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Abstract

The aim of this paper is to propose a new measure of regional development which is based on a method developed by the World Bank called the Human Opportunity Index, which quantifies the total contribution of individual socioeconomic and demographic circumstances to inequality of opportunity in accessing basic services in 6 Tunisian regions and for three years 2005, 2010 and 2015. s. We use the Principal Component Analysis (PCA) method to determine the weighting factors of the**.** Regional composite Human Opportunity Index (RCHOI). This regional development index makes it possible to compare the disparities in the level of development between regions, and the results show that Tunisia experienced during two periods considerable disparities between the different regions. The interior region of the country, particularly the central-western region, and north-west, lag behind other regions, and thus occupy the latest development rankings compared to coastal areas.

Keywords: Human Opportunity Index; Inequality; Opportunities; Circumstances; Principal Component Analysis;Tunisia.
JEL Classifications: D63, I24

1. Introduction

Tunisia has recorded remarkable achievements in growth, macroeconomic performance and poverty reduction in recent decades. From 1990 to 2010, the average annual rate of the gross domestic product and the inflation rates reached in 2010 respectively 5% and nearly 3%. The rapid growth has significantly reduced the rate of poverty from 32.4 to 15.5% between 2000 and 2010. Tunisia also performed well on most development indicators. Economic growth and public investments in human development contributed to access basic water and sanitation services and to reduce infant and maternal mortality and child malnutrition at the national level.

Nevertheless, while poverty has decreased, regional disparities particularly in terms of human capital, investment, unemployment have persisted over time. In rural areas children are more than twice as likely to be stunted (10 percent in rural areas versus four percent in urban); Children of Tunisia's interior and those of coastal regions don‘t have the same access to basic public services such as water services (99% in Tunis sand 54.6%in Sidi Bouzid), sanitation (96%in Tunis, and 26.4% in Mednine); the hinterlands, which are also the poorest regionst, have the highest unemployment rates for graduate, above 30% (Gafsa (47%), Sidi Bouzid (41%), Kébili (43%), and Jendouba (40%) compared to the national rate of 13% in 2010. These inequalities between the regions are accentuated by the concentration of economic activities in the coastal region (almost 90% of enterprises and 95 % of foreign investment in companies).

The increase of economic and social disparities between regions, which is exacerbated by the spread of corruption, has created a deep sense of economic marginalization and injustice (Verdier and al., 2011) which led to the Revolution of the 14th January 2011.

This situation implies the obligation to dispose today a tool to monitor and evaluate the level of regional development. For this purpose, the construction of a composite indicator of regional development is fundamental to measure the intensity of inequality within the same country.

The paper aimed to construct a new regional development index for Tunisia. Thus, by using the approach of equality of opportunity (the John Roemer’s theory (1998)). We use the Principal Component Analysis (PCA) method to determine the weighting factors of the**.** Regional composite Human Opportunity Index (RCHOI). This index measures equality of opportunity in access to a bundle of services and how socioeconomic factors outside the control of the child affect their ability to tap into these services. Indeed, an unequal distribution in access to basic public services (housing services, education and others) means that opportunities do not flow equally across the different groups and regions.

The rest of the paper is organized as follows: The next section presents a literature review of regional development measurement. The third section presents the data and the methodology to calculate the regional development indicator. The fourth section, calculates Human Opportunity Indexes for six Tunisian regions and three years, 2005, 2010 and 2015, using data from nationally representative household surveys. Then, the Human Opportunity Index (HOI) is used to construct a regional composit human opportunities index (RCHOI). The conclusion summarizes the main findings rising from the study and provides some policy implications.

2. Regional development measures: literature review

The literature on the economic development proposes different approaches to measure regional development.

Traditional approaches to the measurement of development are unidimensional , since they are based on a single indicator, generally gross domestic product ((Costanza et al. (2009) and also Zidi (2014) Costanza et al. (2009) and also Zidi (2014)) or inequality indexes mainly including Coefficient of variation, Gini coefficient, Theil index ((Jian et al., 1996; Fujita and Hu, 2001; Jonathan and Terry, 2002; Wang et al., 2004; Kanbur and Zhang, 2005; ; Rui and Zheng, 2010).

The one-dimensional indicator gives a limited vision of the progress of the region, (Gurria 2013). The process of improving regions well-being therefore requires a multidimensional approach in measuring the development process (Sen (1983:153), Alkire (2009:31) and Nussbaum (2003:34).

Several multidimensional indicators have been proposed to assess the level of regional. development.

The human development index (HDI) has been the most used amongst these indexes to capture regional and territorial advancement (Hazell and al (2012) and Silva and Lopes (2012) Ben Aabdelaali and al (2013) Zidi (2014),Schrott, Gachter & Theurl, (2015:1). Kovacevic (2011:1) . II is a composite index calculated on the basis of three socioeconomic indicators that reflect three major dimensions of human development: Life expectancy at birth", "Education" and "GDP per capita"

Some critics of HDI have stated that it presents an oversimplified view of HDI and confirm that the HDI needs to be supplemented by other socioeconomic indicators

Since 2003, the "Campaign Sbilanciamoci!" proposed a multidimensional measure of the development of Italian regions, of 41 individual indicators from different types. The considered dimensions are 7: "Environment", "Economy and labour", "Rights and citizenship", "Health", "Education and culture", "Equal opportunities", "Participation". The composite index is equal to the arithmetic mean of 7 macro-indicator. Also, Croatian, Perisic and al (2014) consrtructed a composite index of five socio-economic indicators including per capita income, budget revenu per capita , the unemployment rate, the change in the number of the population and the school success rate. The

construction of this composite indicator was normalized to the national average taking into account the uncertainty and sensitivity analysis that has been performed using Monte Carlo simulations and variance-based techniques. Ahmet and al. (2014), constructed also a composite indicator of 27 indicators scaled according to their importance rank determined by the RDA specialist and which are used to measure the performance of RDAs in Turkey. Meyer and al (2016) proposed a composite index constructed from an arithmetic average of 17 indicators summarizing different dimensions including the demographic dimension, the social dimension, the economic dimension and the employment dimension. ITEQ (2012) and Najeh (2015) constructed a composite regional development indicator for Tunisia. These composite indexes summarized different socio-economic domains. In the paper of Lamia MOKADDEM(2014), the assessment of the regional development index was reconsidered in the light of data envelopment analysis (DEA. First, a DEA-like model was developed to assess the relative efficiency of the regions . Then the application of this non-parametric approach made it possible to obtain efficiency scores and to classify the different regions in terms of performance. The efficiency scores was used as a measure of a regional development.

3. Regional composite Human Opportunity Index (RCHOI)

While measures presented above offer a broad understanding of regional development, they provide a limited picture of regional inequalities. In addition, they do not capture the differential intensity of development across regions that may remain within countries. For these purposes, we think a regional composite index based on the opportunity approach may provide a more accurate picture of regional disparities. The inequality that characterizes the region's distribution of development outcomes lies more inequality of opportunities.

3.1 Methodology for construction RCHOI

3.1.1 The Human Opportunity Index(HOI)

Equality of opportunity is a concept that was developed by the philosophers such as Arneson (1989), Cohen (1989) and explored within the economic literature by Roemer (1988,1993). According to Romer(1993) the equality of opportunity , is determined by two classes of variables: "efforts and "circumstances". The efforts are endogenous and depend on individual choices. Circumstances, by contrast, are exogenous factors, such as socioeconomic status, parental education, race, gender, and geographic location.

Based on the Roemerian approach of inequality of opportunity, Barros and al. (2009) propose the Human Opportunity Index (HOI), an indicator that attempts to capture inequality of opportunity with a special focus on opportunities for children. This tool which was developed by researchers at the World Bank in collaboration with external researchers has been used as an intuitive measure of a society's progress toward equitable provision of opportunities. The HOI methodology takes into account the extent to which personal circumstances affect the probability of accessing basic services which are necessary to succeed in life, like education, running water, electricity.

The HOI measures the contribution of inequality of opportunities given the circumstance variables. The estimation of the human opportunity index consists of aggregating circumstance-specific coverage rates in a scalar measure which increases with the overall coverage and decreases with the differences in coverage between groups with different sets of circumstances. More formally, the HOI for a given opportunity is the average access coverage rate π multiplied by a penalty factor equal to 1 if the opportunities are equitably distributed.:

$$\mathbf{HOI} = \boldsymbol{\pi}\,(1-D) \qquad (1)$$

with $\boldsymbol{\pi}$ is the coverage level and D is the dissimilarity index anging from 0 to 1. In a situation of perfect equality of opportunity, D will be zero.

The objective of the decision-makers will be to maximize the HOI, which can be achieved either by increasing the total possibilities (coverage) or by increasing the equity of opportunities (more equitably distributing opportunity), or by increasing both the hedging and equity.

The D-index can be interpreted as showing the fraction of all available opportunities which need to be reassigned from better-off groups to worse-off groups to achieve equal opportunity for all. It is the total number of opportunities that needs to be reallocated between types to ensure equality of opportunities. It is computed as follows:

$$\mathbf{D} = \frac{\mathbf{1}}{\mathbf{2\pi i}} \sum_{\mathbf{i=1}}^{\mathbf{k}} \mathbf{Wi} \quad | \hat{\pi}\mathrm{i} - \pi | \qquad (2)$$

where **n** is the number of sample households, **wi** is the population weight attached to the ith sample household, and $\boldsymbol{\pi}_\mathbf{i}$ is the proportion of the population with access to a given opportunity. π may be called a coverage level and k the number of groups defined by circumstances. It is the mean of $\hat{}\,\pi$i across all individuals.

