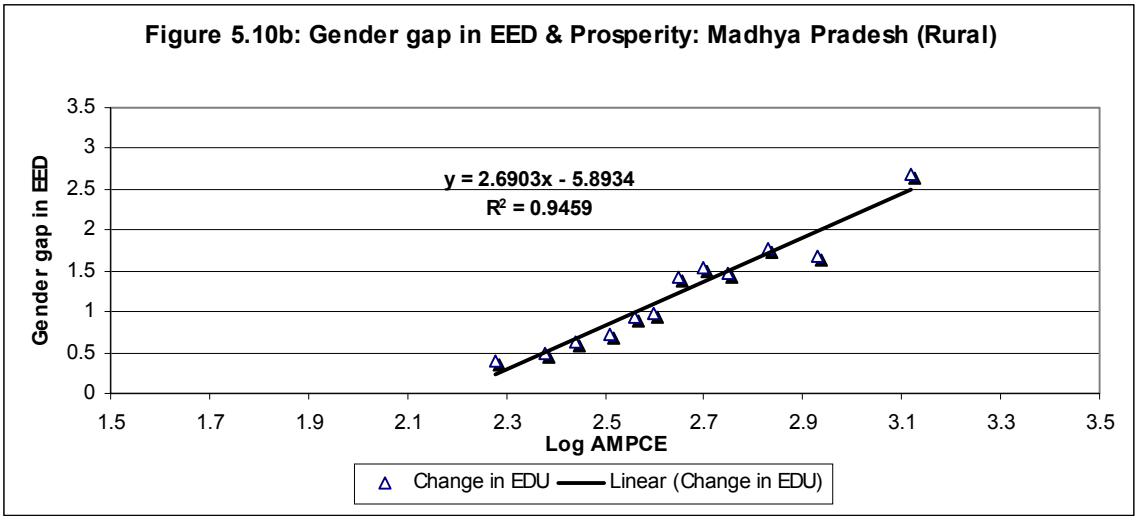


Figure 5.10b: Gender gap in EED & Prosperity: Madhya Pradesh (Rural)
y = 2.6903x - 5.8934
R² = 0.9459
Gender gap in EED
Log AMPCE
Change in EDU
Linear (Change in EDU)

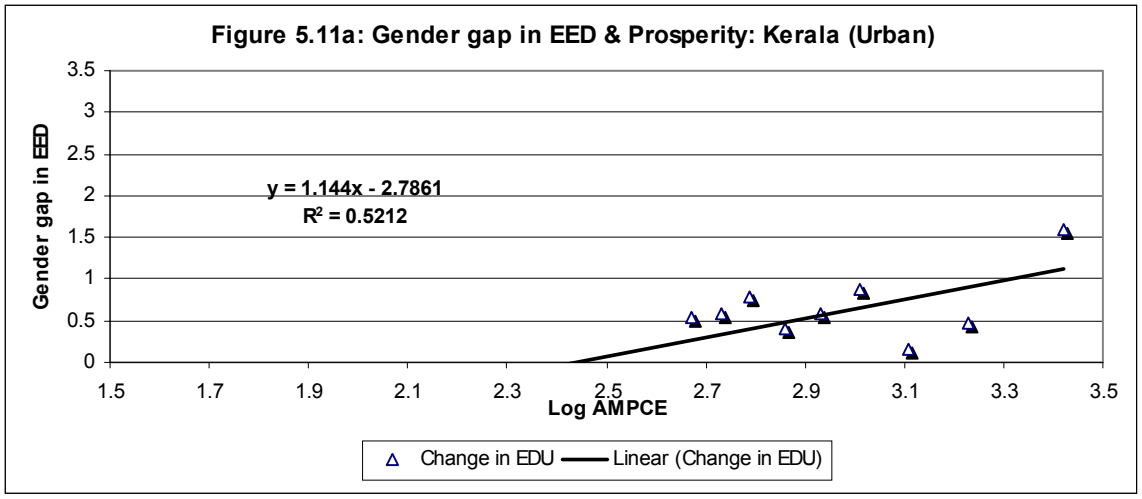


Figure 5.11a: Gender gap in EED & Prosperity: Kerala (Urban)
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
y = 1.144x - 2.7861
R² = 0.5212
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU
Linear (Change in EDU)

