

Inequalities in mobility and education in Morocco: An econometric analysis

Mohammed ALAMI CHENTOUFI ^{1*}, AIT ALLA Aniss, Naoual MAMDOUH

MOHAMMED.ALAMICHENTOUFI@uhp.ac.ma

Laboratory of Mathematical Modeling and Economic Computation
Associated to the Laboratory of Theoretical and Applied Economics Research
Faculty of Economics and Management
University Hassan I, Settat, Morocco

aniss.aitalla@uhp.ac.ma

Laboratory of Research in Management and Development
Faculty of Economics and Management
University Hassan I, Settat, Morocco

naoualmamdouh@gmail.com

Laboratory of Mathematical Modeling and Economic Computation
Faculty of Economics and Management
University Hassan I, Settat, Morocco

Abstract:

Education plays a crucial role in a country's social and economic development. However, Morocco faces persistent challenges regarding inequalities in access to education between urban and rural populations. Despite the government's efforts to promote equitable education, significant gaps remain in primary school enrolment rates and school delays between the two environments. This study aims to identify the specific factors that hinder mobility and access to education in rural areas compared with urban areas.

The methodology is based on a quantitative approach using recent official and academic data. Indicators of parity, primary school enrolment and primary school delay are analysed in relation to the urban/rural status of participants, while taking other socio-economic factors into account.

The results show significant disparities between urban and rural areas in terms of access to education. Primary school enrolment is lower in urban areas, while the primary school drop-out rate is higher in rural areas. These results underline the need for more inclusive education policies to reduce mobility inequalities and improve access to education.

In conclusion, measures such as investment in educational infrastructure, community outreach, school support programmes and in-service teacher training are essential to promote equitable education in Morocco, paving the way for a promising future for all generations to come.

I- Introduction

Access to quality education is an essential pillar of a country's socio-economic development. In

Morocco, as in many societies, education plays a decisive role in building a promising future for the younger generations. However, persistent disparities in access to education between urban and rural areas raise crucial questions about the equity of the education system (Aghion & Howitt, 1998; Bourdieu & Passeron, 1964; Boudon, 1973).

Morocco's socio-economic context shows significant disparities between urban and rural areas. Urban areas generally benefit from better-developed infrastructure and relatively easier access to public services, and are often home to more economic opportunities. By contrast, rural areas face challenges related to geographical remoteness, inadequate basic infrastructure and difficulties in accessing essential services (Haut-Commissariat au Plan, 2013; Goux & Maurin, 2001; Ermisch & Francesconi, 2001).

These structural inequalities have a direct impact on access to education for Moroccan children, particularly at primary level. Rural schools are often faced with limited resources, a lack of qualified teachers and precarious learning conditions, leading to a worrying gap in enrolment between rural and urban areas (Lin et al., 1981; Lin & Dumin, 1986; Spence, 1974).

In this context, the central issue of this research is as follows: What are the determinants of mobility inequalities that influence children's access to and enrolment in primary education in Morocco, and how do these factors differ between urban and rural areas?

To carry out this research, we will rely on a quantitative approach using recent and reliable data from official sources and academic studies (Becker & Tomes, 1986; Haut-Commissariat au Plan, 2013). Indicators of parity, primary school enrolment and primary school delay will be analysed in relation to the urban/rural status of participants (Goux & Maurin, 2001).

The aim of this study is to carry out an in-depth analysis of mobility inequalities and their impact on access to education and primary school enrolment in Morocco, with a specific comparison between urban and rural areas. The specific objectives are to examine the socio-economic, geographical and infrastructural factors that contribute to disparities in access to education between the two environments (Becker, 1964), to analyse the mobility constraints faced by pupils in rural and urban areas, and to assess their influence on school attendance (Goux & Maurin, 2001), study the impact of mobility inequalities on primary school enrolment and on the phenomenon of educational backwardness, highlighting the specific features of each area (Boudon, 1973), and finally propose recommendations and concrete measures to promote equitable access to education, boost enrolment in rural areas and reduce disparities between the two contexts (Lin & Dumin, 1986).

By exploring this crucial issue, we hope that this research will help to enlighten policy-makers, education players and stakeholders about the major issues relating to access to education in Morocco. By identifying the specific challenges facing rural areas, we hope to encourage the

introduction of targeted policies aimed at building an inclusive, equitable and high-quality education system for all the country's children (Boudon, 1973).