$\boldsymbol{\pi}_\mathbf{i}$ are estimated by means of a logit model using a set of k circumstance variables xi1, xi2,..., xik . Accordingly, we have a logit model:

$$\boldsymbol{\pi}\mathrm{i} = \frac{e^{\sum_{j=1}^{k} \beta j x i j}}{1 + e^{\sum_{j=1}^{k} \beta j x i j}} \qquad (3)$$

The estimated coefficients of the regression are used to obtain his/her predicted probability of access to the opportunity for each individual, which is then used to estimate the D-index, the coverage rate. It is important to note that the D-Index thus calculated is a function of the set of circumstances chosen for the analysis.

Then, we follow Son (2013) and calculate the relative contributions of individual circumstance variables to the inequality of opportunity according to the Fields (2003) Method.

The purpose of determining these individual contributions is to recognize the variables of circumstances that greatly influence the inequality of opportunity for each opportunity.

Tthe methodology of calculating these relative contributions is the following:

The ratio of the odds of access to opportunity (zi = 1) against no access to opportunity (zi = 0) is defined as: $\boldsymbol{Yi = \frac{\pi i}{1-\pi i}}$, A special feature of the odds ratio is that, in utilizing equation (1), it can be written in natural logarithmic form as

$$\ln (\mathbf{Y}i) = \sum_{j=1}^{k} \boldsymbol{\beta j x i j} \qquad \textbf{(4)}$$

using this equation, the maximum likelihood estimation of odd ratio can be defined as follows:

$$\boldsymbol{ln\ (\hat{y}i)\ =\ \sum_{j=1}^{k} \hat{\beta} j\ x i j} \qquad \textbf{(5)}$$

Where $\hat{\beta}j$ is the maximum likelihood estimate of the coefficient βj. As defined above, yi is a monotonically increasing function of πi, thus the variation of proportion πi will be equivalent to variation of yi. Similarly inequality of byi which is a defined previously as measure of inequality explained by circumstance variables will be equivalent to inequality of pi . Following Fields (2003) and Son (2013) we took the variance of both sides in the previous equation to get the following equation:

$$\boldsymbol{\sigma^2(ln\ (\hat{y}i))\ =\ \sum_{j=1}^{k} \hat{\beta} j\ cov\ (x i j,\ ln\ (\hat{y}i)\ )} \qquad \textbf{(6)}$$

According to this equation, inequality of opportunity can be decomposed in terms of contribution of each individual circumstance variables. Therefore, we divided the two sides of the previous equation by $\sigma^2(\ln\ (\hat{y}i))$ to obtain the percentage contribution of the jth circumstance variable to the total inequality of opportunity

$$100\% = \sum_{j=1}^{k} \boldsymbol{Sj} \qquad \textbf{(7)}$$

where:

$$\boldsymbol{Sj = 100 * \frac{\hat{B}jcov\ (xij, ln\ (\hat{y}i))}{\sigma^2(ln\ (\hat{y}i))}} \qquad \textbf{(8)}$$

Where Sj is the percentage of contribution of the jth circumstance variable.

3.1.2. Deriving the RCHOI

Consider a country of N regions i. In each region i, there is a K bundle of services which are essential for the development of a child.. These could include access to school, access to electricity at home, access to a clean and hygienic home, access to clean drinking water, access to telephone, etc.

The first step in building a summary measure of development RCHOIi for each region i concerns the construction of a HOI for a selected services. Obviously, the choice depends on data availability, but the variables considered affect the development of child that can be analyzed.

In this work, we select three items from the original dataset, based on their relation with the children deprivation condition. These items cover different living standards aspects, enabling us to identify a range of deprivation dimensions. We do not consider only "basic necessities" for the inclusion in the deprivation index but a wider set of services identifying the society's living standard. Items related to income, labor market status, however, have not been included in our analysis since we consider them as determinants rather than indicators of deprivation

Once HOI Indexes of condition living, infrastructure and education indictors have been calculated, they are aggregated into a single composite index which can be written for a region j as:

$$\mathbf{RCHOI_i} = \sum_{j=1}^{k} \gamma_j \ \mathbf{HOI_{ij}} \qquad (9)$$

Where HOI_{ij} is the human opportunity index of the opportunity j (j= 1…. K) of the region i (i = 1…n)

γ_j is the weight attributed to the indicator HOI_{ij} in the computation of the composite index RCHOI of the region i .

The aggregation of the HOI of the different items into a multidimensional index implies choosing an adequate weighting structure. Different methods have been used in the literature to determine weights of composite indexes. Some studies apply equal weighting for each item (Townsend, 1979; Mack and Lansley, 1985; Nolan and Whelan, 1996, among others), giving the same importance to the different dimensions. Other studies develop their indices by aggregating the variables on the basis of their relative frequencies (Hallerod, 1995, for example), or relying on statistical methods, such as Principal component analysis (PCA). This approach, followed also in our work.

The Principal Component Analysis (PCA) is a statistical technique that transforms a number of correlated variables into a smaller number of uncorrelated variables called principal components, which are linear combinations of the original variables; This technique is used for data reduction by describing a number of uncorrelated linear

combinations of the variables that contain most of the variance. The aim of the PCA is to find the vector of linear combinations of the variables with the greatest variance.

3.2 Data

The methodologies outlined in the previous sections are applied to six regions of Tunisia: North East, North West, Mid-East, Mid-West, South East and South West[3] in order to analyze the inequality of a set of opportunities related to living conditions, education and basic infrastructure. Similarly, the calculations of the D-Index, the HOI and the RCHOI will be made based on key circumstance and outcome variables derived for all children under age 16 living in surveyed households.

Circumstances, as used here, consist of personal or family socioeconomic characteristics over which an individual has no direct control.

Table 1 presents the opportunities and the circumstances considered in the analysis at the national level.

Table1A: definition of opportunities and circumstances used in the inequality analyses for Tunisian Regions

Opportunities	Life conditions	housing type Having a car Having a computer Having a fridge
	Education	Literacy status Primary education Secondary education
	Basic infrastructure	Access to electricity Access to water Access to sanitation Access to internet
Circumstances	Gender Place of residence income education level of the head	

The 2015 survey covered a sample of 25,145 individuals in 6 regions of Tunisia: 26.4% of population for North East, 14.0% for Northwest, 14.1 % for East Center, 15.4% for Central West, 14.8% for South East and 15.3% for South West.

Table 2 describes the sample distribution by region for the three periods of the study.

[3]The Norrth -East (Greater Tunis (4 governorates: Tunis, Ariana, Manouba and Ben Arous) and the 3 governorates: Bizerte, Zaghouan and Nabeul) , The North-West (4 governorates: Jendouba, Beja, Kef and Siliana), The Mid-East (4 governorates: Sousse, Monastir, Mahdia and Sfax) , The Mid-West (3 governorates: Kairouan, Kasserine and Sidi Bouzid), The South-East (3 governorates: Gabes, Medenine and Tataouine) and the South-West (3 governorates: Gafsa, Tozeur and Kebili)

Table 2: Distribution of the population by region

	2005		2010		2015	
	Effective	Percentage	Effective	Percentage	Effective	Percentage
Nord Est	4201	34,1	3532	31,3	6628	26,4
Nord-Ouest	1632	13,2	1553	13,8	3508	14,0
Centre Est	2315	18,8	2101	18,6	3553	14,1
Centre Ouest	1697	13,8	1710	15,2	3869	15,4
Sud Est	1210	9,8	1204	10,7	3744	14,8
Sud-Ouest	1262	10,2	1181	10,5	3842	15,3
Total	12318	100,0	11281	100,0	11281	100,0

Source: National Survey on Household Budget, Consumption and Standard of Living, (2005,2010 and 2015).

4. Results

4.1 Inequality of Human opportunity

Living conditions

For the years 2005, 2010 and 2015, the estimates of the total HOI index, the dissimilarity index and the rate of coverage of the living conditions of each region in Tunisia are presented in table 3 and table 4.

The results of estimations show that access to the living conditions services, is improved over time in Tunisian regions. Indeed, there is a clear upward trend in the overall human opportunity index between the three study periods. In 2005, this index was between 25.24 % and 43.95% compared to 2010, where the results showed an increase in inequality from 26, 48% to 45, 84 %. For 2015, the HOI index varies between 50, 83 and 64, 55.

However, a higher overall HOI shows more equal access opportunities. According to Tables 3 and 4, uneven progress was made in 2005 to ensure equal opportunities between regions. In addition, 43.95% of the basic opportunities available are distributed equitably among children in the North East region, and only 25.24% are distributed to children in the North West region. In 2010, 45.84% of available core opportunities are distributed equitably among children in the North East region and only 26.48% are distributed to children in the Middle West region.

Table 3. Inequality of Opportunity in living conditions (2005-2010)

	2005			2010		
	Coverage opportunity	D index	Human opportunity index	Coverage opportunity	D index	Human opportunity index
North East	47,44	25,83	43,95	52,30	24,11	45,84
North West	31,52	33,55	25,24	40,46	29,77	32,64
Mid-East	40,98	21,38	36,39	49,61	20,68	43,15
Mid- West	33,27	28,81	26,79	32,5	33,88	26,48
South East	44,48	24,11	37,84	52,03	24,04	44,01
South West	37,31	31,61	31,02	40,87	29,61	34,55

Source: Author's calculations based on household surveys.

In 2015, 64.55% of the basic opportunities available are distributed equitably among children in the South East region and only 50.83% are distributed to children in the North West region.

These results imply that, although there is an upward variation in time, access to this service remains largely unequal between regions, and far from universal.

Note that HOI's upward trend is followed by an increase in the covrage index. This index gives an idea of the percentage of access to living conditions (World Bank 2014). The results of the estimations show that this index has seen an upward variation ranging from 33.27% to 47.44% in 2005, from 32.5 %to 52.30 %in 2010 and from 57.49 % to 66.39 % in 2015. However, the Middle West region has the lowest coverage in all three study periods. This means that to ensure equitable coverage of access to living conditions, approximately 12.9% of this service should be reapplied in the Center West region in 2015. This disparity is reflected by the D index which is 12, 9% and that generates a HOI of 53.99%.

