

Inequality of Opportunities in Education in Eswatini:

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Abstract

This study quantifies inequality of opportunity in education in Eswatini using Multiple Indicator Cluster and Demographic and Housing Surveys. Using the “*ex-ante*” approach, the study identifies potential sources of inequality at all levels of the general education system in Eswatini and how these interplay with learner achievement. The study finds that, on average, circumstances account for a low portion of the variance (approximately 23.7%) in learner attainment. This measure is higher for learners aged 15 to 18 years. This means that, as the learner grows, the influence of unequal circumstances on educational attainment increases. In addition, family background variables like household wealth and education of household head are the main sources of inequality of opportunity. Therefore, opportunity equalising policies are required at all levels of the general education system in Eswatini.

Key Words: *Inequality of opportunity, ex-ante*

1. Introduction

Educational achievement is considered as a fundamental input into a person’s functioning and capacity to flourish there has been great interest by individuals and policy makers in the distribution of opportunities in education. Despite the growing interest of policymakers as well as economists in equality of opportunity; its empirical applications remain scarce. The main reason is that implementation of equal opportunity policies requires the identification of the contribution of circumstances and effort to observed inequality (Jusot, Tubeuf, and Trannoy, 2010). Moreover, studying the differential intensity of opportunity inequality across regional areas, professional categories or even income classes, can give clearer information on the priorities of a redistributive policy (Checchi, Daniele, Peragine, and Vitorocco, 2005). This then raises two main questions: what causes these inequalities? How can they be measured?

The theory of inequality of opportunity states that sources of inequality of opportunity are split into circumstances (unfair) and efforts (fair sources). As proposed by Roemer (1998) differences in outcomes can be attributed to partly circumstances which are factors that are economically exogenous to an individual and efforts which are due to a person’s responsibility. However, there is no exact definition of what constitutes circumstances and what constitutes efforts; for example, shortly after independence, education in Eswatini “was characterized by poor quality, uneven distribution of schools, high dropout and repeater rates, serious shortages of teachers, and inappropriate and highly academic curricula” (Magagula, 1990). In essence Eswatini inherited inequality traps that systematically excluded certain sections of the population from gaining access to quality education and it is believed that these factors are what contributed to poor performance in schools.

The National Development strategy recognises the importance of meaningful participation of the country's citizens toward economic development. Also, the 2030 Agenda for Sustainable Development which is grounded in the Universal Declaration on Human Rights and international human rights treaties and emphasises the responsibilities of all states to respect, protect and promote human rights with a strong emphasis on the empowerment of women and vulnerable groups. To achieve this, a measure of inequality of opportunity is required and will enable policy makers to identify and mitigate unequal opportunities. Eswatini has been underperforming in the human development aspect. The United Nations Development Programme estimates the human development index of Eswatini in 2018 at 0.588, and this value falls to 0.414 when adjusted for inequality in education, health and income. This measure places Eswatini in the bottom 5% of medium human development countries with a potential of being a least human development country. Furthermore, the human development index has only increased by a mere 9.7% since 1990. The issue of a low HDI measure speak to the educational and income inequalities that exist in Eswatini. The Gini index of Eswatini has been increasing since 2000 which may imply that Swaziland's policies particularly educational policies were not formulated around equity.

This paper proposes to a tentative answer to the issue of measuring inequality of opportunity by calculating an index of the power of circumstances. This will allow us to explain the influence that the accumulation of pre-determined circumstances have on educational achievements. The key focus of the paper is on the following key surveys namely the Multiple Indicator Cluster Surveys (MICS): MICS 3 (2010) and MICS 5 (2014) and the Demographic and Housing Survey, DHS (2007). These surveys contain country level data on household information which will enable us to map the influence of socio-economic background and biological factors on educational attainment and track this influence over 7 years

2. Literature Review

Rising inequality has caused a deep wedge in society, creating an apparent distinction between those who are extremely wealthy (the '*haves*') and those that are economically disadvantaged (the '*have nots*') and this is seen as the '*greatest injustice of modern times*' (Juan-Pedro and Garces-Voisinat, 2015). There are several reasons why inequality would be seen as an injustice. Firstly, inequality can distort the distribution of human capital tilting comparative advantages towards low skilled economic activities, thus reducing return on investment and the ability of a country to benefit from technological advancement (Vila-Artadi and Sala-i-Martin, 2003). Secondly, high levels of income inequalities have the potential to tip the socio-political structure of a country. High-income disparities trigger financial and political crises because wealth is concentrated in the hands of a fortunate few (Stiglitz 2012; Krugman, 2007). Lahouij (2017), Shin (2012), and Panizza (2002) argue that high levels of income inequality can be associated with low levels of economic growth and Eswatini is no exception, as findings indicate that countries in the Southern African Customs Union (SACU) region could double economic growth if income inequalities could be brought down to that of countries with similar levels of development (Basdevant *et al.*, 2012).

Finally, inequality leads to the emergence of market inefficiencies because the economically disadvantaged cannot afford to invest (Galor and Zeira, 1993, Piketty, 1997). Reich (2012) provides an analysis of how market imperfections arise because of income inequalities and

proposes policy recommendations of how best they can be reversed. (Garces-Voisinat, 2015) suggests that reducing inequalities in human capital (education and health) should be at the forefront when attempting to solve the problem of inequalities, particularly income inequalities and studies indicate that the most important determinant of the distribution of income and life opportunities is education. .