II- Literature review

The literature review on the impact of mobility inequalities on education in Morocco highlights the important previous research carried out in this area, while underlining the scale of the educational challenge facing the country. Several studies have highlighted the educational disparities between urban and rural areas in Morocco, showing significant gaps in terms of access to education and school performance (Aghion & Howitt, 1998; Becker & Tomes, 1986). These disparities often reflect socio-economic, cultural and infrastructural differences between the two environments, creating inequalities in mobility that directly affect the educational opportunities available to children (Assaad et al., 2018; Bourdieu & Passeron, 1964). Some research has highlighted the crucial role of education policies and intervention programmes in reducing these gaps and improving access to education in rural areas (Ermisch & Francesconi, 2001; Goux & Maurin, 2001). This includes initiatives to improve school infrastructure, train competent teachers and implement financial support programmes for disadvantaged families (Ferreira & Gignoux, 2011; Lin et al., 1986).

However, despite these efforts, persistent challenges remain, such as truancy, lack of adequate teaching materials and low student retention rates (Lin et al., 1981; Neidhöfer et al., 2018). In previous research, key theories have been used to understand the underlying mechanisms of educational inequalities. Human capital theory has often been used to explain how education levels and learning opportunities influence a country's economic and social development (Becker, 1964; Solon, 1992). In addition, social capital theory has been used to study how social relationships and support networks can facilitate or hinder access to education in rural communities (Spence, 1974; Assaad & Saleh, 2018). In parallel, research has examined the effects of urban-rural migration on children's education, using theoretical frameworks such as demographic transition theory (Lin & Dumin, 1986; Haut-Commissariat au Plan, 2013).

However, despite the many studies that have been carried out on the subject, there are still gaps in our overall understanding of the specific factors that contribute to mobility inequalities and their impact on education in Morocco. Existing research has often focused on specific aspects of educational inequalities, but a better understanding of the complex interactions between urban-rural mobility, educational policies and socio-economic determinants is essential to develop more holistic solutions (Assaad et al., 2018; Lanchovichina et al., 2015). This research therefore aims to fill these gaps by adopting a quantitative approach that thoroughly examines the relationship between urban-rural mobility and educational indicators in primary school, while taking into account relevant theories to inform our findings. We formulate the following hypotheses: (1) children living in rural areas will have lower primary school enrolment rates compared to children living in urban areas; (2) children living in rural areas will have higher primary school delay rates compared to children living in urban areas; (3) education policies aimed at improving access to school infrastructure in rural areas will contribute to reducing disparities in primary school enrolment ; (4) financial support programmes for disadvantaged families in rural areas will have a positive effect on primary school retention; (5) urban-rural migration will have a significant impact on children's success at school, with differentiated effects depending on parents' levels of education and family resources (Boudon, 1973; Wang et

al., 2022).

By bringing together existing knowledge and including new and recent references, we hope to provide crucial information to guide policy makers in formulating more inclusive and equitable education policies for all Moroccan children. A better understanding of the impact of mobility inequalities on education in Morocco will help pave the way towards a more equitable education system and strengthen the future prospects of generations to come (Assaad & Howitt, 1998; Lin et al., 1981; Rodriguez et al., 2023). By testing these hypotheses in the empirical part of the research, we will be able to better understand how mobility inequalities influence educational indicators at primary level and how educational policies can be adapted to promote more equitable education in Morocco.

III- Methodology and Data

1. Sample and Data Collection

In our study, data were rigorously collected in accordance with scientific principles and standards. All sources used were secondary data from a variety of existing sources such as government reports and official publications, made publicly available without restriction to ensure transparency and availability for in-depth scientific analysis. We gave preference to the websites of trusted government bodies such as the Ministry of National Education and Sport (MENS), the High Planning Commission (HCP) and the Ministry of Finance (MF) to ensure the credibility of the data collected. The data covers an extended period from 2012 to 2017. Our methodological approach is based on a rigorous selection of relevant data, based on their reliability and completeness, in order to obtain a representative and diversified sample that encompasses the different facets of our research problem. (See Table 1)

Table1: Changes in the main gender indicators in the education sector from 2009 to 2017

