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MEASURING THE BENEFIT INCIDENCE OF PUBLIC SPENDING FOR EDUCATION IN BURUNDI

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Clarence Tsimpo and Quentin Wodon[1]

Public funding for education accounts for a substantial share of Burundi's government annual budget. This chapter provides a benefit incidence analysis of who benefits from public spending for education. The analysis is carried for the main three levels of education (primary, secondary, and higher education including technical and vocational education). The share of students from various quintiles of consumption attending public schools at various levels of schooling are estimated using the latest available multi-purpose household survey, while data on public spending by level of education are obtained from the Ministry of education. The results suggest that despite an increase in funding for primary education and a pro-poor benefit incidence of public spending at that level, children in the bottom quintiles of well-being still benefit substantially less from total public education spending than students in the top quintiles.

1. Introduction

Benefit incidence analysis is extensively used by national governments and international organizations in order to assess who benefits from public spending in areas such as education, health, and basic infrastructure services, often with recommendations on how the allocation of public spending could be improved in order to help reduce poverty, or at least allocate a larger share of the benefits from social programs to the poor. The methodology used to conduct the benefit incidence analysis is rather standard. As noted among others by Castro-Leal et al. (1999) and Demery (2003), the estimation involves assessing who uses government services according to various categories of households (or individuals), which is done here by using the latest available nationally representative multi-purpose household survey, the 2006 QUIBB (*Questionnaire des Indicateurs de Base du Bien-être*). This information is then combined with data on the cost for the government to provide the services, so that one can estimate the share of public spending that is allocated to different groups of households or individuals.

In most analyses of benefit incidence data on unit costs of service provision are provided only at a fairly aggregate level – typically at the national level, and this is the case for this paper as well. This is often unavoidable due to data limitations, but it is important to be aware than in such cases, the analysis may from bias due to the assumptions used since differences between areas in the cost of service delivery are not taken into account when assessing who benefits from public spending for such services. In this chapter, while we do rely on national unit costs because of lack of disaggregated data by provinces, we do provide at least some information as to the likely bias that the use of national unit costs may entail on the basis of observed differences in pupil-teacher ratios in primary schools in various parts of the country.

[1] The views expressed in this paper are those of the authors, and need not reflect the views of the World Bank, its Executive Directors or the countries they represent. Funding for this work from the Global partnership for Education is gratefully acknowledged.

Another source of potential bias relates to the fact that most applications of the technique rely on allocated (i.e., voted) budgets as opposed to actually executed budget. Fortunately, in the case of Burundi data from a World Bank (2008) report are available on executed budgets by level of schooling, and in addition information is also available on recurrent as opposed to capital expenditures which is also critical for obtaining reliable estimates, especially in countries such as Burundi where substantial investments have been made recently for school construction.

A third source of bias – or rather a risk of misinterpretation in the results may be related to differences in needs between various household groups, which also tend to be overlooked. Specifically incidence analysis is typically carried by quintiles of population, as opposed to quintiles of needs (these would be quintiles of children in age of going to school). For comparability purposes with other chapters in this study, we will use quintiles of population here, but because lower quintiles tend to have more children, this tends to suggest a rosier picture of benefit incidence than would have been obtained taking the number of children into account.

Finally, it is important to mention that the objective of this paper is very limited – it is simply to estimate the benefit incidence of public spending for education by quintile, in order to provide somewhat comparable information for education as it is available for other sectors, but without aiming to provide policy recommendations. A detailed and policy oriented analysis of the education sector is available for Burundi in World Bank (2006). Even if that study predates this one in terms of data sources, it provides much more details on the education sector.

With these various caveats in mind, the paper is structured as follows. Section 2 introduces the basic methodology used in benefit incidence analysis. Section 3 documents the levels of budgeted and executed public spending for education in Burundi and their allocations according to both economic and functional classifications. Section 4 then provides the benefit incidence analysis proper using estimates on who relies on public schools obtained from the latest national household survey. A conclusion follows.