Table 4. Inequality of Opportunity in living conditions (2015)

	Coverage opportunity	D index	Human opportunity index
North East	61,68	14,72	**55,64**
North West	54,44	14,36	**50,83**
Mid-East	64,47	7 ,28	**61,03**
Mid- West	57,49	12,9	**53,99**
South East	66,39	4,19	**64,55**
South West	65,57	5,27	**63,42**

Source: Author’s calculations based on household surveys.

The index D in Tables 3 and 4, representing the degree of inequality, shows that there are striking dispersions in the different Tunisian regions. For example, in 2005 in the North West, 33.55% of the opportunities for children to live normally must be reallocated to reduce disparities. Although the rate of inequality decreased in 2010 (29.77%), it remains high compared to the northern region. On the other hand, the living conditions inequality in the west of the country increased in 2010 (33.88% against 28.81%). In 2015, 12.9% and 14.72% of children's chances of living were to be reallocated to reduce disparities in Middle West and North East regions.

However, we can note that children in the interior region are always lower among the different opportunities. This is especially reflected in the overall HOI, which is the simple average HOI of each fundamental opportunity, and can be interpreted as the proportion of available opportunities distributed according to the principle of equal opportunity

The same conclusions can be drawn if one analyzes in terms of different possibilities that give an idea of the living conditions, and which concern the type of housing, the fact of having a computer, a car and a refrigerator.

These services also indicate that there are significant disparities in access to these opportunities that persist in all regions.

According to Table1 (Appendice1), interior regions have the lowest coverage. As a result, the probability of having a house in the northeast is higher than in the northwest where HOIs were successively 49.7% and 16.16% in 2005. This result is clear for the index. of dissimilarity where they reach 36, 39 percent in the northwest and only 6.22 percent in the north-east.

By contrast, in 2010, the probability of having a car in the Central East is higher than in the North-West, where the HOI was successively 18.24% and 9.01% with an uneven distribution successively of 10.68% and 29.01%.

In 2015, the probability of having a refrigerator in the Central East is higher than in the Northwest, where the HOI was successively 96.09% and 92.3%.

Basic infrastructure

Basic infrastructure services such as water, electricity and sanitation make significant contributions to well-being. A number of studies (World Bank 2004, Kakwani and H. Son 2005), reveal that a household's access to basic infrastructure services is highly and significantly correlated with a lower probability of being poor.

In Tunisia, access to basic infrastructure services has expanded considerably. According to the results of 2005, 2010 and 2015, the percentage of children living in households benefiting from access to water, sanitation facilities, internet and electricity has risen slightly. But this increase differs across regions. In 2010, the highest expansion, nearly 72,84 percent, is observed in the North East while the lowest level is observed in the center west region (49.95%). The largest expansion, close to 72.84%, is observed in the north-east for the two periods 2005 and 2010 (respectively 60.14% and 72.84%), while in 2015, the largest expansion is observed in the mid-east (88.06%).

Table 5: Inequality of Opportunity in Access to basic infrastructure (2005 – 2010)

	2005			2010		
	Coverage opportunity	D index	Human opportunity index	Coverage opportunity	D index	Human opportunity index
North East	65,51	22,63	60,14	78,75	8,88	72,84
North West	43,53	30,90	38,45	61,27	23,09	50,04
Mid- east	60,63	25,94	55,23	76,70	7,81	71,86
Mid- West	47,16	32,18	38,70	59,87	23,55	49,95
South East	58,045	25,02	52,14	76,14	8,41	71,49
South West	52,86	29,10	48,95	65,73	7,24	61,96

Source: Author's calculations based on household surveys.

Table 5 shows that the interior regions of Tunisia (North west, middle west, south west), have experienced the lowest percentage of access to basic infrastructure services among children during the considered period, indeed, the HOI results suggest that access to basic infrastructure services, such as water, electricity, internet and sanitation, is increased during 2005, 2010 and 2015 and a higher dispersion for all regions.

As for the overall coverage rate, the percentage of access to the infrastructure varies from 43.53% to 65.51% in 2005 respectively for North West and the North East , from 59 .87% to 78.75% in 2010 respectively for Mid-West and North East , and from 77.82% to 92.55% in 2015 respectively for North West and Mid-East.

However, in 2015, the North West region has the lowest coverage. This means that to ensure equitable coverage of access to infrastructure, approximately 11.99% of this service should be reapplied in the North West region. This disparity is reflected by the D index which is 11.99% and which generates a HOI of 64.07%.

Table 6: Inequality of Opportunity in Access to basic infrastructure

	2015		
	Coverage opportunity	D index	Human opportunity index
North East	86,98	6,92	86,25
North West	77,82	11,99	64,07
Mid- east	92,55	3,14	88,06
Mid- West	74,11	10,41	65,85
South East	88,26	2,76	85,49
South West	86,40	3,23	82,61

Source: Author's calculations based on household surveys.

On the other hand, the degree of inequality represented by the dissimilarity index shows that there are striking dispersions in terms of access to infrastructure in the different

Tunisian regions. For example, in 2005 in Mid-West, 32.18% of access to infrastructure must be redistributed equally to reduce disparities. As well as 10.41% and 6.92% of access to infrastructure were to be redistrubuted equally in 2015 to reduce disparities in the Mid-West and Northeast regions.

As shown in appendix 2, the North East takes the lead in access to water in 2005 and 2010 with its HOI equal to 85.36% and 86.45%. By contrast, in 2015 South East occupies the first ranking of access to water with a HOI which affects 97.45%. In contrast, North West and Central West have an HOI below 50% for this service in 2005 and 2010, with a remarkable improvement during the 2015 period.

Access to infrastructure has shown an upward trend between the three periods.. This is represented by the coverage rate, which are 95,8 % in 2015 although it was 90.8% in 2005 in the North East region. However, this improvement in the coverage rate is followed by a decrease in the inequalities of access to this service or the index D is 2.75%

As for electricity, the north East and the mid-East lead, with HOI higher than 99%. In sanitation, only one of the six regions examined in this study displays an HOI higher than 50%, while the West regions (North West,Mid-West and South West have HOI lower than 35 % (appendix 2). In 2015, the three eastern regions have an HOI greater than 99% for electricity with an improvement in sanitation for the South West region.

Furthermore, access to internet services also shows improvement in 2010. Coverage rate and HOI for this opportunity varied dramatically overtime, especially, in 2005, the HOI varied between 0,31 percent and 1,18 percent and in 2010 varied between 30,46 percent and 54,41 percent. However, in 2015, access to this service varies between 86.24% and 77.15%

It is worth estimating here that there is a significantly larger increase in internet access between the periods of study. Indeed, in 2005, the rate of access to internet was very low which is explained by the fact that most Tunisian households in 2005 were still not connected to the Internet because of its high cost, which was most often caused by the lack of connection in their homes to internet. Therefore, low-income households have less access to information and communication technologies than other households. In addition, households with limited resources, for which other consumption priorities may be required, are more often left out of this progress. Moreover, the number of Tunisian households connected to the Internet has increased as the cost of equipment has been reduced and with the simplification of usage over time, which explains the sharp increase in access to the Internet in 2010 and 2015.

Education

During the period 2005 – 2015, inequality of children's opportunities in Tunisian regions increased gradually. In terms of education, all three opportunities, namely primary education, secondary education and literacy status performed well considering the fact that their HOI and coverage rates were always greater than 80 percent and the gaps between them, in general, were relatively small.

In contrast, in 2015, a slight decrease in access to education with an HOI that varies between 70.55% and 80.06%

The analysis of access to education shows significant disparities in the coverage of this opportunity. As observed in Table 3, the children who live in the mid-west region had the lowest coverage of education (82,39 percent in 2005and 83,49 percent in 2010). Indeed, the overall likelihood of access to education has dropped slightly from 86.48% to 85.21% and from 92.15% to 89.24% respectively in the northwest and south west, and has risen from 91.2% to 93,15in the north and from 90.99% to 91,46 % in the south East. In 2015, we still note that the West Central region still has the lowest access rate (74.76%).

There was important progress in 2010 relating to the distribution of opportunity for children to access basic primary education, which is a high variable across regions in Tunisia. As indicated in appendix 3, the North East has the highest rate of availability and in equitably distributed primary education services (HOI 91.22%). In contrast, only 73,38% of the basic educational services are available in the mid-west and are distributed inequitably among children. For the rest of the regions, the estimated HOI is higher than 74%, suggesting that more than 74% of primary education services required for universal coverage are available and distributed equitably.

Table 7: Inequality of Opportunity in Access to Education (2005-2010)

	2005			2010		
	Coverage opportunity	D index	Human opportunity index	Coverage opportunity	D index	Human opportunity index
North East	93,18	2,12	91,2	94,79	1,73	93,15
North West	88,86	2,69	86,48	88,74	4,15	85,21
Mid- east	93,55	2,4	91,32	93,13	2,36	90,95
Mid- West	82,39	4,87	78,32	83,49	3,31	80,79
South East	93,72	2,67	90,99	90,33	2,18	91,46
South West	93,78	1,75	92,15	91,89	2,89	89,24

Source: Author's calculations based on household surveys.

Compared to their younger cohorts, children in the secondary-school-age group (12–16 years old) in the western regions are more likely to have lower levels of equitably allocated education services. The HOI for secondary education services ranges from a high of 91,22% for North East to a low of 73,38% for mid-west. (appendix3).

As shown in Table, the Northeast has the highest rate of available and equitably distributed primary education services (82.83%). On the other hand, only 71.06% of basic services in West Central in 2015 are unfairly available and distributed among children.

The final opportunity, literacy status, shows an improvement and only three regions in Tunisia have a HOI higher than 90 percent, such as the north east, mid-east and south east.