2.1 Inequality of Opportunity

The rise of inequality in modern times has inspired the development of numerous schools of thoughts on equality, not the least inequality of opportunity (Piketty, 2013). These schools of thought try to explain, contextualise, and provide ideas on how to understand and create an equal society. Evidence shows that early efforts focused on developing models for formulating theories that would equalise opportunities for achievement in a given population (Ramos and Van de gaer, 2013; Fleurbaey and Schokkaert, 2009).

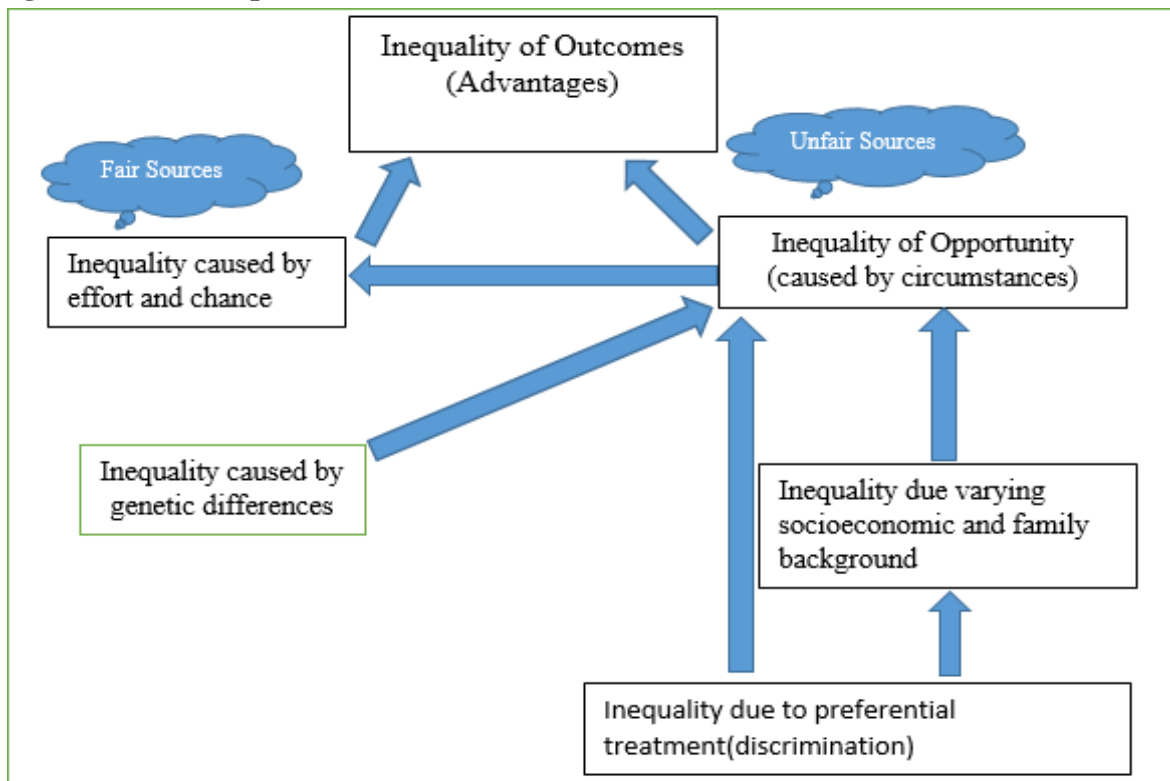
A growing body of literature shows that growing inequality is a direct consequence of the actions of government and business and not a natural occurrence (Stiglitz, 2013). Up until the 1960s, policy focused on achieving equality of welfare or utility, or equality of outcomes without focusing on the things that bring about the desired equal outcomes (utilitarianism).

Documented evidence suggests that the concept of inequality of opportunity arose from a debate that brought about arguments on how to utilise public policy in order to achieve a fairer distribution of outcomes of interest such as income, health, and wealth (Lo Bue and Idzalika, 2016). The equality of opportunity theory presents two views: 1) a conservative view that states that everything is effort, meaning that a person can always overcome a situation if they are determined enough and 2) a radical view that states that everything is circumstance and everyone is completely a product of the circumstances they are born into.

In a study conducted in 1998, John Roemer provided arguments that reconciled these schools of thoughts and he adopted a political stance that placed the responsibility on society to define what it calls ‘circumstances’ and use that definition to describe equality of opportunity. Roemer (1998) called for policy reforms that made it possible to eradicate those factors that are beyond an individual’s control and to level the playing field while at the same time allowing outcomes to respond to efforts and hold individuals accountable for their actions. Stiglitz (2013) advises that such policies should focus on continually developing innovative education and training models, to build new skills that are sufficient to meet labour demand and facilitate the inclusion of young people into the job market, otherwise known as *opportunity equalising policies*.

A formal definition of inequality of opportunity according to Roemer (1998) was that an individual’s outcome is partly due to circumstances and partly effort. The author defined outcomes as ‘advantages’, circumstances as ‘economically extrinsic factors’, and effort as ‘those factors that an individual has control over’. Moreover, Roemer (1998) observed that circumstances and efforts can also be disaggregated into smaller units namely *types* and *tranches*. A *type* is a set of people in the population with the same circumstances, while a *tranche* refers to a set of people exhibiting the same amount of effort. This level of disaggregation is important as it allows economists to partition the population into finite categories and go as far as providing a cardinal measure of inequality of opportunity. A conceptual framework of inequality of opportunity can be seen in figure 2.2.1 below showing how inequality of opportunities translates into inequalities in outcomes.