2. Methodology for benefit incidence analysis

Using the same notation as in Demery (2003), denote by S_i government spending on education level i, with i =1,..,3 representing primary, secondary, and higher education. The value S_i should represent net cost for the government after having deducted fees and receipts from other cost recovery mechanisms, or net funding transfers as is the case with the data used for Burundi. Denote by E_{ij} the number of students in publicly funded schools from household group j (which may for example represent quintiles) at education level i, and by E_i the total number of students in education level i. Only students attending government-subsidized (i.e., typically public) schools should be taken into account in the estimation. Then, S_i/E_i can be considered as the average unit cost for the government of providing education services for school level i. The total implicit transfer (in kind) received from public spending on education households of type j, denoted by X_j, is then:

$$X_j \equiv \sum_{i=1}^{3} E_{ij} \frac{S_i}{E_i} \qquad (1)$$

Equation (1) makes it clear that the value of the benefits accruing to group *j* depends on both the unit cost of providing education services at different levels, and the number of students using the public schools in each household group. If *S* denotes total public spending for education, the share of the total education subsidy accruing to group *j*, denoted by x_j, is:

$$x_j \equiv \sum_{i=1}^{3} \frac{E_{ij}}{E_i} \frac{S_i}{S} = \sum_{i=1}^{3} e_{ij} s_i \qquad (2)$$

As pointed out by Demery (2003), a group's benefit share of total public education spending is equal to the weighted sum of the group's share of the students for each level of schooling (e_{ij}), with the weight defined by the shares of the total budget allocated to the various education levels. In order to make comparisons between groups, or to assess whether the share of total benefits received by any given group can be considered as equitable, it is standard to compare the share of the benefits received by a group to the group's population share.

Consider now the case when public subsidies for health services vary across geographic areas, denoted by the subscript *k* (these represent provinces in the case of Burundi). If S_{ik} denotes the total cost of providing education services for education level *i* in area *k* (k=1, …, n), and E_{ik} is the number of students in education level *i* in area *k*, then S_{ik}/E_{ik} is the average unit cost of education services at level *i* in area *k*. These area-specific unit costs may be important to factor in the analysis, because they may differ substantially between areas, and because in terms of outcomes, there is an implicit assumption (although not always verified empirically) that higher unit costs may be associated with higher quality in education services. In the case of education services in developing countries like Burundi, given that a large share of the costs are accounted for by the salaries of teachers, unit costs may differ between areas due to both less qualified (and thereby lower paid) teachers in poorer and more remote areas, as well as possibly a higher pupil-teacher ratio on these areas. Denoting by E_{ijk} the number of students of group *j* at education level *i* and area *k*, we have:

$$X_j^K \equiv \sum_{k=1}^{n} \sum_{i=1}^{3} E_{ijk} \frac{S_{ik}}{E_{ik}} \qquad (3)$$

As before, if *S* denotes the total public spending for education, the share of the total public education subsidy accruing to group *j*, denoted by x_j, is then given by:

$$x_j^K \equiv \sum_{k=1}^{n} \sum_{i=1}^{3} \frac{E_{ijk}}{E_{ik}} \frac{S_{ik}}{S} = \sum_{k=1}^{n} \sum_{i=1}^{3} e_{ijk} s_{ik} \qquad (4)$$

A group's benefit share of total public spending is still equal to the weighted sum of the group's share of students, but the sum is now taken for all education levels in each province, with the weight defined by the shares of the total budget allocated to the various education levels and provinces. As we shall see in the next section, although this will not be estimated due to limited data available, the use of aggregate national-level unit costs as opposed to unit costs disaggregated by province could make a difference in the estimation of the shares accruing to each household group, so that our estimates of benefit incidence may be (slightly) biased.