Table 8: Inequality of Opportunity in Access to Education (2015)

	2015		
	Coverage opportunity	D index	Human opportunity index
North East	85,70	3,86	82,39
North West	78,12	5,50	73,25
Mid- east	82,84	4,27	79,30
Mid- east	74,76	5,62	70,55
South East	82,92	2,89	80,53
South East	86,81	3,19	84,06

Source: Author's calculations based on household surveys.

In 2010 and 2015, the difference between coverage and HOI was quite small but still statistically significant implying that these opportunities were provided unequally among different regions. Specifically, the levels of inequality in the western regions are much more evident compared to other regions.

In conclusion, the inequalities in access to such basic services are largely due to geographical differences. The remaining inequalities are explained by other individual and contextual factors that will be further investigated, when looking at the contribution of these circumstances to the inequality of opportunities in access to basic services.

4.2 Contribution of circumstance variables to inequality of opportunities

After estimating the inequality of opportunity level using the Human Opportunity Index (HOI), it is important to assess the contribution of different circumstances variables of inequality.

The different estimates providing evidence on the relative importance of the circumstances variables on the child's access to a given opportunity are presented in appendices 5 and 6.

It is remarkable that most circumstances are also significantly associated with access to living conditions such as income, location and education level of the household head. As to income, it is the main factor explaining disparities in living conditions. This is very clear in the results of estimates showing the effect of income on the possibility of an individual having a house or a car, which are considered the most expensive properties in a household, and their value is therefore related to his outcome.

The level of head of household education also has a significant impact on the possibility of having a computer. There is a direct association between the level of education of the head and his perception of having a computer. Indeed, less educated parents and especially those living in disadvantaged areas could see the computer as a secondary need for their lives. In turn, educated parents are significantly more likely to provide their child with a computer.

For access to basic infrastructure such as water, internet, electricity and the sanitation service, inequality of opportunity is mainly due to income and, to the same extent, the place of residence and the level education of the head of household.

As can be seen from the appendices, localization predominates in six regions, especially in the case of water and sanitation where access to these services is generally higher in urban areas than in rural areas. This is due to the fact that in rural areas the main challenge is the relatively higher cost of building water and sanitation infrastructure and the presence of rural poverty. As a result, rural areas often lack an enabling environment for public or private investment in water services, leading to the provision of such services

In all regions, household poverty is a greater constraint on access to water and sanitation services than is residing in a rural area. This was reflected by our findings in the appendix as we concluded that income is the main contributor to inequality of opportunities in accessing water and sanitation services in Tunisia. Although rural populations in general have less access to safe drinking water or sanitation services than urban dwellers, the rural and urban poor suffer most from poverty and therefore tend to endure illnesses or economic costs. Therefore, investments in water and sanitation in the country should focus on rural areas and urban slum dwellers.

In addition to the financial constraints associated with the provision of water and sanitation services in rural areas, the perceptions and behavior of people in these areas related to water and sanitation also pose challenges. Many rural households do not see the need to invest in tap water or sanitary toilets in their homes because there are free options. This leads to low demand and further reduces the financial viability of projects for the provision of these services.

As shown in Appendices 5, the inequality of opportunity to access to electricity is largely dependent on the location and economic situation measured by income. In view

of the first circumstance (location), people in rural areas should be less likely to have access to electricity than their urban counterparts because there are constraints to achieving universal electrification in rural areas.

The estimation results show that income is also a significant circumstance variable that influences access to internet. Indeed, Low-income households have less access to information and communication technologies than other households, and they more often justify the lack of connection to the Internet. However, these resource-poor households, for which other consumption priorities may be needed, are more often left out of this progress.

Reasons for non-access to the internet are not only financial, low-income households included; some households simply do not see the value or find the use of these products too complex.

For access to education the results in the appendix show that inequality of educational opportunities is mainly attributable to household income and geographical location which have a higher level of contribution to education inequality in the six selected regions. These results suggest also that circumstantial variables, such as gender and level of education of the head of household have little influence on the fact that a school-aged child has equitable access to educational opportunities.

For primary education, for example, the most important circumstance variable is the income which influences whether a child has fair access to education opportunities. Its contribution to inequality of opportunity for primary education is important for all the regions. This suggests that income plays a major role in affecting the ability of a child to improve his situation over time through education.

For literacy status, localization is an important circumstance variable since it substantially contributes to inequality of opportunity for literacy status in all regions. The contribution of income to inequality of opportunity for secondary education is also significant in all regions

As to secondary education, the estimated results show that location, gender and income are the main variables contributing to inequality of opportunity; indeed, the rural-urban divide, in terms of residence, affects the possibility of the child to have access to secondary education opportunities. The contribution of this location situation is particularly important for the North West, because children living in the rural North West have limited access to schools because of their remote and mountainous locations. According to a World Bank (2006) report, teachers are an essential constraint to improving quality education. It is much more difficult to recruit and motivate teachers to work in rural and remote areas.

Gender is also a significant variable to inequality in secondary education, mostly apparent in the mid-west and southeast. These conclusions call for strategic government policies that could redistribute the education services available for girls in order to help them achieve equality of opportunity in secondary education.

4.3 Estimates of the composite regional development indicator

Three main dimensions are included into the composite regional human opportunity index (RCHOI) : living conditions (measured by the type of housing, having a car, having a computer and having a fridge), access to education (measured by literacy status, primary and secondary education), and basic infrastructure (measured by access to a set of opportunities including water, electricity, sanitation and the Internet).

Dimensions of the RCHOI index

GLOBAL DIMENSION	DIMENSION INDEX	
Living conditions	HOI of housing type	RCHOI
	HOI of have a computer	
	HOI of have a fridge	
	HOI of have a car	
Education	HOI of literacy status	
	HOI of primary education	
	HOI of secondary education	
Basic infrastructure	HOI of water	
	HOI of electricity	
	HOI of sanitation	
	HOI of internet	

The weighting by the PCA method is carried out according to the following steps:

1. Verification of the existence of correlations between variables
2. Selecting the relevant factors that best explain the variance of the sample.

The PCA performs a linear combination of all the variables maintaining relations with each other

It thus releases the main components which can be summarized as one, two, three or more factors according to the different linear combinations. To be able to determine the main factors, three conditions are imperatively required:

(1) the eigenvalue associated with the relevant factors to be retained must be ≥ 1
(2) the individual contribution of relevant factors to the total variance must be at least $\geq 10\%$;
(3) Cumulation in descending order of the variances of the relevant factors must be $\geq 60\%$.

For simplicity and comparisons, we normalize the sum weights per unit. The normalized weight of each component is equal to its weight divided by the total weight

The estimation results presented in Table 7 and 8 show that these conditions are met and the first factor is the factor that satisfies the criteria (1),(2) and (3).

The estimate also shows that the first factor is the factor that satisfies the criteria described above.

This factor returns 86.44% in 2005, 96.56% in 2010 and 86, 03% in 2015 of the information contained in the individual dimensions of regional development (see tables 12, 13 and 14).

Table 12. The main component 2005

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.59308	2.20579	0.8644	0.8644
Comp2	0.387288	0.367652	0.1291	0.9935
Comp3	0.019636	-	0.0065	1.0000

Table 13. The main component 2010

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.89681	2.83377	0.9656	0.9656
Comp2	.0630463	.0229065	0.0210	0.9866
Comp3	.0401398	-	0.0134	1.0000

Table 14. The main component 2015

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.58102	2.28231	0.8603	0.8603
Comp2	.298709	.178435	0.0996	0.9866
Comp3	.120275	-	0.0401	1.0000

Only the eigenvalues which are bigger than 1 were used in computing the different components of the index. The first principal component yields a regional multidimensional human opportunity index that accounts for the largest proportion of the variance. In the analysis of the variables described above, the resulting first principal component explained 86.4% in 2005, 95.69% in 2010 and 86, 03% in 2015 of the information contained in the individual dimensions of regional development.

the correlation coefficient matrix load factors allow the weighting calculation by dividing the eigenvalues of each variable by the sum of the eigenvalues.

The weight will be equal to:

$$\gamma_j = \frac{\lambda i}{\sum_{k=1}^{m} \lambda k}$$

Where λi is the eigenvalues of correlation coefficient matrix

The results of estimation of different weights are presented in the table 15

Table 15 : Determination of weights

Opportunity	Weights 2005	Weights 2010	Weights 2015
Living Conditions	0.3385	0.3346	0.3211
Basic Infrastructure	0.3535	0.3324	0.3429
Education	0.3078	0.3330	0.3359

The obtained RCHOI is distributed on a scale ranging from 0 to 100 (from very bad to excellent), the closer the RCHOI to 100 the more the level of development is raised

Table 9. Regional Composite Human Opportunity Index

Region	RCHOI 2005	RCHOI 2010	RCHOI 2015
Northeast	16,44	23,52	25,03
Northwest	16,25	18,64	20,96
Middle east	19,98	22,87	25,47
Middle west	15,61	17,45	21,20
South east	19,74	22,98	25,39
South west	18,72	20,62	25,34

Based on the result values of the Regional composite Human opportunity index, regions of Tunisia are divided into three groups: regions with high development, regions with medium development and regions with low development. Analyzing these results, the difference between the most developed and the least developed regions is very visible.

In this way, it appears from the estimated results of RCHOI that the north East has the highest annual performance ranking of the Tunisian regions, followed by the middle East and the south East which occupy an intermediate position compared to the disadvantaged zones, in particular the middle west and the North West have benefited less from economic growth in terms of living conditions, basic infrastructure and education,

Thus, according to the estimated results, it is important to note that both the Middle East and the middle West express extreme disparity of RCHOI with successive values in 2005 of 19,98% and 15,61%. In addition, the gap between most developed and least developed regions can be easily seen. In 2015, the middle- East occupied the first ranking of regional development by an RCHOI of 25,47%.