Figure 2.1.1 Conceptual Framework



Source: Author's own depiction based on Roemer (1993, 1998).

Notes: The figure shows the different sources of inequality of outcomes or advantages. The sources are broken down into types (unfair sources shown on the right hand side (RHS) of the figure and fair sources shown on the left hand side of the figure (LHS) and tranches (all other sources below the types)).

According to Roemer (1998) as cited by (Brunori, 2016), a way was paved for more measures of inequality of opportunity. Two measures that have gained popularity in the field of inequality are the *ex-ante* and *ex-post* method. The *ex-ante* approach is a method initially proposed by Checchi and Peragine (2010) and later developed by Ferreira and Gignoux (2011) to be used in the assessment of inequality of opportunity in education. It postulates that equality of opportunity is achieved when the mean outcomes are equalised across types, that regardless of circumstances individuals face the same set of opportunities (Jusot *et al.*, 2006). The *ex-post* method which was proposed by Checchi and Peragine (2010) suggests that equality of opportunity is attained when the individuals exhibiting the same effort achieve that same level of outcome - also known as within *tranche* inequality (Ferreira and Gignoux, 2011). This paper utilises the *ex-ante* method to analyse inequality of opportunities because of the lack of rich data sets that have all the information on circumstances and efforts, which is the kind of data that the *ex-post* method requires. The data on efforts that the *ex-post* method uses is also not easily observable or quantifiable. The *ex-ante* method is therefore ideal because the ability to utilise public policy to address the issue of inequality of outcomes can be best addressed by identifying its sources, breaking them down into their constituent elements and attending to each one by their magnitude (de Barros *et al.*, 2006). This decomposition method is called the Shapley Value decomposition method and has been used by Bjorklund *et al.* (2012), Brunori *et al.* (2016) and Salvi (2007) to estimate the contribution

of each circumstance to inequality in income distribution. The concept of a Shapely Value method was adopted from Shapley (1953), in which the author introduced theory on cooperative games. The Shapley Value Method is a method that permits the index of inequality of opportunity to be broken down in order to find the contribution of each circumstance in the observed joint inequality of opportunity (Shorrocks, 2013). The main reason why it is such a widely used measure is that any distributional statistics can be broken down and even though it was pioneered in the field of income, it can be used to assess any outcome of interest (Devicienti, 2010).

2.2 Empirical Evidence

A number of studies (see Lo Bue and Idzalika, 2016; Ferreira and Gignoux, 2010; Aguirreche, 2012) have found evidence of inequality of opportunity. These studies used the Program for International Student Assessment (PISA) data in their analysis. Lo Bue (2016) conducted a study to measure inequality of educational opportunities among learner's aged 11 to 15 by dividing them into two cohorts in the 13 Indonesian provinces for the years 1997-2007. Lo Bue (2016) found that overall inequality of educational opportunities decreased in Indonesia except for some regions like South Kalimantan where inequality of opportunity increased from 27% to 44% in the youngest cohorts and increased by 50% for the oldest cohorts. The study also found that parent's educational backgrounds explained most of the inequality in educational opportunity in Indonesia. Inequality of opportunity was also found to be higher for older cohorts and was negatively correlated with increased education spending. The implication for public policy was that supply (household) side interventions are most effective in reducing higher levels of inequality in education, especially where inequality of educational opportunities is the highest.

Perhaps the earliest attempts at measuring inequality of opportunity in the education sector can be seen through a study conducted by Ferreira and Gignoux (2010). The study measured the influence of circumstances on math, reading, and science scores among Turkish learners aged 15 or above in grade 7. The study found that circumstances range from 25% to 33% in explaining variance in educational achievement. Family background variables such as parental education and family size explained most of the inequality of opportunity across all subject areas. These results echo a similar finding by Tansel (2015) that both the influence of family background and overall inequality of educational opportunity in Turkish learners was decreasing over time, hence opportunity equalising policy needs to reduce family background influence on achievement. The same cannot be said about the gender of a pupil as it only explains how it could possibly affect enrolment and not achievement. This means that once a student has access to school, they have an equal chance of passing, regardless of their gender.

In the aftermath of coups and revolutions, countries in the Middle East and North Africa (MENA) region embarked on wide scale reforms meant to provide a free and meritocratic education system for a more equitable society (Salehi-Isfahani, *et al.*, 2012). Salehi-Isfahani, Hassine, and Assaad (2012) conducted a study to investigate how inequality of opportunity has changed overtime in the MENA region following the reforms. The authors found that the policies mainly succeeded in increasing access as opposed to quality of schooling. In particular, they found that family and community characteristics contributed the most to inequality of educational opportunity and advised MENA Governments to pursue policies that will equalise access to education at a community level to reduce the effect of family background on inequality of opportunity.

In a 2014 study, Ersado and Gignoux measured inequality of opportunity in the most unequal country in the MENA region, Egypt. Contrary to Lo Blue (2016), the authors found evidence of high inequality of educational opportunity at primary school level as opposed to high school level. This result can be explained by the highly competitiveness of the education system, with a large portion of public resources dedicated to higher education. Learning gaps are more pronounced at an early age in a meritocratic system and opportunity equalising policy reforms should be focussed on reducing these gaps.