3. Public spending on education in Burundi

Data on public spending on education at the time of the QUIBB survey (in 2006) as well as on the trend in education expenditure before the survey are available from the PEMFAR report (Public Expenditure Management and Financial Accountability Review) completed by the World Bank (2008). **Table 1** shows that budgeted (as opposed to executed) education expenditure increased substantially in nominal terms between 2001 and 2006, but remained relatively stable at about 15%-16% of total public expenditures until 2005, before increasing sharply to 22% in 2006. The increase in expenditure in 2006 is related to the availability of debt relief funds, in that 47% of debt relief funds for that year (FBu 18.4 billion) were allocated to education. The bulk of that allocation (90%) was earmarked for the construction of new primary schools (by contrast, in 2007 only FBu 9.8 billion or about one third of the debt relief funds were allocated to the education sector.) But it was also necessary to increase recurrent spending because of the (welcome) decision made by the President and the government to abolish school fees for students in public primary schools, which yielded a large increase in enrollment at that level (Sommeiller and Wodon, 2013; for an assessment of the change in the share of total primary education expenditure in the country paid for directly by households and by the budget, see Tsimpo and Wodon, 2013). Overall, given a relative lack of economic growth over the period and an increase in donor support, executed education expenditure increased from 3.8% of GDP in 2001 to 7.0% in 2006.

Table 1. Budgeted and executed public education spending, Burundi, 2001-2006

	FBu Billions		Share of budget (%)		Share of GDP (%)	
	Budget	Execution	Budget	Execution	Budget	Execution
2001	20.6	20.9	15	15	3.8	3.8
2002	22.6	22.3	13	14	3.9	3.8
2003	28.6	27.9	16	16	4.4	4.3
2004	34.4	33.8	15	15	4.7	4.6
2005	42.1	43.5	16	19	4.9	5.0
2006	78.5	65.1	22	22	8.4	7.0

Source: World Bank (2008), based on MINEDUC data

Table 2 provides data on executed education expenditure by economic classification over the same period. Until 2006, almost all expenditures were allocated to recurrent expenditures, with the bulk of the budget paying for wages, including teacher salaries. The execution rate for capital expenditure in 2006 was relatively low due to delays in implementing the construction of new primary schools. The share of the recurrent budget allocated to transfers and subsidies increased in 2006 is probably in part related to the implementation of the free primary public education policy which reduced the availability of funding from parents at the school level and thereby required transfers from the government, but other factors may also have been at work.

What matters more for the analysis in this paper is the data in **Table 3**, which provides executed expenditures by functional classification (education level). This can be used to compute unit costs, or alternatively the share of total spending that is allocated to different levels of schooling, both of which can be used for the benefit incidence analysis of total public spending for education, as explained in the previous section. Note that benefit incidence is normally based on recurrent spending, as opposed to total spending, and this is indeed the data reported in Table 3. The table shows that in 2006, 48.9% of total recurrent spending was allocated to pre-schooling and primary education. In practice, given the very limited extent of publicly financed pre-schooling in Burundi, that share can be used to account for primary education spending.

The share allocated to secondary education was 22.7%. Technical and vocational education benefited from 3.6% of total spending, and tertiary education from 22.4%. In the analysis that follows, technical and vocational education will be considered as part of higher education. General services and funding for the medical school of Kamenge Hospital account for the rest. When not including general services and the medical school, in proportion of total spending for the three levels of education (primary, secondary, and higher), primary education spending accounts for 50.1% of the total, while secondary And higher education account respectively for 23.3% and 26.6% of the total. These are the values used for the variable s_i in equation (2) of the methodological section and in **Table 5**.