5. Conclusion and recommendations

Equalization of opportunities remains an important policy challenge in the regional development process and public policy discussions including the Millennium Development Goals initiative.

The purpose of this study is to construct a composite regional index of human opportunity to assess disparities between regions in terms of access to economic opportunities based on Roemer's approach to inequality of opportunity (1998).

To build this composite index we based on the method developed by the World Bank (2006)called the Human Opportunity Index (HOI), which quantifies the total contribution of individual socioeconomic and demographic circumstances to inequality of opportunity. These indicators of inequality (HOI) have been used as a tool for assessing the degree of opportunity inequality in the Tunisian regions concerning the access to adequate living conditions (house,care, computer), infrastructure (sanitation, safe water, electricity)and education by children under 16 years of age.

The obtained results of estimates of human opportunity index suggest that Tunsia improved its fairness in terms of equality of opportunity between 2005 and 2015. Yet, disparities between, the country's interior and coastal region persists. Children in inner regions acces to lower opportunities than those of coastal regions . The analysis results also provides the importance of each circumstantial variable in determining inequality of opportunity for children, indicating that income and location are the most critical factors.

We use the Principal Component Analysis (PCA) method to determine the weighting factors of the**.** Regional composite Human Opportunity Index (RCHOI).

This composite index makes it possible to compare the disparities in the level of development among regions, and the results show that Tunisia experienced considerable disparities among the different regions during the selected periods. The interior region of the country, particularly the central-western region, and north-west, lag behind other regions, and thus occupy the lowest development rankings compared to coastal areas.

Given these findings, the Tunisian authorities should focus on specific aspects that have a relatively low coverage rate. These disadvantaged opportunities need urgent support to strengthen public services for all children, regardless of their circumstances. Indeed, the contribution of circumstances to the unequal opportunities for children suggests that regional development is one of the major issues of concern. Hence, targeted interventions and appropriate investments for disadvantaged areas can offer significant potential for improving the overall equity of living conditions, infrastructure and education for children.

It is also clear that the most vulnerable children should receive more attention and policy interventions to overcome poverty and unequal opportunities as vulnerable

children may be less likely to access basic services. Thus, all grant programs should focus on improving living conditions and providing quality education, as well as better basic infrastructure.

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Appendice 1: The Human Opportunity Index

Table 1: HOI index of living conditions (2005)

	Housing	Car	Computer	Fridge	Average
North East	49,7	22,69	8,36	95,07	**43,95**
North West	16,16	14,98	1,33	68,5	**25,24**
Middle East	36,15	14,12	6,58	88,72	**36,39**
Middle West	19,39	19,75	3,4	64,63	**26,79**
South East	34,76	19,48	7,21	89,94	**37,84**
South West	30,61	6,99	4,46	82	**31,01**

Table 2: HOI index of living conditions (2010)

	Housing	Car	Computer	Fridge	Average
North East	61,62	9,46	16,04	96,24	45,84
North West	32,22	9,01	6,1	83,26	32,64
Middle East	46,82	18,24	14,86	92,69	43,15
Middle West	20,41	5,84	2,86	76,82	26,48
South East	45,26	19,61	14,5	96,7	44,01
South West	24,94	6,71	11,96	94,6	34,55

Table 3: HOI index of living conditions (2015)

	Housing	Car	Computer	Fridge	Average
North East	72,61	25,23	29	95,72	55,64
North West	83,68	14,3	13,06	92,3	50,83
Middle East	73,98	44,14	29,91	96,09	61,03
Middle West	84,63	22,7	12,7	95,94	53,99
South East	89,85	40,43	32,15	95,8	64,55
South West	90,87	37,65	29,69	95,48	63,42

Table 4: HOI index of Basic Infrastructure (2005)

	Electricity	Water	Sanitation	Internet	Average
North East	97,2	85,36	57,26	0,757	60,14
North West	96,31	39,03	18,08	0,41	38,45
Middle East	98,25	82,86	38,99	0,85	55,23
Middle West	90,44	48,61	15,01	0,75	38,70
South East	97,64	79,16	30,59	1,18	52,14
South West	96,07	76,56	22,87	0,31	48,95

Table 5: HOI index of Basic Infrastructure (2010)

	Electricity	Water	Sanitation	Internet	Average
North East	99,25	86,45	68,2	37,49	**72,84**
North West	97,48	47,81	24,43	30,46	**50,04**
Middle East	99,12	92,1	46,6	49,63	**71,86**
Middle West	97,04	36,88	15,41	50,48	**49,95**
South East	97,65	90,61	43,3	54,41	**71,49**
South West	97,6	84,32	34,49	31,43	**61,96**

Table 6: HOI index of Basic Infrastructure (2015)

	Electricity	Water	Sanitation	Internet	Average
North East	97,2	85,36	57,26	0,757	**60,14**
North West	96,31	39,03	18,08	0,41	**38,45**
Middle East	98,25	82,86	38,99	0,85	**55,23**
Middle West	90,44	48,61	15,01	0,75	**38,70**
South East	97,64	79,16	30,59	1,18	**52,14**
South West	96,07	76,56	22,87	0,31	**48,95**

Table 7: HOI index of Education (2005)

	Literacy status	Primary education	Secondary education	Average
North East	91,18	90,64	91,78	91,2
North West	89,57	87,13	82,74	86,48
Middle East	93,38	93,51	87,07	91,32
Middle West	78,74	76,85	79,38	78,32
South East	94,49	90,24	88,24	90,99
South West	93,83	94,34	88,3	92,15

Table 8: HOI index of Education (2010)

	Literacy status	Primary education	Secondary education	Average
North East	94,73	91,22	93,51	93,15
North West	91,17	74,26	90,22	85,21
Middle East	94,87	85,38	92,62	90,95
Middle West	83,98	73,38	85,03	80,79
South East	91,46	88,25	94,68	91,46
South West	93,05	83,93	90,76	89,24

Table 8: HOI index of Education (2015)

	Literacy status	Primary education	Secondary education	Average
North East	81,08	82,83	83,26	82,39
North West	66,43	73,05	80,27	73,25
Middle East	80,33	81,11	76,48	79,30
Middle West	69,09	71,06	71,51	70,55
South East	78,19	78,78	84,62	80,53
South West	82,24	81,24	88,71	84,06

Appendix 2: The Covrage and the D– index of the Opportunities

Table 2.1: Coverage and the D– index of living conditions (2005)

regions		Housing	Car	Computer	Fridge	Average
North East	Coverage	52,99	31,1	9,52	96,14	47,43
	D index	6,22	41,57	54,45	1,11	25,83
North West	Covrage	25,4	19,11	3,72	77,85	31,52
	D index	36,39	21,61	64,22	12,01	33,55
Middle East	Covrage	40,8	20	11,2	91,94	40,98
	D index	11,38	29,39	41,24	3,51	21,38
Middle West	Covrage	28,79	24,45	7,12	72,75	33,27
	D index	32,64	19,22	52,24	11,15	28,81
South East	Covrage	42,8	29,45	11,98	93,71	44,48
	D index	18,78	33,84	39,84	4,01	24,11
South West	Covrage	39,93	12,57	9,43	87,32	37,31
	D index	23,34	44,36	52,63	6,1	31,61

Table 2.2: Coverage and the D– index of living conditions (2010)

		Housing	Car	Computer	Fridge	Average
North East	Covrage	67,2	18,46	25,85	97,7	52,30
	D index	8,3	48,72	37,94	1,49	24,11
North West	Covrage	48,61	12,7	12,43	88,12	40,46
	D index	33,71	29,01	50,86	5,51	29,77
Middle East	Covrage	52,42	25,73	24,78	95,51	49,61
	D index	10,68	29,1	40,01	2,94	20,68
Middle West	Covrage	32,33	9,46	6,23	81,98	32,5
	D index	36,86	38,3	54,08	6,29	33,88
South East	Covrage	54,57	30,76	24,81	97,99	52,03
	D index	17,07	36,24	41,54	1,31	24,04
South West	Covrage	34,17	13,3	20,14	95,9	40,87
	D index	26,99	49,51	40,61	1,36	29,61

Table 2.3: Coverage and the D– index of living conditions (2015)

		Housing	Car	Computer	Fridge	Average
North East	Covrage	75,87	33,94	40,29	96,62	61,68
	D	4,29	25,65	28,03	0,93	14,725
North West	Covrage	86,56	17,79	19,41	94,03	54,4475
	D	3,33	19,61	32,67	1,83	14,36
Middle East	Covrage	78,05	46,95	36,14	96,77	64,4775
	D	5,21	5,96	17,25	0,71	7,2825
Middle West	Covrage	88,11	25,51	19,86	96,51	57,4975
	D	3,94	11,01	36,07	0,58	12,9
South East	Covrage	90,93	43,62	34,93	96,11	66,3975
	D	1,18	7,31	7,95	0,32	4,19
South West	Covrage	91,91	39,38	34,9	96,12	65,5775
	D	1,12	4,41	14,91	0,66	5,275

Table 2.4: Coverage and the D– index of Basic infrastructure (2005)

		Electricity	Water	Sanitation	INTERNET	Average
North East	Covrage	98,25	90,8	70,88	2,12	65,51
	D index	1,06	5,98	19,2	64,28	22,63
North West	Covrage	97,01	41,48	34,27	1,36	43,53
	D index	0,72	5,9	47,23	69,76	30,90
Middle East	Covrage	98,57	89,45	51,48	3,03	60,63
	D index	0,32	7,36	24,26	71,84	25,94
Middle West	Covrage	93,63	62,53	30,95	1,55	47,16
	D index	3,4	22,25	51,51	51,57	32,18
South East	Covrage	98,41	85,58	45,28	2,91	58,04
	D index	0,78	7,5	32,44	59,38	25,02
South West	Covrage	97,77	79,77	32,19	1,71	52,86
	D index	1,73	4,02	28,95	81,73	29,10