2.3 Opportunity Equalising Policies

From the studies reviewed, the effect of family background learning development cannot be understated. Hence, policy reforms that would provide equal educational opportunities should be innovative enough to recognize the role of the household unit on a learner's development (Carneiro, 2015). For examples, the Norwegian education system nullifies the influence of family background on academic achievements by identifying the capabilities and talents of learners and steering them in the right direction (Juan-Pedro and Garces-Voisinat, 2015). What empirical literature teaches us, is that even when supply side interventions have had an impact on student outcomes, they are too costly to be justified (see van der Berg 2002). Supply-side interventions are only a part of the solution in reducing educational inequalities as illustrated by the failures of Universal Primary Education policies in Nigeria and Uganda that intended to significantly increasing school performance and the substantial increase in the general education budget in South Africa to increase matric pass rates (Onwuameze, 2013; Bruns *et al.*, 2003).

3. Method

This section describes the methods used to answer the research questions furthermore achieving the objectives of the study. Also in this section, you will find the data sources and a description of the empirical model. In the previous section, the paper shows that the preferred method for quantifying inequality of opportunities in education is the *ex-ante* approach. The method attributes inequality of opportunities or advantages in education to sources, which are further divided into *types* and *tranches*. The method gained popularity because of its ability to identify the root sources of inequality of opportunities even at the level of the types of inequality. This study uses the *ex-ante* method given its benefits.

3.2 The ex-ante approach

Building on Roemer's (1998) egalitarian principle, Ferreira and Gignoux (2011) provide a non-parametric measure of inequality of opportunity in a model, which is specified as follows:

$$Z = f(C, E, u) \quad (1)$$

where Z ($z_i \in Z; i = 1, \dots, n$) is the outcome of interest that is determined in part by circumstances (C) and in part by efforts (E) and u is the random error term. Circumstances are defined as a finite set $C = \{c_1, \dots, c_k, c_n\}$ and efforts as a finite set $E = \{e_1, \dots, e_k, \dots, e_n\}$ such that:

$$E = g(C, v) \quad (2)$$

where g is a function of circumstances and efforts and v is a random error term that comprises all variables which are not explicitly included in the model. Ferreira and Gignoux (2011) provide a method of measuring inequality of opportunity, which is based on the ordinary least squares regression of z on C . The authors use a linearized version of equation (1) and (2) such that:

$$z_i = \beta C_i + \rho_i \quad (3)$$

where,

C_1 = Relationship to household head

C_2 = Sex of the pupil

C_3 = Mother Alive

C_4 = Pair of Shoes

C_5 = Region

C_6 = Electricity

C_7 = Sex of Household Head

C_8 = Age of Household Head

C_9 = Wealth

C_{10} = Type of Place of Residence

C_{11} = Education of Household Head

and βC_i is the vector of expected outcomes from the regression and ρ_i captures all other circumstances and efforts not explicitly stated in the model. The proposed measure of inequality of opportunity under this framework uses variance as the index of inequality of opportunity (IOP) such that:

$$IOP = \frac{var(\beta C_i)}{var(z_i)} \quad (4)$$

The inequality of opportunity index is the coefficient of determination (R^2) of the OLS regression of outcomes on circumstances of each individual. In this study, we have specifically chosen to adopt this method because i) it is easy to interpret as IOP is understood as the lower bound of the variation in educational attainment explained by a variation in the biological and socio-economic factors (Brunori, 2016; Lo Bue & Idzalika, 2016). ii) Given that the purpose of the paper is to compute the joint effects of circumstances that causally explain educational attainment. The downside however is that β cannot be interpreted as a causal estimate because it is highly correlated with unobserved circumstances and as such, part of their effect will be expressed in the model.

3.3 Description of the Explanatory Variables

The selected explanatory variables are in line with literature and the empirical model explains possible factors, which may influence school performance for each pupil at primary, secondary and high school level in Eswatini. The variables may exert a positive or negative effect on school performance. For example, educational attainment could be negatively affected by financial constraints (wealth) as parents, or guardians might not be able to adequately provide to the academic needs of their children. Table 3.2.1 provides a detailed explanation of explanatory variables

Table 3.3.1 Detailed Explanation of Explanatory Variables

Variable	Classification
Relationship to Household Head	Categorical (1 = Head, 2=Wife/Husband, 3=Son/Daughter, 4=Son-in-Law/Daughter-in-Law, 5=Grandchild, 6= Parent, 7=Parent-in-law, 8=Brother/Sister, 9=Brother-in-law/Sister-in-Law, 10-Uncle/Aunt, 11=Niece/Nephew, 12=Other/Relative, 13=Adopted/Foster/Stepchild, 14=Not related, 98=Don't know, 99=Missing)
Sex of the pupil	Dummy (1=Male, 2=Female)
Natural Mother Alive	Categorical (1=Yes, 2=No, 8=Don't Know, 9=Missing)
Pair of Shoes	Categorical (1=Yes, 2=No, 8=Don't Know, 9=Missing)
Region	Categorigal (1=Hhohho, 2=Manzini, 3=Shiselweni, 4=Lubombo)
Electricity	Dummy (1=Yes, 2=No)
Sex of Household Head	Dummy(1=Male, 2=Female)
Age of Household Head	Continuous
Wealth	Categorical (1=Poorest, 2=Second, 3=Middle, 4=Fourth, 5=Richest)
Type of Place of Residence	Dummy (1=Urban, 2=Rural)
Education of Household Head	Categorical (1=None, 2=Primary, 3=Secondary, 4=High, 5=Tertiary, 9=Missing/Don't Know)

Source: Author's own depiction from literature reviewed.