Table 2. Executed education spending by economic classification, 2001-2006

	Recurrent Expenditure				Capital expenditures	Total
	Total recurrent	Wages	Goods & services	Transfers & subsidies		
2001						
Executed budget (FBu billions)	19,995	12,804	610	6,581	863	20,858
Share of total executed budget (%)	95.9	64.0	3.1	32.9	4.1	100
Execution rate (%)	99.5	99.7	91.5	100	97.4	99.4
2002						
Executed budget (FBu billions)	21,610	13,602	954	7,054	724	22,334
Share of total executed budget (%)	96.8	62.9	4.4	32.6	3.2	100
Execution rate (%)	101	103.1	125.4	94.8	58.8	98.7
2003						
Executed budget (FBu billions)	27,554	18,395	864	8,295	357	27,911
Share of total executed budget (%)	98.7	66.8	3.1	30.1	1.3	100
Execution rate (%)	97.8	96.8	99.8	100	88.1	97.7
2004						
Executed budget (FBu billions)	32,282	21,055	912	10,315	550	32,832
Share of total executed budget (%)	98.3	65.2	2.8	32.0	1.7	100
Execution rate (%)	95.4	93.8	88.3	99.5	95.7	95.4
2005						
Executed budget (FBu billions)	42,830	31,665	1,416	9,749	627	43,457
Share of total executed budget (%)	90.6	73.9	3.3	22.8	1.4	100
Execution rate (%)	103.9	105.7	96.5	99.4	71.9	103.2
2006						
Executed budget (FBu billions)	56,791	38,074	3,346	15,371	8,317	65,108
Share of total executed budget (%)	87.2	67.0	5.9	27.1	12.8	100
Execution rate (%)	96.7	95.9	96.4	98.7	42.8	83.2

Source: World Bank (2008), based on MINEDUC data

Table 3. Executed education spending by functional classification, 2001-2006

	2001	2002	2003	2004	2005	2006
General services	328	550	367	321	540	623
Share of total executed budget (%)	1.6	2.5	1.3	1.0	1.3	1.1
Pre-schooling and primary	8,105	8,416	11,673	13,871	19,018	27,751
Share of total executed budget (%)	40.6	38,9	42.4	43.0	44.4	48.9
Secondary	5,302	5,718	7,021	7,567	10,288	12,904
Share of total executed budget (%)	26.5	26.5	25.5	23.4	24.0	22.7
Technical & vocational	962	1,064	1,116	1,180	1,770	2,018
Share of total executed budget (%)	4.8	4.9	4.1	3.7	4.1	3.6
Tertiary	4,935	5,450	6,916	8.85	10,673	12,719
Share of total executed budget (%)	24.7	25.2	25.1	27.4	24.9	22.4
Kamenge Hospital (Medical school)	363	411	462	497	542	775
Share of total executed budget (%)	1.8	1.9	1.7	1.5	1.3	1.4
Total	19,994	21,609	27,554	32,285	42,830	56,791

Source: World Bank (2008), based on MINEDUC data

4. Benefit Incidence Analysis

The analysis of who uses public schools is based on data from the QUIBB multi-purpose household survey which covers demography, health, education, employment, migration, housing, agriculture activities, non-farm self-employment, household expenditures, durable goods and, remittances and other incomes. The survey was administrated to just over 7,000 households. When conducting a benefit incidence analysis of public spending for education, it is important to consider only students attending publicly funded schools. In Burundi, an overwhelming majority of primary school students (95.9%) attend public schools, but this drops to 60.9% at the secondary level, and 40.9% at the tertiary level as at those levels, the market share of private schools increases substantially, especially in urban areas.

Table 4 provides the results from the benefit incidence analysis, with each of the quintiles representing 20% of the population and with the indicator of welfare being the level of consumption per equivalent adult of households. The benefit incidence analysis estimates are computed using nationwide budget shares by education level, because data at the level of the provinces are not available. As expected the distribution of public spending for education as a whole (all levels combined) is regressive, since the bottom quintile receives only 15.2% of total spending while the top quintile obtains 28.6% of total spending.

At the primary level, public spending is actually progressive, essentially because students in the top quintile are more likely to attend private schools (and also, households in that quintile tend to have fewer children in age of attending school). For secondary education and especially for higher education, the very poor tend to have a much smaller share of the benefits of public education spending than their share of the population. The higher level of schooling accounts for more than a fourth of total recurrent public education spending, and is especially regressive. This does not necessarily mean that funding at that level needs to be reduced as there may be important benefits for the country from those in the work force who are tertiary educated (a much more detailed analysis would be required to make recommendations; for elements of such an analysis, see World Bank, 2006; see also Obura, 2008, and Republic of Burundi for more information on the education sector). Still, the information in Table 4 is hopefully useful when considering who benefits from various types of public spending, including for education.