Table 2.5: Coverage and the D– index of Basic infrastructure (2010)

		Electricity	Water	Sanitation	INTERNET	Average
North East	Covrage	99,52	91,86	79,34	44,3	78,75
	D index	0,26	5,89	14,04	15,36	8,88
North West	Covrage	97,79	63,81	44,47	39,02	61,27
	D index	0,31	25,06	45,07	21,94	23,09
Middle East	Covrage	99,48	95,16	59,05	53,14	76,70
	D index	0,35	3,2	21,07	6,6	7,80
Middle West	Covrage	97,69	51,96	32,72	57,14	59,87
	D index	0,664	29,02	52,9	11,65	23,55
South East	Covrage	98,24	92,24	53,79	60,29	76,14
	D index	0,61	3,84	19,48	9,74	8,41
South West	Covrage	98,56	89,41	42,26	32,72	65,73
	D index	0,968	5,69	18,37	3,94	7,24

Table 2.6: Coverage and the D– index of Basic infrastructure (2010)

		Electricity	Water	Sanitation	INTERNET	Average
Nord Est	Covrage	98,25	90,8	70,88	2,12	**65,51**
	D	1,06	5,98	19,2	64,28	**22,63**
Nord West	Covrage	97,01	41,48	34,27	1,36	**43,53**
	D	0,72	5,9	47,23	69,76	**30,90**
Middle Est	Covrage	98,57	89,45	51,48	3,03	**60,63**
	D	0,32	7,36	24,26	71,84	**25,94**
Middle West	Covrage	93,63	62,53	30,95	1,55	**47,16**
	D	3,4	22,25	51,51	51,57	**32,18**
South Est	Covrage	98,41	85,58	45,28	2,91	**58,04**
	D	0,78	7,5	32,44	59,38	**25,02**
South West	Covrage	97,77	79,77	32,19	1,71	**52,86**
	D	1,73	4,02	28,95	81,73	**29,10**

Table 2.7: Coverage and the D– index of Basic infrastructure (2015)

		Electricité	Eau	Sanitaire	Internet	Moyenne
Nord Est Nord oust	Covrage	99,28	95,8	80,16	72,7	86,985
	D	0,28	2,75	10,75	13,91	6,9225
Centre Est centre oust	Covrage	99,7	80,1	43,53	87,95	77,82
	D	0,14	9,86	31,95	6,01	11,99
Sud Est	Covrage	9,73	96,77	83,36	90,35	92,5525
	D	0,09	1,46	6,48	4,55	3,145
Nord Est Nord oust	Covrage	99,61	76,47	40,06	80,31	74,1125
	D	0,18	8,39	27,03	6,07	10,4175
Centre Est centre oust	Covrage	99,22	97,5	73,19	83,16	88,2675
	D	0,01	0,44	8,01	2,6	2,765
Sud Est	Covrage	99,62	96,45	69,14	80,4	86,4025
	D	0,11	1,95	6,85	4,04	3,2375

Table 2.8: Coverage and the D– index of Education (2005)

regions		Literacy status	Primary education	Secondary education	Average
North East	Covrage	92,99	93,12	93,44	93,18
	D index	1,94	2,67	1,77	2,12
North West	Covrage	91,1	89,1	86,39	88,86
	D index	1,67	2,21	4,21	2,69
Middle East	Covrage	95,2	95,58	89,88	93,55
	D index	1,91	2,16	3,13	2,4
Middle West	Covrage	79,67	83,11	84,39	82,39
	D index	1,16	7,53	5,94	4,87
South East	Covrage	95,75	93,75	91,66	93,72
	D index	1,31	2,99	3,73	2,67
South West	Covrage	94,96	95,3	91,08	93,78
	D index	1,19	1,01	3,05	1,75

Table 2.9: Coverage and the D– index of Education (2010)

regions		Literacy status	Primary education	Secondary education	Average
North East	Covrage	94,92	96,27	93,2	94,79
	D index	1,48	1,61	2,12	1,73
North West	Covrage	92,67	92,55	81,01	88,74
	D index	2,65	1,49	8,31	4,15
Middleeast	Covrage	94,56	96,58	88,27	93,13
	D index	2,05	1,76	3,27	2,36
MiddleWest	Covrage	86,51	86,04	77,92	83,49
	D index	1,7	2,4	5,82	3,30
South East	Covrage	96,46	83,98	90,57	90,33
	D index	1,84	2,15	2,56	2,18
South West	Covrage	94,07	94,44	87,16	91,89
	D index	3,51	1,47	3,7	2,89

Table 2.10: Coverage and the D– index of Education (2015)

regions		Literacy status	Primary education	Secondary education	Average
North East	Covrage	85,68	84,83	86,6	85,703333
	D	5,36	2,36	3,86	3,86
North West	COVRAGE	73,19	77,62	83,55	78,12
	D	9,23	3,35	3,93	5,5033333
Middleeast	COVRAGE	84,53	83,92	80,09	82,846667
	D	4,96	3,35	4,5	4,27
MiddleWest	COVRAGE	74,89	74,06	75,35	74,766667
	D	7,74	4,04	5,1	5,6266667
South East	COVRAGE	82,78	80,49	85,5	82,923333
	D	5,53	2,11	1,03	2,89
South West	COVRAGE	85,98	84,2	90,26	86,813333
	D	4,35	3,51	1,71	3,19

Appendix 3: Contribution of Circumstances Variables to Inequality of Opportunities

Table 3.1: contribution of circumstances variables to inequality of opportunities for living conditions (2010)

	Housing				Computer			
	localisation	gender	Level education of the head	income	localisation	gender	Level education of the head	Income
North East	-1,17 (0.000)***	-0,339 (0.026)**	-0,048 0.577	0.000 (0.000)***	-0,806 (0.034)**	0.012 (0.954)	0.601 (0.000)***	0.0001 (0.000)***
Northwest	-2,904 (0.000)***	-0,731 (0.014)**	0.0105 (0.962)	0.0001 (0.001)***	-2,148 (0.000)***	0.099 (0.797)	0.520 (0.004)***	0.0001 (0.000)***
middle East	-1,226 (0.000)***	0.127 (0.463)	0.211 (0.022)**	-4,6 (0.605)	-3,29 (0.001)***	-0,194 (0.4.15)	0.619 (0.000)***	0.0001 (0.000)***
middle East	-2,118 (0.000)***	-0,281 (0.264)	0.781 (0.000)***	0.000 (0.038)**	-1,06 (0.048)**	0.640 (0.183)	0.964 (0.000)***	0.00006 (0.008)***
south East	-1,148 (0.000)***	-0,094 (0.729)	0.869 (0.000)***	0.00011 (0.594)	-0,716 (0.147)	-0,753 (0.039)**	0.833 (0.000)***	0.0001 (0.000)***
Southwest	-0,965 (0.014)**	0.127 (0.670)	0.494 (0.001)***	0.0001 (0.000)***	1.821 (0.009)***	0.030 -0,934	0.545 (0.001)***	0.0001 (0.0001)***

	Fridge				Car			
	localisation	Gender	Level education of the head	Income	localisation	gender	Level education of the head	Income
North East	-0,619 (0.214)	0.692 (0.159)	0.196 (0.708)	0.0006 0.000	-0,206 (0.556)	-0,657 (0.004)***	0.388 (0.000)***	0,0002 (0,000)***
Northwest	-1,685 (0.004)***	-0,279 (0.426)	-0,226 (0.562)	0.0002 (0.002)***	-0,088 (0.823)	0.153 (0.650)	0.526 (0.004)***	0,00006 (0,018)**
middle East	1.213 (0.014)**	-0,157 (0.726)	0.336 (0.558)	0.0004 (0.000)***	-0,163 (0.578)	-0,588 (0.007)***	0.538 (0.000)***	0,0006 (0,000)***
middle East	-0,932 (0.009)***	-0,385 (0.145)	0.690 (0.107)	0.00001 (0.001)***	0.343 (0.409)	0.575 (0.120)	0.831 (0.000)***	0,00008 (0,001)***
south East	-0,479 (0.572)	-0,323 (0.684)		0.0001 (0.183)	0.167 (0.682)	-0,462 (0.164)	0.610 (0.000)***	0,0001 (0,000)***
Southwest	-0,406 (0.708)	1.465 (0.233)		0.0009 (0.035)**	-0,086 (0.883)	0.374 (0.403)	0.977 (0.000)***	0,0001 (0,000)***

Table 3.2: contribution of circumstances variables to inequality of opportunities for living conditions (2005)

	Housing				Computer			
	localisation	Gender	Level education of the head	Income	localisation	Gender	Level education of the head	Income
North East	-0.645	-0.099	0.147	7.37	-1.296	0.402	0.776	0.0001
	(0.000)***	(0.413)	(0.034)**	(0.43)	(0.015)**	(0.115)	(0.000)***	(0.000)***
northwest	-1.506	0.224	0.138	0.0001	-2.689	-2.278	0.263	0.0001
	(0.000)***	(0.389)	(0.448)	(0.000)***	(0.014)**	(0.65)	(0.378)	(0.000)***
middle East	-0.518	-0.019	0.241	0.00004	-1.178	-0.227	0.735	0.00006
	(0.012)**	(0.912)	(0.016)**	(0.003)***	(0.017)**	(0.447)	(0.000)***	(0.000)***
middle East	-1.451	-0.117	0.603	0.0006	-1.899	-0.621	0.474	0.00009
	(0.000)***	(0.685)	(0.000)***	(0.006)***	(0.005)***	(0.239)	(0.033)**	(0.001)***
south East	-1.241	0.566	0.314	0.00004	0.55	0.352	0.785	0.00008
	(0.000)***	(0.03)**	(0.019)**	(0.024)**	(0.245)	(0.398)	(0.000)***	(0.001)***
southwest	-0.619	-0.489	0.691	0.0001	-0.252	0.159	0.999	0.0001
	(0.028)**	(0.06)*	(0.000)***	(0.002)***	(0.654)	(0.723)	(0.000)***	(0.000)***