Notes: The table shows the explanatory variables that are used in the empirical model and their classification.

3.4 Decomposition of the Inequality of Opportunity Index

In order to assess the contribution of the circumstances on educational attainment the IOP index needs to be decomposed. The Shapley Value Method is employed for that purpose, as this method allows the index of inequality of opportunity to be probed further in order to find the contribution of each circumstance in the observed joint inequality of opportunity

(Shorrocks, 2013). The Shapley Value regression model gives the value of the cooperative game played by the set of circumstances against educational attainment (Mishra, 2016). We have that:

$$Y = \beta C + \rho_i \quad (5)$$

where Y is our outcome of interest (educational attainment) and C ($c_i \in C ; i= 1, \dots, n$) is a vector of circumstances. The Shapley Value method calculates the most likely contribution of each $c_i \in C ; i= 1, \dots, n$ to the chosen inequality of opportunity index, which is the R^2 .

3.5 Data Sources

The paper makes use of secondary data from survey household data from the Eswatini Multiple Cluster Indicator Cluster Survey (2010 and 2014) and the Eswatini Demographic and Housing Survey (2007). The surveys are a nationally representative sample of more than 4000 households (in each survey) that contain extensive information, from household characteristics to complete individual information of each member from each household. These surveys are specifically suitable for the needs of this paper because they contain detailed information on education as well as the socio-economic characteristics of all individuals present in each household. Moreover, the surveys were conducted nationwide and cover all the four regions of Eswatini namely; Hhohho, Manzini, Lubombo, and Shiselweni. They also make it possible to estimate inequality of opportunities in education at a nationwide level.

3.6 A Description of the Empirical Model

The analysis is run for the three cohorts separately. Typically, a child starts school at roughly 6 years of age in Eswatini. Cohort 1 categorizes ages 6-10 years; Cohort 2 categorizes ages 11-13 years and cohort 3 ages 14 – 18 years. The cohorts are further categorised based on the assumption that each cohort experiences the same set of opportunities. The first cohort represents primary school pupils, the second cohort represents secondary school pupils, and the third cohort represents high school learners. Age is not included as an explanatory variable because as Lo Bue and Idzalika (2016) put it, it is not a variable worth considering as factor that may drive inequality. Thus, the authors control for the effect of age on educational attainment. Using this approach, a regression is run for each of the cohorts using age as our explanatory variable and educational attainment as our explained variable to obtain residuals R_i . The residuals obtained from the regression in equation 6 are what we call “age adjusted educational attainment”.

$$\text{Educational attainment}_i = \text{Age}_i + R_i \quad (6)$$

In the following model, the explanatory variable of choice of the adjusted educational attainment of individual i is (R_i). It is important to note that the choice of circumstance variables must correspond to the outcome chosen and they must also be truly exogenous to the outcome itself and must be predetermined. Circumstances (C_i) are identified as potential causes of inequality of opportunity and represent the explanatory variables. The following

regression model is run separately for each cohort and used in the estimation and decomposition of the inequality of opportunity index for each cohort.

$$R_j = \alpha C_j + \partial_i \quad (7)$$

where ∂_i is a random error term.

4. Results and Discussions

4.1 Interpretation of Results

Table 4.1.1 shows the estimates of the inequality of educational opportunity, measured as the R-squared of a set of several regressions run separately for each region, year, and cohort. Table 4.2.1 – 4.4.1 shows a breakdown of the share of inequality in achievement by individual circumstances. While there is a wide range of estimates of IOP in Eswatini, there is a fair amount of consistency in the results across cohorts and years.

For the moment, attention is on the results for 2014, the most recent year for each cohort. The Hhohho region is by far the equal region concerning educational opportunities in the first cohort with about 4.7% explaining total IOP. At the other end of the spectrum, the Manzini region is the most opportunity unequal region in the region with an IOP measure of 12.6%. Substantiating this result is the fact that the Hhohho region has the highest transition rate from primary to secondary school while the Manzini region has the worst (see Ministry of Education and Training, 2015). A similar story can be told in the second cohort as the Manzini region still has the highest IOP measure, at an astounding 28.32%; while the Shiselweni region is the most opportunity equal among learners aged 13 – 15 and according to the 2014 Annual Education Census report, the Shiselweni region has the highest number of appropriately qualified teachers in secondary. In the oldest cohort, the Lubombo region has the highest IOP estimate of 37.4%, while the Hhohho region has the least estimate at 23.17%; these estimates measure comparably with measures in the Eastern and Southern areas of Indonesia that have an average IOP measure of about 40%, for older cohorts.

It is not obvious what the high IOP regions have in common in the youngest cohort. However, trends begin to emerge in older cohorts. For example, in the first cohort the Manzini region demonstrates that sex of an individual accounts for almost half of inequality of educational opportunities while in the Lubombo region financial status (wealth) assumes the biggest role in the estimated IOP, which is closely followed by whether or not a learner owns a pair of school shoes. In cohort 2, however, the most unequal regions (Hhohho and Manzini) indicate that the household's wealth and education of the household head level have the highest explanatory share in the estimated IOP measure, respectively. In the oldest cohort, the most opportunity unequal region - the Lubombo region - shows wealth as having the most impact on school achievement followed by the sex of the pupil, while the Manzini region indicates wealth and education of the household head as the highest contributors to unequal opportunities.