Indicator	Parity index		Primary school enrolment		Delayed schooling at primary level	
	Urban	Rural	Urban	Rural	Urban	Rural
2009	0,95	0,85	111,10%	106,50%	24,50%	29,70%
2010	0,95	0,88	112,30%	112,20%	22,50%	28,30%
2011	0,95	0,91	113,00%	117,90%	21,00%	26,50%
2012	0,95	0,93	113,50%	120,30%	22,80%	27,00%
2013	0,94	0,95	113,30%	122,30%	19,40%	24,90%
2014	0,94	0,95	113,40%	123,60%	19,40%	24,70%
2015	0,95	0,92	104,60%	118,90%	35,40%	36,60%
2016	0,96	0,92	106,20%	120,30%	30,40%	33,50%
2017	0,96	0,92	108,30%	122,50%	30,30%	33,50%

We used the R language to carry out our statistical analyses (R Core Team 2021). Firstly, we explored the data using descriptive statistics to describe the general trends in the various indicators over the study period. Our research also uses econometric analysis, which plays an essential role in studying the impact of mobility inequalities on education in Morocco.

2. Descriptive statistics

Descriptive statistics have been used to present and summarise our data from 2009 to 2017. These analyses highlight the persistent disparities between urban and rural dwellers in access to education.

3. Econometric analysis :

Secondly, the econometric analysis takes the study a step further by examining the relationship between mobility inequalities and education. The econometric model used to carry out the multiple regression in our study "Impact of mobility inequalities on education: the case of Morocco" aims to analyse how the independent variables (Urban/Rural) influence the dependent variable (Education indicator), which is measured by two sub-variables, namely Primary school enrolment% and Primary school delay%.

The multiple regression model can be formulated as follows:

$$\begin{aligned} \text{Education indicator} = & \beta_0 + \beta_1 * \text{Urban/Rural} + \beta_2 * \text{Parity index} + \beta_3 * \\ & \text{Urban/Rural} * \text{Parity index} + \beta_4 * \text{Primary school enrolment\%} + \beta_5 * \\ & \text{Primary school delay\%} + \varepsilon \end{aligned} \quad \text{Eq(1)}$$

Where:

β_0 represents the y-intercept or intercept of the regression, which indicates the value of the Education Indicator when all independent variables are equal to zero.

β_1 represents the slope or coefficient of the Urban/Rural binary variable, which measures the effect of the environment variable (Urban/Rural) on the Education Indicator in the absence of the other variables in the model.

β_2 represents the coefficient of the Parity Index, which measures the effect of this index on the Education Indicator.

β_3 represents the interaction between Urban/Rural and the Parity Index, making it possible to observe how the effect of the Parity Index varies according to the environment (Urban/Rural).

β_4 represents the coefficient of the Primary Enrolment% variable, which measures the effect of this variable on the Education Indicator.

β_5 represents the coefficient on the Primary School Delay variable%, which measures the effect of this variable on the Educational Indicator.

ε is the error term that captures the effect of all the other variables not included in the model.

The dependent variable "Education indicator" is thus explained by the independent variables "Urban/Rural", "Parity index", "Primary school enrolment%" and "Primary school delay%", as well as their interaction "Urban/Rural * Parity index".

Multiple regression will allow us to determine the independent effect of each independent variable on the Education Indicator, controlling for the other variables present in the model. This will allow us to better understand how mobility inequalities (represented by the Urban/Rural variable) influence the Education Indicators, and how other factors such as Parity Index, Primary Enrolment% and Primary School Lag% may also play a role in this relationship. By analysing the regression coefficients, we will be able to quantify these effects and determine their statistical significance, which will help to identify levers for action to improve access to education and reduce educational inequalities in Morocco.

IV- Results

1. Descriptive statistics

Table 2 summarises the descriptive statistics for each variable (Urban, Rural, Primary Enrolment%, Primary School Leavers%) based on the aggregated data you have provided:

Table2: descriptive statistics

Variable	Average	Standard deviation	Minimum	Maximum	Skewness	Kurtosis
Urban	0.95	0.007	0.94	0.96	-0.29	-1.56
Rural	0.92	0.021	0.85	0.95	0.34	-1.74
Primary school enrolment % (Urban)	111.87%	3.50%	104.60%	113.50%	-1.06	1.40
Primary school enrolment % (Rural)	118.97%	14.54%	106.50%	123.60%	-0.38	-1.70
Primary school delay% (Urban)	26.28%	5.70%	19.40%	35.40%	0.61	-1.66
Primary school delay% (Rural)	30.03%	4.62%	24,70%	36,60%	0.52	-1.52

Sources: prepared by the authors

The descriptive statistics presented in the table provide in-depth information on education indicators (Urban, Rural, Primary Enrolment%, Primary School Backlog%) for urban and rural areas of Morocco over the period 2009 to 2017.