	Fridge				Car			
	localisation	Gender	Level education of the head	Income	localisation	Gender	Level education of the head	Income
North East	-1.366	0.017	0.289	0.0028	-0.222	-0.199	0.491	0.002
	(0.000)***	(0.942)	(0.254)	(0.000)***	(0.393)	(0.286)	(0.000)***	(0.000)***
northwest	-1.502	0.014	0.959	0.00056	1.78	0.100	0.247	0.0001
	(0.000)***	(0.958)	(0.077)*	(0.000)***	(0.000)***	(0.699)	(0.227)	(0.000)***
middle East	-1.509	0.097	-0.102	0.00018	0.481	0.148	0.589	0.0008
	(0.000)***	(0.764)	(0.639)	(0.001)***	(0.065)*	(0.519)	(0.000)***	(0.000)***
middle East	-1.257	0.26	0.305	0.0001	0.235	0.170	0.130	0.0001
	(0.000)***	(0.341)	(0.172)	(0.002)***	(0.439)	(0.543)	(0.408)	(0.000)***
south East	-1.39	0.141	0.801	0.0001	0.140	0.039	0.368	0.002
	(0.000)***	(0.716)	(0.072)*	(0.002)***	0	(0.030)**	(0.019)**	(0.024)**
southwest	-1.69	-0.76	0.347	0.008	0.126	-0.413	0.663	0.00019
	(0.005)***	(0.156)	(0.533)	(0.001)***	0.781	(0.299)	(0.000)***	(0.000)***

Table 3.3: contribution of circumstances variables to inequality of opportunities for living conditions (2015)

	Housing				Computer			
	localisation	Gender	Level education of the head	income	localisation	Gender	Level education of the head	Income
North East	-1,37 (0.000)***	-0,378 (0.006)**	0,568 0.577	0.000 (0.001)***	-0,567 (0.022)**	0.012 (0.954)	0.633 (0.0001)***	0.0234 (0.000)***
Northwest	-2,114 (0.000)***	-0,271 (0.014)**	0.0105 (0.977)	0.0001 (0.001)***	-1,234 (0.0001)***	0.011 (0.567)	0.234 (0.000)***	0.0027 (0.000)***
middle East	-1,336 (0.000)***	0.327 (0.422)	0.451 (0.012)**	-4,6 (0.805)	-2,33 (0.001)***	-0,567 (0.4.15)	0.897 (0.000)***	0.0001 (0.000)***
middle East	-2,118 (0.000)***	-0,281 (0.264)	0.781 (0.000)***	0.000 (0.022)**	-1,06 (0.048)**	0.640 (0.183)	0.964 (0.000)***	0.00006 (0.008)***
south East	-1,543 (0.000)***	-0,094 (0.729)	0.869 (0.000)***	0.00271 (0.594)	-0,716 (0.147)	-0,753 (0.039)**	0.833 (0.000)***	0.0001 (0.000)***
Southwest	-0,965 (0.014)**	0.127 (0.670)	0.494 (0.001)***	0.0001 (0.000)***	1.821 (0.009)***	0.030 -0,934	0.545 (0.001)***	0.0001 (0.0001)***

	Fridge				Car			
	Localization	Gender	Level education of the head	Income	localisation	Gender	Level education of the head	Income
North East	-0,619 (0.214)	0.692 (0.159)	0.196 (0.708)	0.0006 0.000	-0,206 (0.556)	-0,657 (0.004)***	0.388 (0.000)***	0,0002 (0,000)***
Northwest	-1,685 (0.004)***	-0,279 (0.426)	-0,226 (0.562)	0.0002 (0.002)***	-0,088 (0.823)	0.153 (0.650)	0.526 (0.004)***	0,00006 (0,018)**
middle East	1.213 (0.014)**	-0,157 (0.726)	0.336 (0.558)	0.0004 (0.000)***	-0,163 (0.578)	-0,588 (0.007)***	0.538 (0.000)***	0,0006 (0,000)***
middle East	-0,932 (0.009)***	-0,385 (0.145)	0.690 (0.107)	0.00001 (0.001)***	0.343 (0.409)	0.575 (0.120)	0.831 (0.000)***	0,00008 (0,001)***
south East	-0,479 (0.572)	-0,323 (0.684)		0.0001 (0.183)	0.167 (0.682)	-0,462 (0.164)	0.610 (0.000)***	0,0001 (0,000)***
Southwest	-0,406 (0.708)	1.465 (0.233)		0.0009 (0.035)**	-0,086 (0.883)	0.374 (0.403)	0.977 (0.000)***	0,0001 (0,000)***

Table 3.4: contribution of circumstances variables to inequality of opportunities for Basic Infrastructure(2010)

	Electricity				Internet			
	localisation	gender	Level education of the head	Income	localisation	gender	Level education of the head	Income
North East	-1,175	0,919		0.0004	-1,615	-0,347	-0,045	0.0008
	(0.354)	(0.459)		(0.144)	(0.140)	(0.313)	(0.750)	(0.001)***
northwest	0.337	-0,456	0.378	-0,00001		-0,03	0.248	0.0001
	(0.658)	(0.537)	(0.511)	-0,775		(0.966)	(0.422)	(0.035)**
middle East	-1,613	0,188	-1,705	0,0004		-0,084	0.218	5,48
	(0.306)	(0.887)	(0.009)***	(0,055)*		(0.805)	(0.102)	(0.648)
middle East	-0,591	-0,95	-0,154	0,00001		0.467	0.392	0.00002
	-0,488	(0.175)	(0.778)	-0,266		(0.659)	(0.353)	(0.751)
south East	-1,573	-0,848		0.0001	-0,685	-0,15	0.198	0.000
	(0.225)	(0.495)		(0.668)	(0.426)	(0.787)	(0.407)	(0.089)*
southwest	-0,952	-0,902	-1,791	0.00002	0.150	-0,252	0.084	-6,04
	(0.452)	(0.403)	(0.018)**	(0.739)	(0.908)	(0.684)	(0.731)	(0.864)

	Water				Sanitation			
	localisation	gender	Level education of the head	Income	localisation	gender	Level education of the head	Income
North East	-3,249	-0,131	0,783	0.0001	-3,578	-0,124	0,336	0.00001
	(0.000)***	(0.656)	(0.036)**	(0.003)***	(0.000)***	(0.600)	(0.040)**	(0.001)***
northwest	-4,523	-0,149	0.747	0.0001	-4,329	-0,212	0.407	0.00005
	(0.000)***	(0.617)	(0.087)*	(0.009)***	(0.000)***	(0.577)	(0.131)	(0.078)*
middle East	-2,614	-0,562	0.177	0.0001	-4,58	-1.103	0.205	0.00002
	(0.000)***	(0.187)	(0.696)	(0.010)***	(0.000)***	(0.634)	(0.083)*	(0.066)
middle East	-3,733	-0,112	0.386	0.0003	-4,208	-0,225	0.922	0.00003
	(0.000)***	(0.657)	(0.096)*	(0.118)**	(0.000)***	(0.516)	(0.000)	(0.296)
south East	-1,608	-0,421	0.399	0.0001	-1,926	0.0609	-0,066	0.00002
	(0.001)***	(0.339)	(0.274)	(0.013)***	(0.000)***	(0.820)	(0.629)	(0.200)
southwest	-3,343	-0,058	0.0031	-0,0001	-2,834	0.187	-0,012	0.00004
	(0.000)***	(0.917)	(0.993)	(0.701)	(0.000)***	(0.514)	(0.935)	(0.086)*

Table 3.5: contribution of circumstances variables to inequality of opportunities for Basic Infrastructure(2005)

	Access to electricity				access to internet			
	localisation	gender	Level education of the head	income	localisation	gender	Level education of the head	Income
North East	-1,578 (0.020)**	-0,085 (0.880)		0,0007 (0.001)***	-0,963 (0.360)	1,161 (0,021)**	1,09 (0,000)***	0,00004 (0,003)***
Northwest	-1,203 (0.261)	0,125 (0.839)		0,0001 (0.358)		-0,761 (0.660)	-0,398 -0,667	0,0002 (0,045)***
middle East				0,0002 (0.623)	-0,65 0,582		2,171 (0.000)***	-8,24 0,708
middle East		1,477 (0.080)*		0,001 (0.014)**	-1,754 -0,126	0,313 -0,743	-1,379 -0,151	0,00009 (0,033)**
south East				0,0005 0,351	0,628 (0.656)	1,226 0,338	2,109 (0,011)**	0,0001 (0,014)**
Southwest				0,004 0,35		1,549 -0,175	1,171 (0,023)**	0,00007 (0,289)**

	Water				Sanitation			
	localisation	gender	Level education of the head	Income	localisation	gender	Level education of the head	Income
North East	-2,704 (0.000)***	-0,369 (0.117)	0,754 (0.014)**	0,0001 (0.004)***	-3,702 (0.000)***	-0,043 (0.816)	0,39 (0,004)***	0,00006 (0,006)***
Northwest		0,057 (0.814)	0,414 (0.137)	0,00006 (0,089)*	-3,608 (0,000)***	-0,253 (0.392)	0,175 (0.425)	0,00001 (0.587)
middle East	-3,399 (0.000)***	0,314 (0.324)	0,526 (0.053)*	0,00006 (0.079)*	-3,375 (0.000)***	-0,0013 (0.995)	0,208 (0.086)**	0,00004 (0.017)**
middle East	-3,362 (0.000)***	-0,376 (0.193)	0,636 (0.004)***	2,01 (0.942)	-3,952 (0.000)***	-0,404 (0.248)	0,197 (0.291)	0,00002 (0.312)
south East	-2,178 (0.000)***	-0,541 (0.220)		0,0001 (0,055)*	-3,014 (0.000)***	-0,373 (0.197)	0,459 (0.001)***	0,00002 (0.194)
Southwest		0,602 0,911		0,0002 (0,089)*	-3,984 (0.000)***	-0,48 (0.104)	0,087 (0.575)	0,0005 (0.143)