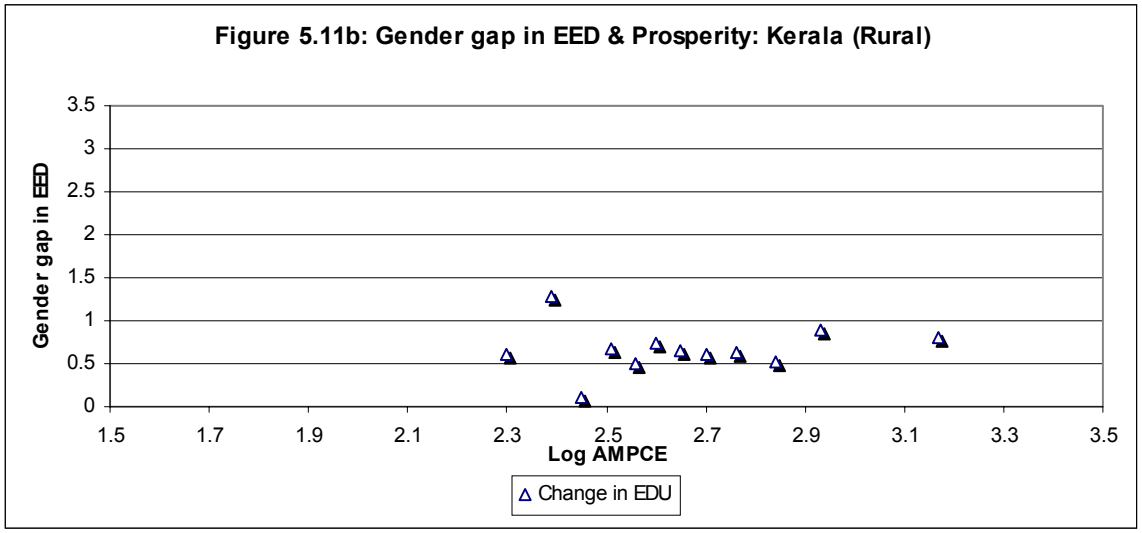


Figure 5.11b: Gender gap in EED & Prosperity: Kerala (Rural)
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU

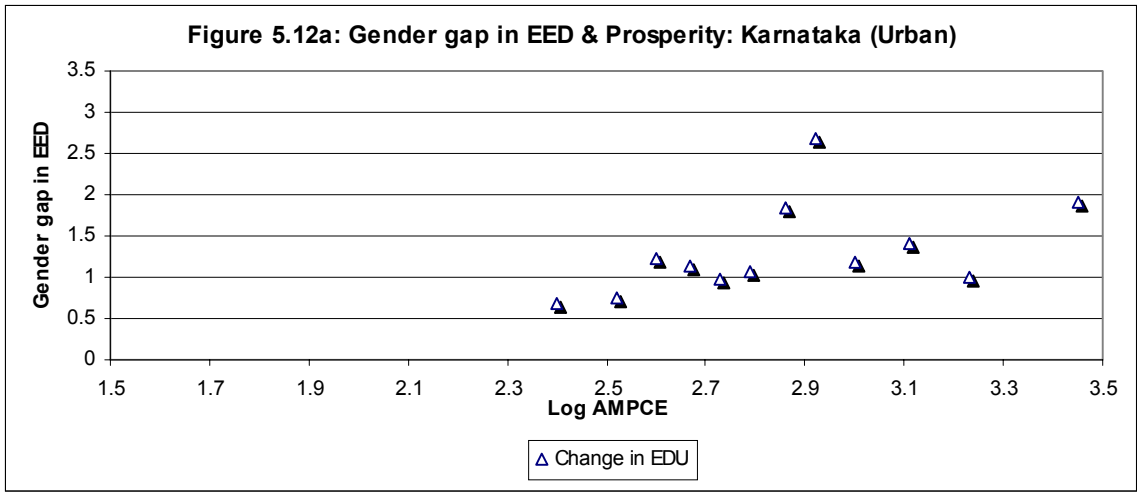


Figure 5.12a: Gender gap in EED & Prosperity: Karnataka (Urban)
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU

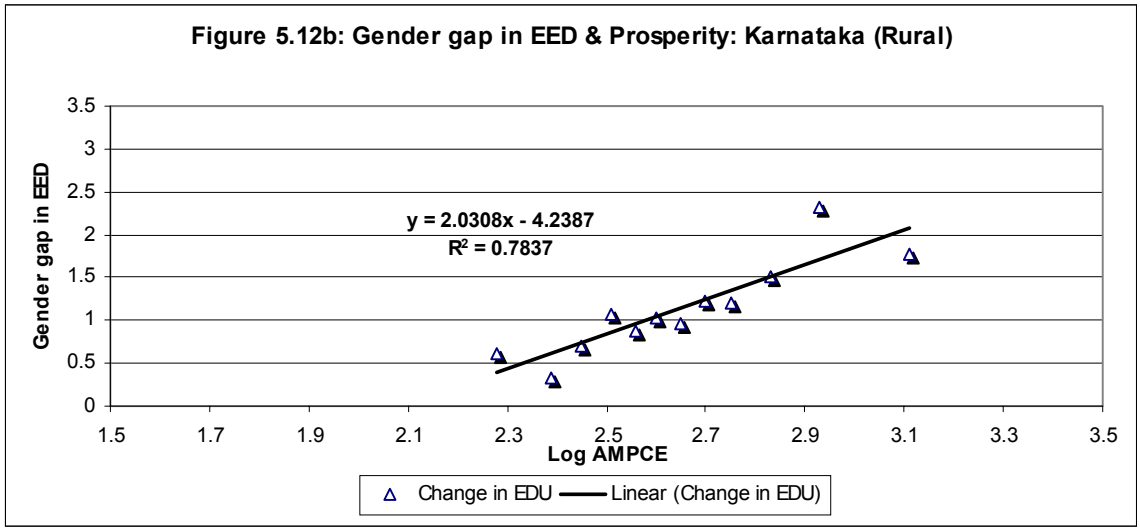


Figure 5.12b: Gender gap in EED & Prosperity: Karnataka (Rural)
Gender gap in EED
y = 2.0308x - 4.2387
R² = 0.7837
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU
Linear (Change in EDU)

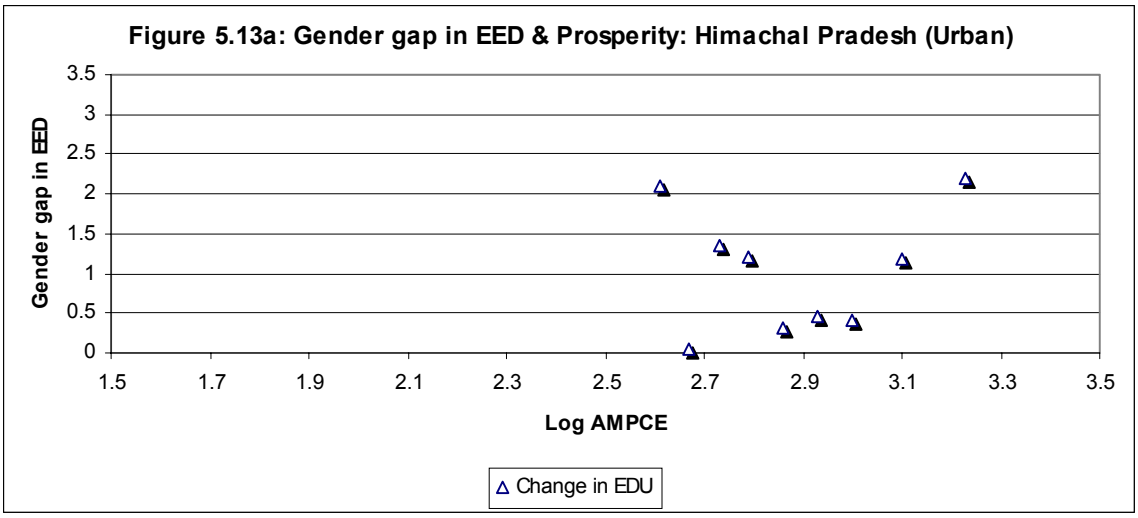


Figure 5.13a: Gender gap in EED & Prosperity: Himachal Pradesh (Urban)
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU

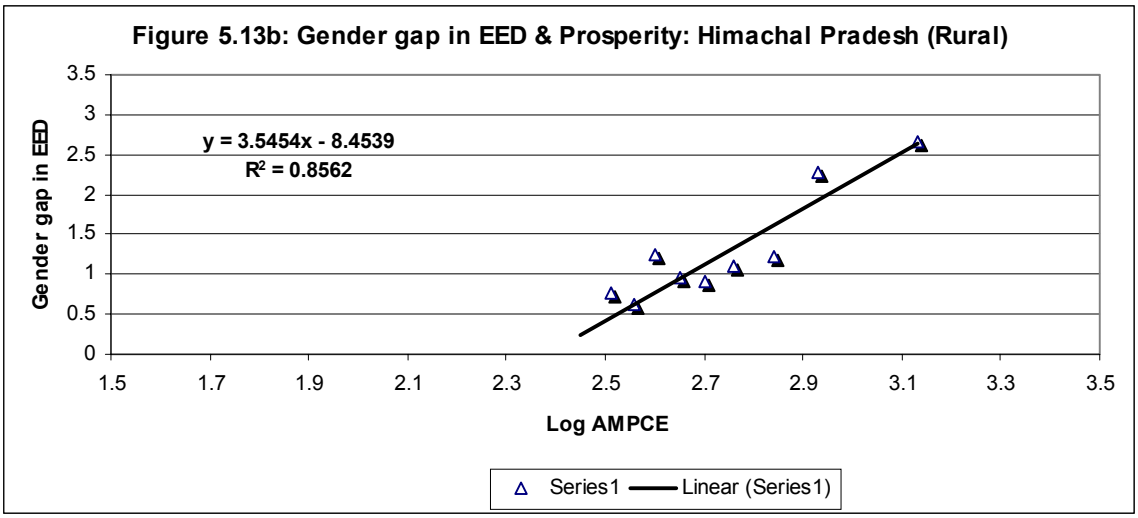


Figure 5.13b: Gender gap in EED & Prosperity: Himachal Pradesh (Rural)
y = 3.5454x - 8.4539
R² = 0.8562
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Series1
Linear (Series1)

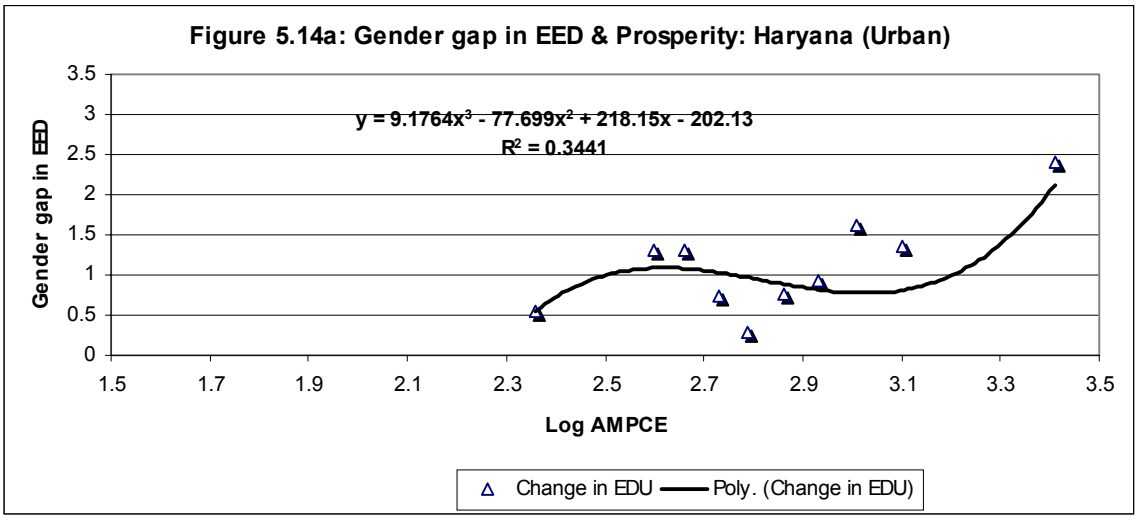


Figure 5.14a: Gender gap in EED & Prosperity: Haryana (Urban)
y = 9.1764x³ - 77.699x² + 218.15x - 202.13
R² = 0.3441
Gender gap in EED
Log AMPCE
Change in EDU
Poly. (Change in EDU)