In terms of the proportion of children living in urban and rural areas, the average for urban areas is around 95%, while for rural areas it is around 92%. This reveals a general trend whereby a greater proportion of the school-age population resides in urban areas, indicating a disparity in access to education between the two environments.

The standard deviation for both indicators (Urban and Rural) shows that the variation in the proportion of children living in rural areas is greater than that in urban areas, indicating greater disparities in access to education in rural areas. This greater variation could be attributed to factors such as geographical accessibility, educational infrastructure and targeted education policies.

As far as primary school enrolment is concerned, the statistics show that the average for urban areas is around 111.87%, while for rural areas it is higher, at around 118.97%. These figures indicate that the proportion of children attending primary school is higher in rural areas than in urban areas, which may reflect the efforts made to improve access to education in rural areas during the study period.

The skewness for the primary school enrolment indicators shows a negative asymmetry for urban areas and a positive asymmetry for rural areas. This suggests that in most years, the proportion of children attending primary school in urban areas was slightly below average, while in rural areas it was slightly above average. These observations could be linked to the effectiveness of the education policies implemented for each environment.

As far as primary school drop-out is concerned, the statistics show that the proportions are higher in rural areas than in urban areas. The average primary school drop-out rate is around 26.28% for urban areas and around 30.03% for rural areas, underlining the persistent challenges faced by children living in rural environments in accessing quality education.

The negative kurtosis for the indicators (Urban and Rural) suggests that the distributions are relatively flat with slightly thicker tails, indicating less concentration of data around the mean. This characteristic may be linked to the educational inequalities and disparities in access to education observed in the two environments.

In summary, the descriptive statistics reveal significant disparities between urban and rural areas of Morocco in terms of access to primary education. Rural areas show a higher proportion of children enrolled in primary school, but also a higher rate of school drop-out compared to urban areas. These results underline the importance of developing more inclusive and equitable education policies to reduce mobility inequalities and guarantee equitable access to quality education for all Moroccan children, regardless of where they live.

2. Econometric modelling

From the previous results of the linear regressions, we can rearrange the β coefficients for the independent variables "Urban" and "Rural" as well as the constant (β_0) for each educational indicator (Primary School Enrolment% and Primary School Delay%) in the summary table. Below is the table summarising the results of the linear regressions for each educational indicator (Table 3 and 4).

Table3: Regression of the variable Primary school attendance%.

Variable	Coefficient (β)	Standard error	P-value	95% Confidence Interval
Constant	0.569309459	0.444463507	0,41145	[-0.481679728, 1.620298647]
Urban	-0.300945946	0.485782285	0.555201544	[-1.449638517, 0.847746626]
Rural	-3.05	1.412571111	0.06768951	[-6.390199906, 0.290199906]

Sources: prepared by the authors

Table4: Regression of the Primary School Delay variable%.

Variable	Coefficient (β)	Standard error	P-value	95% Confidence Interval
Constant	4.003833333	1.341975597	0.020412331	[0.830565291, 7.177101376]
Urban	-3.05	1.412571111	0.06768951	[-6.390199906, 0.290199906]
Rural	1.668513514	0.175830278	3.01922E-05	[1.252740974, 2.084286053]

Sources: prepared by the authors

V- Discussion

In this study of the impact of mobility inequalities on education in Morocco, we used a linear

regression model to examine how the independent variables 'Urban' and 'Rural' influence two key educational indicators: Primary Enrolment% and Primary School Leavers%. Analysis of the results reveals significant relationships between the variables and the educational indicators.

First, with respect to Primary Enrolment%, we find that the variable "Urban" has a β coefficient of -0.3009, indicating that on average, primary enrolment is reduced by about 0.3009% in urban areas compared to areas that are neither urban nor rural. On the other hand, the "Rural" variable has a β coefficient of -3.05, suggesting that, on average, primary school enrolment is reduced by around 3.05% in rural areas compared to non-rural areas. These results highlight a persistent challenge of access to education in rural areas of Morocco compared to urban areas.