Table 4.1.1 IOP decomposed into individual Circumstances Share for Cohort 6 – 12 years

	Region	Relationship to Household Head	Sex	Mother Alive	Pair of School Shoes	Electricity	Sex of Household Head	Age of Household Head	Wealth	Urban/Rural	Education of Household Head
2007	Hhohho	15.3	9.62	0.34	24.88	10.35	0.45	0.85	18.88	7.65	11.68
	Manzini	10.23	12.69	0.96	7.46	23.7	0.51	0.74	28.06	6.9	8.73
	Shiselweni	13.33	24.61	0.25	21.42	3.39	3.87	1.95	14.79	8.17	8.2
	Lubombo	4.42	11.12	0.47	13.28	14.6	0.52	3.15	19.62	7.83	24.98
2010	Hhohho	1.02	10.57	1.89	2.95	2.54	1.02	2.28	38.28	11.82	27.46
	Manzini	0.42	9.33	1.23	7.68	0.77	0.81	3.08	41.23	12.85	22.58
	Shiselweni	9.87	15.54	0.45	0.23	0.67	2.62	1.55	48.37	0.95	19.77
	Lubombo	3.89	11.91	0.45	14.25	0.98	3.05	3.9	39.66	5.81	16.1
2014	Hhohho	3.14	24.63	0.35	1.03	0.45	5.34	5.76	11.75	20.07	27.49
	Manzini	0.03	49.16	3.94	0.65	0.12	0.33	1.62	19.86	2.99	21.31
	Shiselweni	0.27	47.87	4.12	3.78	0.06	0.29	0.62	26.58	1.95	14.48
	Lubombo	0.09	4.04	5.78	26.46	2.29	0.94	2.78	36.24	4.16	17.22

Source: Author's Estimation, based on cross-sectional data from MCIS and DHS 2007, 2010, and 2014.

Notes: The figure shows partial contribution of circumstances decomposed using the Shapley Value method for all years in the first cohort for the years 2007, 2010, and 2014.

Table 3. IOP decomposed into individual Circumstances Share for Cohort 13 – 15 years

Year	Region	Relationship to Household Head	Sex	Mother Alive	Pair of School Shoes	Electricity	Sex of Household Head	Age of Household Head	Wealth	Urban/Rural	Education of Household Head
2007	Hhohho	7.8	5.31	1.3	17.35	11.39	0.89	1.17	23.56	10.63	20.6
	Manzini	24.95	16.47	1.88	6.6	19.26	0.55	0.39	16.21	4.04	9.66
	Shiselweni	15.11	25.57	2.85	18.2	2.88	4.16	0.51	19.95	1.03	9.74
	Lubombo	10.7	16.63	0.91	11.95	13.09	2.37	1.38	19.33	6.82	16.58
2010	Hhohho	8.6	20.85	1.47	1.64	0.21	2.96	1.89	21.09	8.63	32.67
	Manzini	2.49	18.97	0.75	1.05	1.13	5.07	1.11	45.99	6.58	16.86
	Shiselweni	15.99	27.54	1	0.51	2.12	5.68	0.7	16.5	15.03	14.93
	Lubombo	12.02	4.66	0.3	10.44	0.6	1.65	2.1	38.28	10.82	19.13
2014	Hhohho	1.4	19.17	0.11	0.04	0.12	2.02	0.88	34.51	10.36	31.37
	Manzini	0.34	5.53	1.66	5.89	5.29	1.1	3.11	36.55	4.3	36.22
	Shiselweni	0.5	32.77	20.37	0.32	0.78	0.06	5.53	21.36	1.96	16.34
	Lubombo	0.44	31.15	4.63	3.1	0.21	1.23	1.16	33.26	2.94	21.89

Source: Author's Estimation, based on cross-sectional data from MCIS and DHS 2007, 2010, and 2014.

Notes: The figure shows partial contribution of circumstances decomposed using the Shapley Value method for all years in the second cohort for the years 2007, 2010, and 2014.

Table 4. IOP decomposed into individual Circumstances Share for 16 – 18 years old

Year	Region	Relationship to Household Head	Sex	Mother Alive	Pair of School Shoes	Electricity	Sex of Household Head	Age of Household Head	Wealth	Urban/Rural	Education of Household Head
2007	Hhohho	28.94	6.97	0.44	3.72	7.19	0.45	1.41	13.55	5.49	31.85
	Manzini	11.4	7.52	0.35	19.29	8.35	0.23	0.4	30.66	9.39	12.4
	Shiselweni	20.9	10.52	0.81	19.03	3.69	0.22	1.45	26.49	0.68	16.21
	Lubombo	19.86	16.4	2.45	1.25	7.71	0.65	2.44	25.98	7.43	15.84
2010	Hhohho	10.02	14.99	0.61	1.8	0.4	0.06	1.32	25.35	12.56	32.9
	Manzini	38.05	16.65	0.22	0.73	0.28	0.82	4.99	19.76	1.16	17.34
	Shiselweni	15.01	10.62	0.16	0.47	4.32	1.41	2.87	39.44	3.28	22.41
	Lubombo	2.59	23.08	0.52	6.68	0.31	4.53	0.72	37.19	5.91	18.48
2014	Hhohho	0.77	20.48	2.45	3.78	3.61	0.43	4.51	33.66	7.92	22.39
	Manzini	13.89	8.34	1.89	7.31	0.1	0.57	8.08	34.69	6.04	19.09
	Shiselweni	0.96	12.81	7.66	2.21	1.3	0.74	2.36	36.95	7.46	27.54
	Lubombo	2.1	22.08	0.91	0.49	0.04	3.42	0.52	46.52	15.6	8.31

Source: Author's Estimation, based on cross-sectional data from MCIS and DHS 2007, 2010, and 2014.