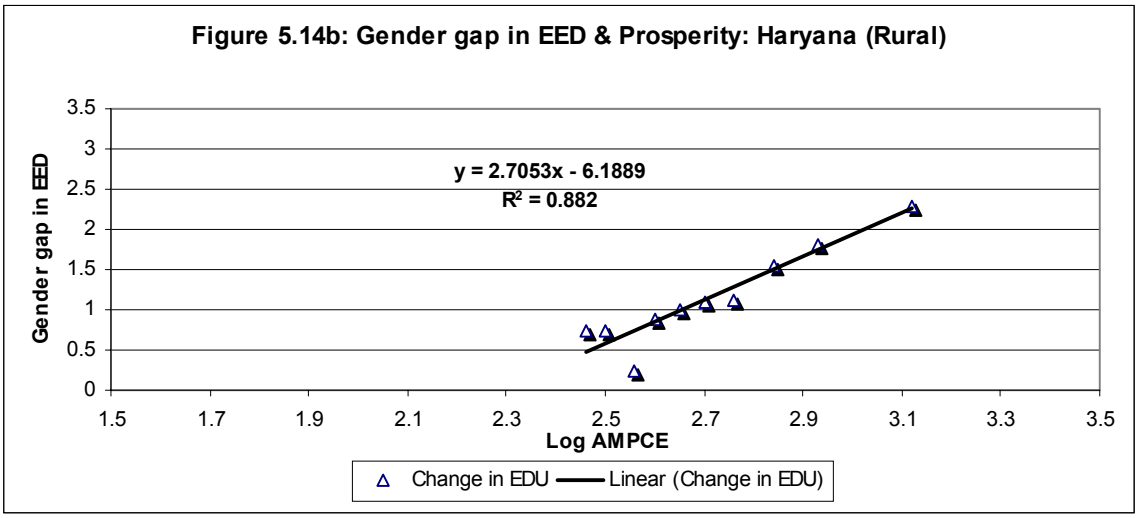


Figure 5.14b: Gender gap in EED & Prosperity: Haryana (Rural)
y = 2.7053x - 6.1889
R² = 0.882
Gender gap in EED
Log AMPCE
Change in EDU
Linear (Change in EDU)

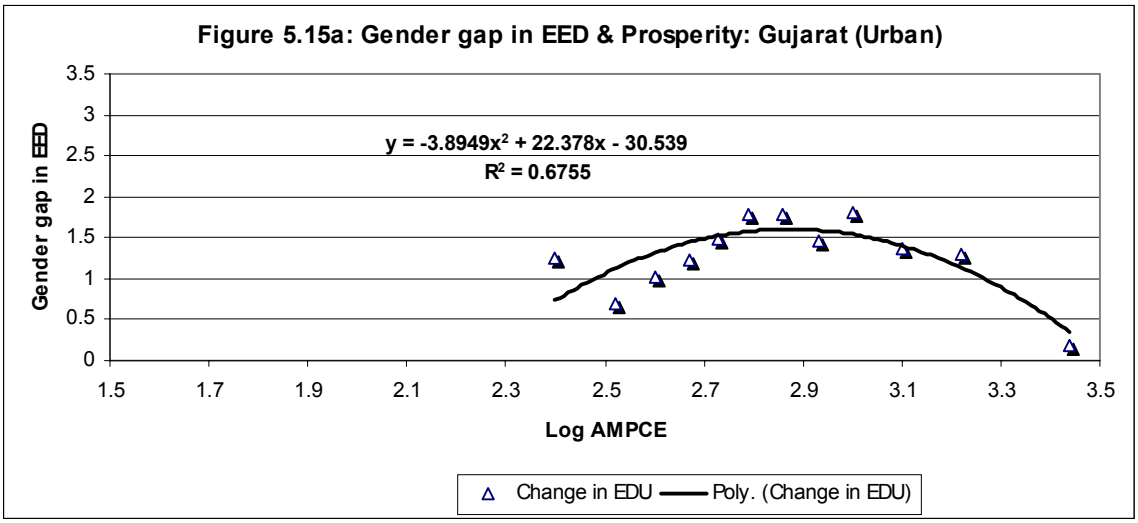


Figure 5.15a: Gender gap in EED & Prosperity: Gujarat (Urban)
y = -3.8949x² + 22.378x - 30.539
R² = 0.6755
Gender gap in EED
Log AMPCE
Change in EDU
Poly. (Change in EDU)