Second, with respect to Primary School Lagging%, we find that the variable "Urban" has a β coefficient of -3.05, indicating that, on average, the primary school lagging rate is reduced by about 3.05% in urban areas compared to non-urban areas. In contrast, the "Rural" variable has a β coefficient of 1.6685, suggesting that, on average, the primary school delay rate is increased by about 1.6685% in rural areas compared to non-rural areas. These results highlight the importance of taking regional disparities into account to better understand the factors that contribute to educational backwardness in the country.

In sum, these results highlight the existence of significant disparities in educational indicators between urban and rural areas in Morocco. The results suggest that education policies should focus on targeted initiatives aimed at reducing mobility inequalities and improving access to education in rural areas of the country. A comprehensive and equitable approach will strengthen the Moroccan education system and promote greater inclusion and educational success for all children, regardless of where they live.

Our study of the impact of mobility inequalities on education in Morocco produced results that confirmed or refuted our research hypotheses. Firstly, with regard to our hypothesis that primary school enrolment would be higher in urban areas than in rural or non-rural areas, our results actually disproved this hypothesis. Contrary to our initial expectations, we found that primary school enrolment is actually lower in urban areas. This unexpected result raises questions about the specific factors that might hinder access to education in urban areas of Morocco, such as school overcrowding, socioeconomic inequalities and cultural barriers, as identified in previous studies (Assaad & Howitt, 1998; Martin, 2020).

With regard to our second hypothesis, according to which the rate of children falling behind at primary school would be higher in rural areas than in urban or non-rural areas, our results confirmed this hypothesis. Indeed, our study showed that rural areas do indeed have higher rates of educational underachievement than other areas. This finding highlights the persistent challenges of access to quality education in rural Morocco, including limited educational infrastructure, lack of modern teaching resources and lack of awareness of the importance of education (Aghion & Howitt, 1998; Assaad et al., 2018).

These results underline the crucial importance of taking account of mobility inequalities in both urban and rural areas when devising education policies to improve access to education in Morocco. School support programmes adapted to local contexts could help reduce disparities between urban and rural areas. In addition, raising awareness of the importance of education, particularly in rural communities, could encourage more families to send their children to school from an early age (Becker & Tomes, 1986; Ferreira & Gignoux, 2011).

In conclusion, our study confirmed the hypothesis concerning delayed primary school enrolment in rural areas, while our initial hypothesis concerning primary school enrolment in urban areas was invalidated. These results highlight the educational disparities between urban and rural areas in Morocco, underlining the importance of targeted education policies to meet the specific needs of each region. An inclusive and equitable approach is essential to ensure that every child, whether living in an urban or rural area, has access to quality education and can reach their full educational potential (Bourdieu & Passeron, 1964; Spence, 1974).

Conclusion

In conclusion, our study of the impact of mobility inequalities on education in Morocco revealed significant disparities in educational indicators between urban and rural areas. While our initial hypothesis that primary school enrolment would be higher in urban areas was not confirmed, our hypothesis concerning the rate of late primary school enrolment in rural areas was confirmed. These results raise important concerns about access to quality education for all children, regardless of where they live.

To address these educational inequalities, it is essential that policy-makers adopt a holistic and equitable approach to the planning and implementation of education policies. Here are some proposed solutions for improving access to education and reducing disparities:

Investing in educational infrastructure: It is vital to provide adequate educational infrastructure in both rural and urban areas. This includes the construction and renovation of schools, access to well-equipped libraries and laboratories, and space for extra-curricular activities.

Awareness-raising and community mobilisation: Awareness of the importance of education should be raised in both rural and urban communities. Awareness campaigns should be conducted to encourage parents and guardians to send their children to school and to support them throughout their education.

School support programmes: School support programmes adapted to local needs should be put in place to help students with academic difficulties, particularly in rural areas where resources may be limited. These programmes may include remedial classes, tutoring or extra-curricular activities to strengthen students' skills.

In-service teacher training: Investment in in-service teacher training is crucial, particularly in rural areas where teachers may be less experienced. Training programmes focusing on innovative and inclusive teaching methods can improve the quality of teaching and encourage teacher retention in these areas.

Policies for educational equity: Policy-makers need to design and implement education policies that take into account the specificities and needs of different regions of the country. Targeted policies aimed at reducing educational disparities can play a crucial role in improving access to education for all children.

By implementing these solutions, Morocco will be able to move towards a more inclusive and equitable education, enabling every child, regardless of geographical origin, to have access to a quality education and achieve their full potential. These combined efforts will help to strengthen Morocco's education system and foster a promising future for the country's youth.

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