Notes: The figure shows partial contribution of circumstances decomposed using the Shapley Value method for all years in the last cohort for the years 2007, 2010, and 2014.

It is a widely held notion that the sex of the pupil contributes a significant portion towards inequality of opportunity given the traditional role of a woman in Eswatini. The data indicates that although sex is still an important variable in explaining inequality of opportunity, its importance varies among regions and cohorts. For example, in the youngest cohort, the importance of sex in educational inequality is more pronounced in the Shiselweni and Manzini regions, with it accounting for almost half of the total inequality of opportunity, while in the Lubombo region it is not a variable of high importance. In the older cohorts, the opposite occurs where we see gender gaining importance in the inequality of educational opportunity in the Lubombo region. This can be attributed to high teenage pregnancies (see Dlamini and Mohammed, *forthcoming*).

The influence of wealth and education of the household head in inequality of opportunity is mainly dependent on the quality of public schools and the availability of private schools. These variables also speak to the ability of parents to supplement their children's educational needs in instances where there are better alternatives in the area. In part, this explains why the Shiselweni region has been able to attain the highest equality of opportunity measure in all years considered in this study across all cohorts. The Hhohho, Manzini, and Lubombo regions however have varying inequality of opportunity across cohorts over time and this is attributed to the many different types of schools which have varying degrees of quality. These findings are consistent with the findings of de Barros *et al.*, (2009) for Latin America and Salehi-Isfahani *et al.*, (2012) in the MENA region.

4.2 Prevailing Trends in the IOP Estimates

Regarding the prevailing trends in the IOP estimates for the country, the results suggest that there has been an overall increase in the inequality of opportunity in Eswatini across all the three cohorts, as shown in Table 4.2.1. However, there are regions that exhibit conflicting trends. To illustrate, in the first cohort, the IOP in the Shiselweni region increased by 1.2 percentage points rising from 10.4% in 2007 to 11.6% in 2014, an outcome that is similar to the second and third cohorts for Manzini and Lubombo regions, respectively. In the first cohort, sources that lead to an increase in inequality of opportunity are not clear-cut, as they seem to vary from year to year.

Table 4.2.1. Aggregate Index Inequality of opportunity measure

Year	2007	2010	2014	2007	2010	2014	2007	2010	2014
Region	First Cohort(6 – 12)			Second Cohort(13– 15)			Third Cohort(16-18)		
	R²								
Hhohho	0.150	0.151	0.048	0.310	0.304	0.238	0.292	0.388	0.232
Manzini	0.141	0.154	0.126	0.278	0.405	0.283	0.342	0.305	0.293
Shiselweni	0.104	0.141	0.116	0.237	0.135	0.188	0.311	0.292	0.270
Lubombo	0.166	0.143	0.125	0.340	0.138	0.197	0.372	0.449	0.374

Source: Author's Estimation, based on cross-sectional data from MCIS and DHS 2007, 2010, and 2014.

Notes: The figure shows index of inequality of opportunity measured as the lower bound estimate of the total variation in educational attainments that is explained by the total variation in the observed circumstances for all regions across all cohorts.

The situation is less ambiguous for the second cohort where inequality of opportunity increased in the Manzini region because of the increasing share of education of the household

head variable in explaining IOP. In the last cohort, however, we see the share of wealth in explaining total inequality of opportunity increases over time causing an overall increase in inequality of opportunity in education. In older cohorts, regions with an overall increase in the IOP measurement occurs because of the increasing influence of wealth and household head education over time. In the long run, the results show that household wealth emerges as the biggest driver of unequal educational opportunities in Eswatini during the period 2007 – 2014. In the youngest cohort, however, these findings do not apply as the influence of wealth in driving educational achievements in the youngest cohort in the Manzini and Hhohho region is reduced to less than 20% of the IOP estimates overtime.

In 2010, the IOP measure shows an increase in some regions across the cohorts and all the regions with a higher IOP measure in 2010 also experience an increased influence of household wealth in inequality of educational opportunity. The same does not hold for regions that experienced a decrease in IOP in 2010. In the youngest and oldest cohort, the most opportunity equal region is the Hhohho region. The effect of circumstances in the youngest cohort decreases by about 68% from its initial level at the start of the period (see Table 1). The results show that not only is Hhohho the most opportunity equal region in Eswatini, it also shows that the region experienced the highest improvement in reducing inequality of opportunities in education. In the second cohort, the Lubombo region - although the second most opportunity unequal region in 2014- shows the best improvement in inequality of opportunity. This is encouraging and in line with IOP theory because, year by year the opportunity set available to students in the Lubombo region is converging towards that of other regions. These findings suggest that, over the years, inequality of opportunity measures between Manzini, Shiselweni, and Lubombo converge in the youngest cohort.