Table 3.6: contribution of circumstances variables to inequality of opportunities for Basic Infrastructure(2015)

	Electricity				Internet			
	localisation	gender	Level education of the head	Income	localisation	gender	Level education of the head	Income
North East	-1,175	0,919		0.0004	-1,615	-0,347	-0,045	0.0008
	(0.354)	(0.459)		(0.144)	(0.140)	(0.313)	(0.750)	(0.001)***
northwest	0.337	-0,456	0.378	-0,00001		-0,03	0.248	0.0001
	(0.658)	(0.537)	(0.511)	-0,775		(0.966)	(0.422)	(0.035)**
middle East	-1,613	0,188	-1,705	0,0004		-0,084	0.218	5,48
	(0.306)	(0.887)	(0.009)***	(0,055)*		(0.805)	(0.102)	(0.648)
middle East	-0,591	-0,95	-0,154	0,00001		0.467	0.392	0.00002
	-0,488	(0.175)	(0.778)	-0,266		(0.659)	(0.353)	(0.751)
south East	-1,573	-0,848		0.0001	-0,685	-0,15	0.198	0.000
	(0.225)	(0.495)		(0.668)	(0.426)	(0.787)	(0.407)	(0.089)*
southwest	-0,952	-0,902	-1,791	0.00002	0.150	-0,252	0.084	-6,04
	(0.452)	(0.403)	(0.018)**	(0.739)	(0.908)	(0.684)	(0.731)	(0.864)

	Water				Sanitation			
	localisation	gender	Level education of the head	Income	localisation	gender	Level education of the head	Income
North East	-3,249	-0,131	0,783	0.0001	-3,578	-0,124	0,336	0.00001
	(0.000)***	(0.656)	(0.036)**	(0.003)***	(0.000)***	(0.600)	(0.040)**	(0.001)***
northwest	-4,523	-0,149	0.747	0.0001	-4,329	-0,212	0.407	0.00005
	(0.000)***	(0.617)	(0.087)*	(0.009)***	(0.000)***	(0.577)	(0.131)	(0.078)*
middle East	-2,614	-0,562	0.177	0.0001	-4,58	-1.103	0.205	0.00002
	(0.000)***	(0.187)	(0.696)	(0.010)***	(0.000)***	(0.634)	(0.083)*	(0.066)
middle East	-3,733	-0,112	0.386	0.0003	-4,208	-0,225	0.922	0.00003
	(0.000)***	(0.657)	(0.096)*	(0.118)**	(0.000)***	(0.516)	(0.000)	(0.296)
south East	-1,608	-0,421	0.399	0.0001	-1,926	0.0609	-0,066	0.00002
	(0.001)***	(0.339)	(0.274)	(0.013)***	(0.000)***	(0.820)	(0.629)	(0.200)
southwest	-3,343	-0,058	0.0031	-0,0001	-2,834	0.187	-0,012	0.00004
	(0.000)***	(0.917)	(0.993)	(0.701)	(0.000)***	(0.514)	(0.935)	(0.086)*

Table 3.7: contribution of circumstances variables to inequality of opportunities for Education (2010)

	Literacy status				Primary education			
	localisation	gender	Level education of the head	income	localisation	gender	Level education of the head	income
North East	-0,863 (0.009)***	0.170 (0.588)	0.198 (0.395)	0.0001 (0.022)**	-0,654 (0.182)	0.754 (0.112)	0.201 (0.561)	0.0001 (0.047)**
northwest	-1,765 (0.009)***	0.559 (0.189)	0.129 (0.785)	0.00002 (0.665)		0.057 (0.944)	-0,837 (0.348)	0.0002 (0.300)
middle East	-1,512 (0.001)***	0.271 (0.543)		0.0001 (0.666)	-2,941 (0.039)**			-0,0001 (0.118)
middle East	-0,612 (0.078)*	-0,017 (0.950)	0.0712 (0.752)	-0,00001 (0.479)	0.793 (0.112)	0.033 (0.934)	0.012 (0.967)	1.29 (0.76)
south East	-2,526 (0.000)***	0.461 (0.414)	0.979 (0.092)*	-0,00001 (0.675)	0.937 (0.214)	-0,134 (0.851)	1.259 (0.135)	-8,011 (0.875)
southwest	-1,798 (0.040)**	0.265 (0.746)		0.0003 (0.058)*				0.0002 (0.606)

	Secondary education			
	localisation	gender	Level education of the head	Income
North East	-0,386 (0.291)	0.554 (0.109)	0.202 (0.421)	0.0001 (0.009)***
Northwest	-2,044 (0.002)***	-0,493 (0.208)	1.081 (0.195)	0.00006 (0.358)
middle East	-0,805 (0.046)**	0.035 (0.927)	0.166 (0.537)	0.00007 (0.067)**
middle East	-1,06 (0.009)***	-0,43 (0.193)	0.852 (0.119)	8.96 (0.776)
south East	-1,021 (0.109)	-0,12 (0.840)	0.425 (0.326)	-7,76 (0.854)
Southwest	-1,327 (0.010)**	-0,327 -0,767	0.310 (0.346)	-8,83 (0;823)

Table 3.8: contribution of circumstances variables to inequality of opportunities for Education (2005)

	Primary education				Secondary education			
	localisation	gender	Level education of the head	Income	localisation	gender	Level education of the head	Income
North East	-1,187	0,368	0,269	0,0001	-0,881	0,37	0,554	0,0009
	(0.001)	(0.294)	(0.401)	(0.046)	(0.018)**	(0.314)	(0.156)	(0.142)
Northwest	-0,029	-0,715	-0,174	0,0001	-0,33	0,455		0,0003
	(0.960)	(0.129)	(0.669)	(0.178)	(0.585)	(0.339)		(0.013)
middle East	-1,94	0,827	0,349	0,00003	-1,392	0,234	-0,113	9,03
	(0.006)***	(0.200)	(0.458)	(0.591)	(0.001)***	(0.581)	(0.647)	(0.792)
middle East	-3,027	0,025	-0,119	0,00005	-1,068	-1,386	0,544	-0,0003
	(0.005)***	(0.957)	(0.763)	(0.416)	(0.074)*	(0.012)**	(0.162)	(0.316)
south East	0,466			0,0003	1,225	1,354		0,0003
	(0.724)			(0.192)	(0.176)	(0.081)*		(0.070)
Southwest	1,081	0,0179	0,052	0,00008	-1,436	-0,196		0,00007
	(0.330)	(0.982)	(0.904)	(0.456)	(0.091)	(0.785)		(0.718)

	Literacy status			
	localisation	Gender	Level education of the head	Rev
North East	-0,634	0,097	0,197	0,0001
	(0.011)**	(0.681)	(0.324)	(0.002)***
Northwest	0,365	-0,317	0,021	0,0001
	0,346	(0.357)	(0.945)	(0,024)**
middle East	-1,299	0,422	0,249	0,0001
	(0.002)***	(0.305)	(0.450)	(0.031)**
middle East		0,06	0,228	-0,00003
		(0.871)	(0.472)	(0.331)
south East	-1,115	-0,035		0,00008
	(0.128)	(0.959)		(0.367)
Southwest	-0,166	0,686	0,526	0,00002
	(0.757)	(0.197)	(0.19)	(0.762)

Table 3.9: contribution of circumstances variables to inequality of opportunities for Education (2010)

	Literacy status				Primary education			
	localisation	gender	Level education of the head	income	localisation	gender	Level education of the head	income
North East	-0,863 (0.009)***	0.170 (0.588)	0.198 (0.395)	0.0001 (0.022)**	-0,654 (0.182)	0.754 (0.112)	0.201 (0.561)	0.0001 (0.047)**
northwest	-1,765 (0.009)***	0.559 (0.189)	0.129 (0.785)	0.00002 (0.665)		0.057 (0.944)	-0,837 (0.348)	0.0002 (0.300)
middle East	-1,512 (0.001)***	0.271 (0.543)		0.0001 (0.666)	-2,941 (0.039)**			-0,0001 (0.118)
middle East	-0,612 (0.078)*	-0,017 (0.950)	0.0712 (0.752)	-0,00001 (0.479)	0.793 (0.112)	0.033 (0.934)	0.012 (0.967)	1.29 (0.76)
south East	-2,526 (0.000)***	0.461 (0.414)	0.979 (0.092)*	-0,00001 (0.675)	0.937 (0.214)	-0,134 (0.851)	1.259 (0.135)	-8,011 (0.875)
southwest	-1,798 (0.040)**	0.265 (0.746)		0.0003 (0.058)*				0.0002 (0.606)

	Secondary education			
	localisation	gender	Level education of the head	Income
North East	-0,386 (0.291)	0.554 (0.109)	0.202 (0.421)	0.0001 (0.009)***
Northwest	-2,044 (0.002)***	-0,493 (0.208)	1.081 (0.195)	0.00006 (0.358)
middle East	-0,805 (0.046)**	0.035 (0.927)	0.166 (0.537)	0.00007 (0.067)**
middle East	-1,06 (0.009)***	-0,43 (0.193)	0.852 (0.119)	8.96 (0.776)
south East	-1,021 (0.109)	-0,12 (0.840)	0.425 (0.326)	-7,76 (0.854)
Southwest	-1,327 (0.010)**	-0,327 -0,767	0.310 (0.346)	-8,83 (0;823)