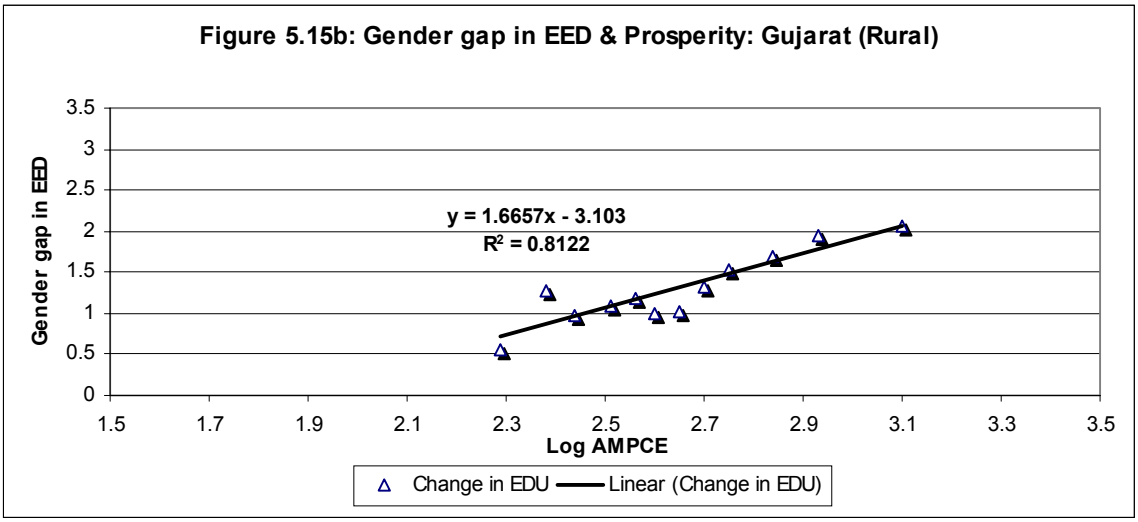


Figure 5.15b: Gender gap in EED & Prosperity: Gujarat (Rural)
y = 1.6657x - 3.103
R² = 0.8122
Gender gap in EED
Log AMPCE
Change in EDU
Linear (Change in EDU)

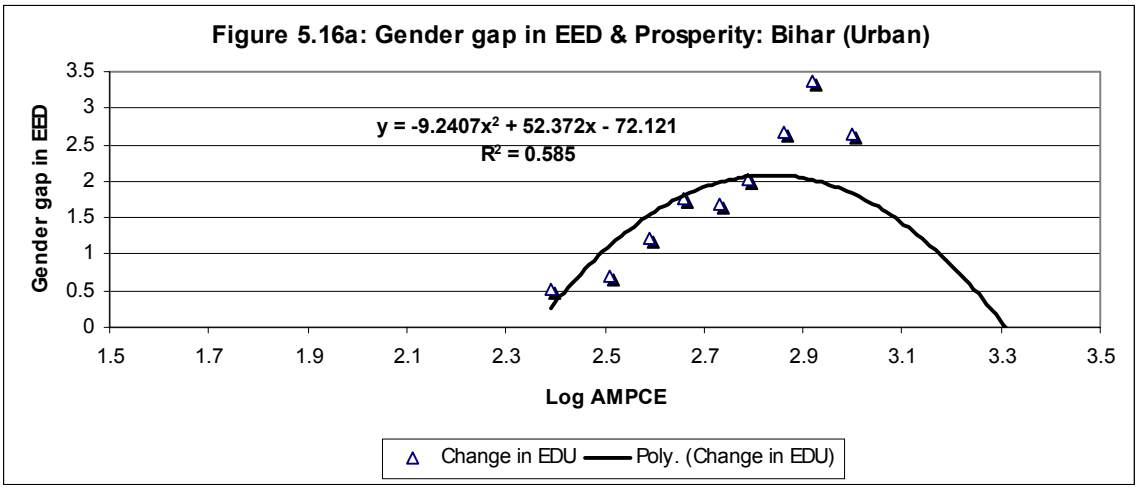


Figure 5.16a: Gender gap in EED & Prosperity: Bihar (Urban)
y = -9.2407x² + 52.372x - 72.121
R² = 0.585
Gender gap in EED
Log AMPCE
Change in EDU
Poly. (Change in EDU)

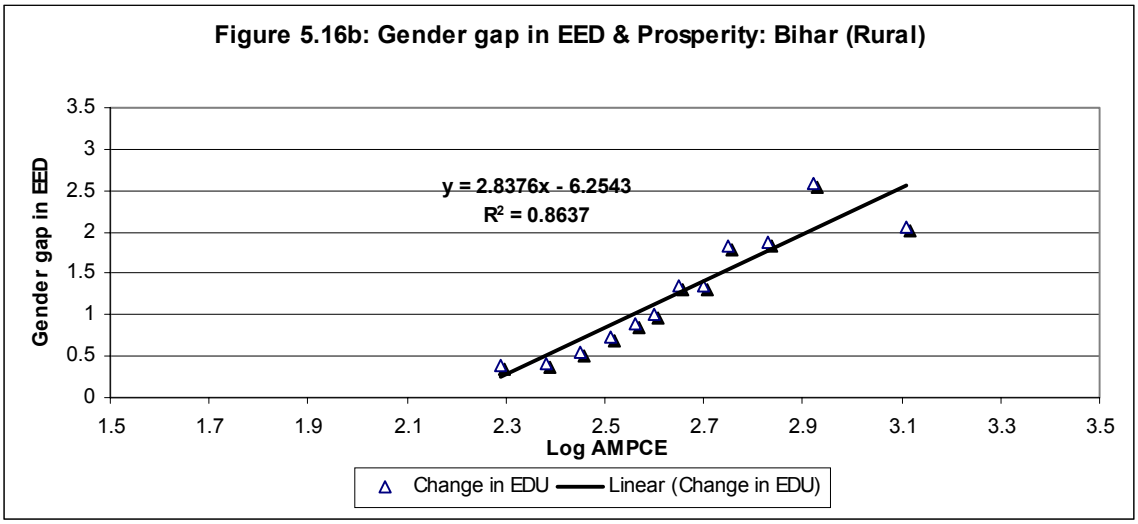


Figure 5.16b: Gender gap in EED & Prosperity: Bihar (Rural)
y = 2.8376x - 6.2543
R² = 0.8637
Gender gap in EED
Log AMPCE
Change in EDU
Linear (Change in EDU)