Turning attention to cohort 2, the results show that at the beginning of period the inequality of opportunity index of pupils in the second cohort school is on average twice as higher as that in primary school in the same year. The largest discrepancy can be seen in the Hhohho region in 2014, where the inequality of educational opportunity in the second cohort is five times higher than that of the first cohort. This is explained by drastic reduction of the inequality of opportunity in the youngest cohort and does not have any major negative implications about the quality of schooling in the Hhohho region. The largest IOP measure in this cohort is 40.5% in the Manzini region in 2010, with household wealth explaining about 46% of the total inequality in educational opportunity. This relatively large measure of inequality of opportunity measure implies that household wealth has the largest influence in explaining educational achievements among students aged 13 to 15 and has direct implications on the quality of public schools and quantity of private schools. We can see this impact in 2014 where the influence of wealth is still the highest amongst all the regions, hence the highest IOP measure in Manzini region.

The Shiselweni and Lubombo regions seem to defy the odds in this cohort, as results indicate that respectively they have the smallest IOP measure in all years and this is against prior assumptions that the poorest areas exhibit high inequality of opportunity. This is evidence that quality learning can occur in less well-off regions and that the supply of educational resources does not always translate into equal opportunities. This finding is against the general notion that inequality of opportunity is highest in poorer regions and wealth does not always translate to better quality schools. The wealth effect is more pronounced in the oldest cohorts compared to the younger cohorts. One thing that emerges is that, the fact the Shiselweni and the Lubombo regions are the least well-off regions does not show itself explicitly in inequality of opportunity but through the distribution of sources of inequality.

For instance, the Shiselweni region is the only region where the learner's mothers living status helps to explain about a fifth of inequality of opportunity. This result is not in isolation as reported in the Annual Education Census reports of 2009 to 2015 that stated that the Shiselweni region has the highest number of orphaned and vulnerable learners and this figure has been increasing since 2009. Another reason that explains a relatively low inequality of opportunity is the failure of a significant increase in the share of household wealth to produce a corresponding increase in inequality of opportunity.

Perhaps the most important cohort, which is just as important as the first cohort, is the third cohort, which represents the high school age group in Eswatini. In this cohort, circumstances account for a larger variation in educational attainment than the first cohort does. The highest inequality of opportunity measure is 44.9% in the Lubombo region in 2010. This is explained in part by the increase in the influence of the sex of the pupil and household wealth. . However, the impact of these variables in influencing educational attainment decreases in 2014 because the overall share of these circumstances decreases but inequality of opportunity increases to approximately the level that prevailed in 2007. This region also happens to be the most opportunity unequal region for learners in 16 to 18 age group.

Also in this cohort, the order of regions according to inequality of educational achievement in 2014 reverts to that in 2007 with the Hhohho region being the most opportunity equal region and the Lubombo region being the least opportunity equal region. The same cannot be said about the sources of inequality. It is evident that the share of household wealth and education of the household head increases to explain most of the variation in educational achievement in most of the regions, and the sex of the pupil gains an increasing role in place of household head education level apart from in the Lubombo region.

The Shiselweni and Manzini region exhibit similar trends in inequality of opportunity. This is because they share certain similarities in the decomposition of circumstances. The first one is the fact that in 2007, whether or not a pupil has school shoes explains about a fifth of inequality of opportunity. A different picture emerges in 2010 when that share reduces to less than 1% of inequality in educational attainment. The consequence of this resulted in a corresponding fall in the estimated inequality of opportunity measure. This implies that the poverty gap in these regions closed because as the number of pupils without school shoes fell it resulted in an increase in educational outcomes for those pupils and hence a lower inequality of opportunity measure.

5. Conclusions and Recommendations

In this study, we set out to measure inequality of opportunity in Eswatini at primary, secondary, and high school level. The study also decomposed the inequality of opportunity measure into its constituent sources to understand the key sources of inequality of opportunity in the education sector in Eswatini. Studying the sources of inequality of opportunity is important given that inequality of opportunity in education is increasingly being identified as the greatest source of all kinds of inequalities. The results of the study will help identify and develop policy solutions that would reduce inequality of opportunity in Eswatini. The study finds that family background variables contribute the most to inequality of opportunity in the older cohorts and that, on average, inequality of opportunity is about twice as higher in the older cohorts than the youngest cohort is. Household wealth also matters. The study finds that the ability of household wealth to increase the wide educational achievement gaps is strongest in the Hhohho and Manzini regions and weakest in Shiselweni

and Lubombo regions. This confirms the fact that the wider the variations in the types of schools, the wider the inequality of opportunity. The inability of a school-going child to progress successfully through school limits the opportunity set available to that child. The child will become a victim of circumstances as opposed to choice, and that in itself is an injustice that needs to be corrected. Thus, there is a major incentive for the government of Eswatini to intervene and mitigate the effects of circumstances on educational outcomes. For example, at primary school level, households bear the full costs of a child repeating. Similarly, the effects of a child not completing the primary education cycle within the stipulated time, or at all accrue to households and in turn to the government. The immediate economic impact of unequal opportunities are the monies the government pays for free primary education. The medium and long-term effects include compromised human capital development, which impedes economic growth of the country due to insufficient human capital. With everything considered, unequal opportunities in education undermine government's effort to provide equitable and quality education for all in Eswatini. Therefore, the study recommends that the country needs to:

- Invest in social programmes that will make households less vulnerable by engaging in income generating and wealth creating opportunities.
- Develop a mechanism through which the worst performing regions can be assisted.
- Develop a dropout and repeater policy that would specifically address the problem of high dropout and repeater rates in Eswatini schools. Such a policy should spell out the role of the parents, government, and other stakeholders in the education sector of Eswatini
- Establish mandatory workshops and other school programmes to assist parents learn about what goes on in the classroom.

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