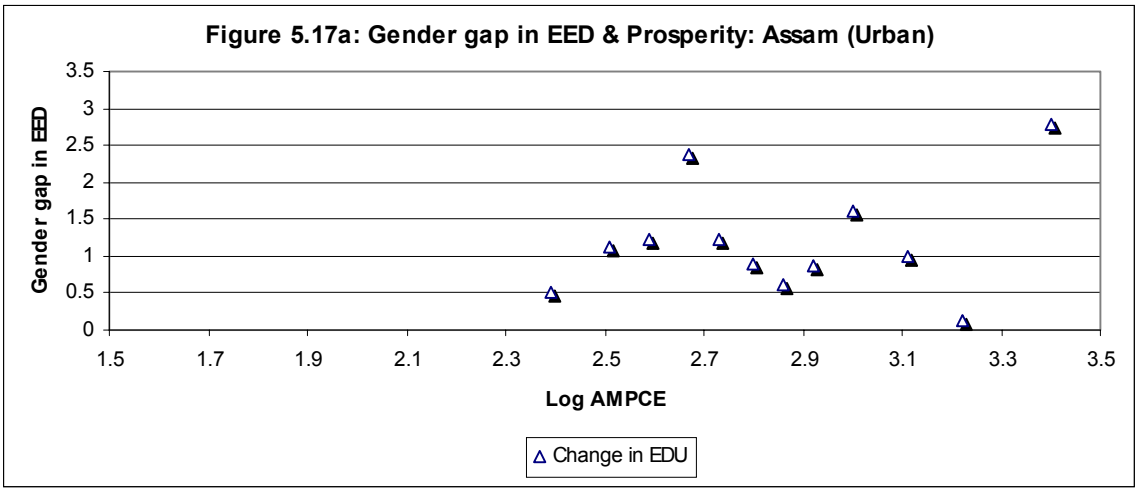


Figure 5.17a: Gender gap in EED & Prosperity: Assam (Urban)
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU

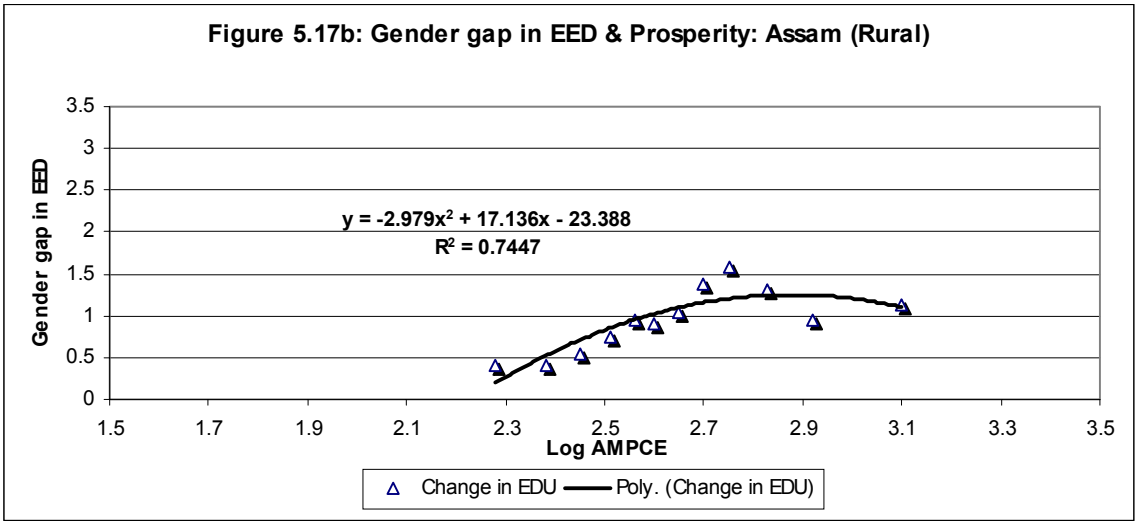


Figure 5.17b: Gender gap in EED & Prosperity: Assam (Rural)
Gender gap in EED
y = -2.979x² + 17.136x - 23.388
R² = 0.7447
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU
Poly. (Change in EDU)

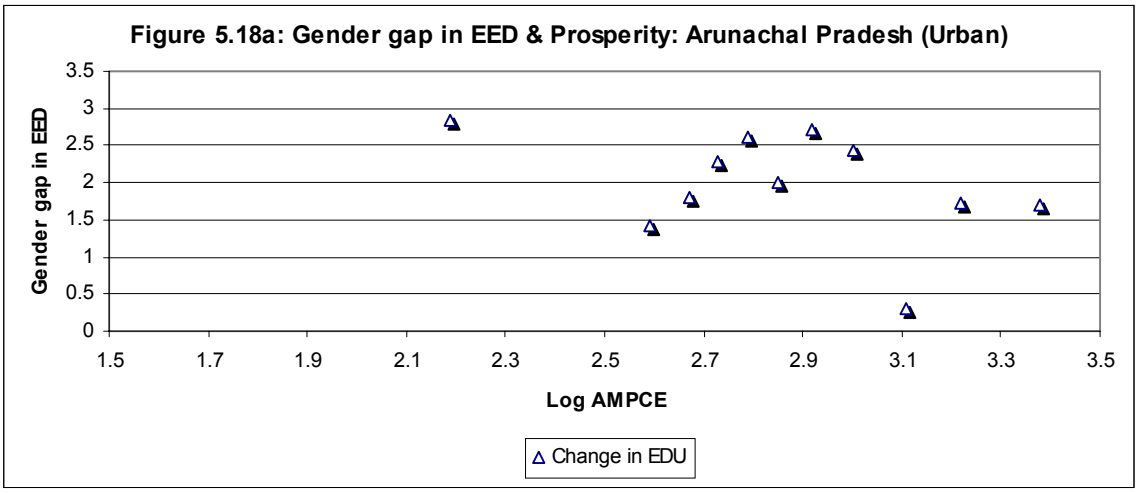


Figure 5.18a: Gender gap in EED & Prosperity: Arunachal Pradesh (Urban)
Gender gap in EED
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU

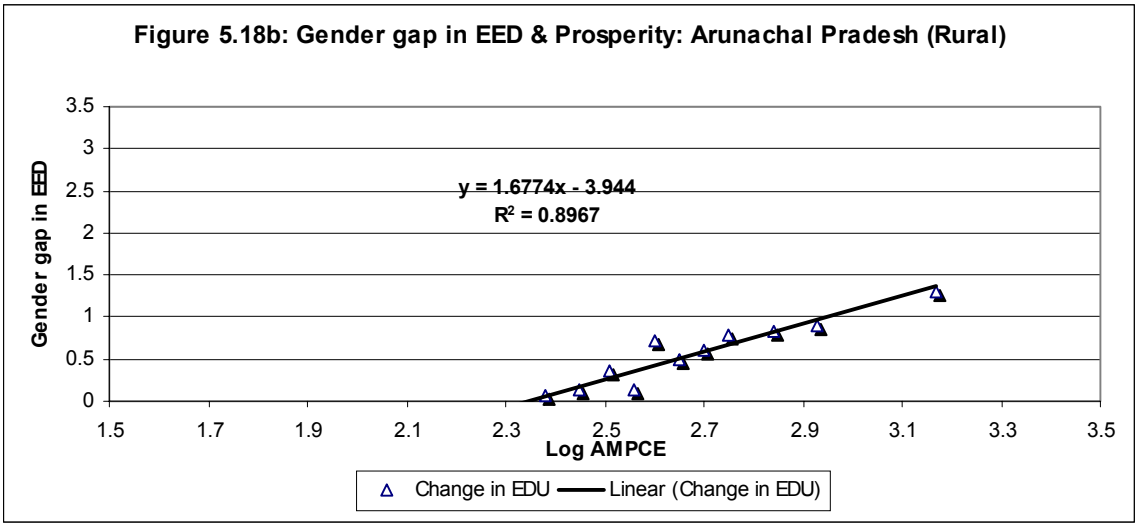


Figure 5.18b: Gender gap in EED & Prosperity: Arunachal Pradesh (Rural)
Gender gap in EED
y = 1.6774x - 3.944
R2 = 0.8967
3.5
3
2.5
2
1.5
1
0.5
0
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
3.3
3.5
Log AMPCE
Change in EDU
Linear (Change in EDU)