Table 4. Benefit incidence analysis of public education spending, Burundi 2006 (%)

	Primary	Secondary	Higher	Total spending
Share of public spending	50.1	23.3	26.6	100
Share of students/spending by quintile				
Q1 (poorest)	22.7	12.0	3.9	15.2
Q2	22.7	18.1	3.6	16.5
Q3	21.3	20.9	23.7	21.8
Q4	20.1	22.3	9.6	17.8
Q5 (richest)	13.3	26.7	59.2	28.6
All quintiles	100.0	100.0	100.0	100.0

Source: Authors

It was mentioned in the introduction and methodology sections that to the extent that unit costs differ between areas within the country, the benefit analysis based on average national unit costs may be biased. Unfortunately, it is difficult to correct for such bias here given the lack of data on public education spending by provinces, but the fact that there is indeed a likely bias in the results is suggested by the data in Table 5. The table shows that the number of pupils per

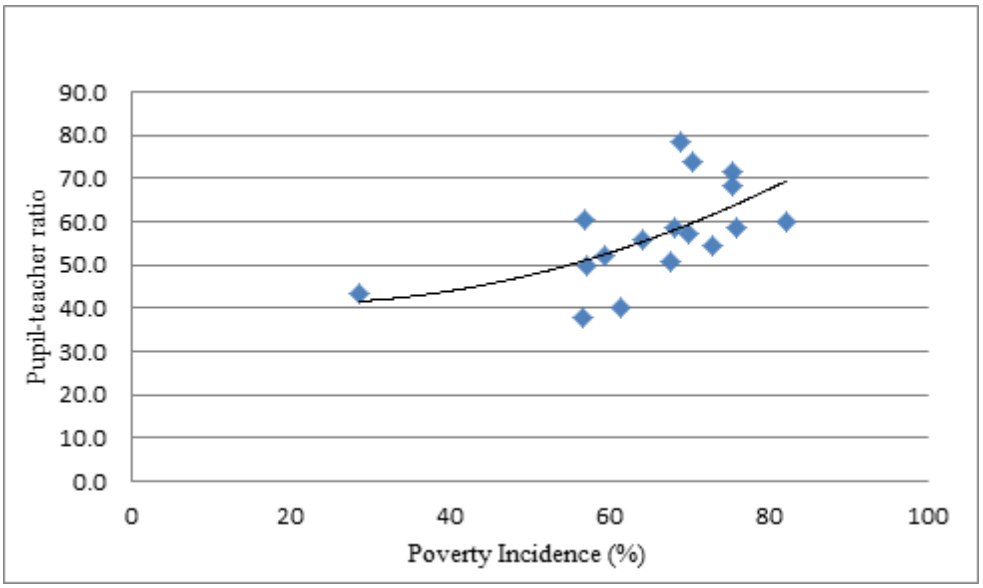
teacher in primary schools as well as the number of classrooms per teacher at that level are not uniformly distributed between the provinces. **Figure 1** suggests that poorer areas tend to have higher pupil teacher ratios (see also **Figures 2** and **3** for a visualization of the data through maps). The higher pupil-teacher ratios observed in poorer areas would normally imply that the unit cost of service delivery is lower in those areas (given that as shown in Table 2 teacher costs account for the bulk of recurrent spending). This would suggest that the estimates of benefit incidence for the poorest quintiles may be overestimated and should thus be considered as generous.

Table 5. Pupil-teacher ratio in public primary schools (2007-2008) and incidence of poverty

Provinces	Poverty incidence (%)	Number of Schools	Number of students	Number of teachers	Pupil-teacher ratio	Students per classroom
Bubanza	57.0	96	59 981	994	60.3	84
Bujumbura Mairie	28.7	55	67 891	1 560	43.5	90
Bujumbura Rural	64.3	177	115 783	2 069	56.0	82
Bururi	56.7	0	141 069	3 727	37.9	NA
Cankuzo	67.7	72	41 768	821	50.9	65
Cibitoke	59.5	141	84 576	1 614	52.4	NA
Gitega	68.2	193	149 633	2 543	58.8	87
Karuzi	68.9	97	81 828	1 045	78.3	100
Kayanza	75.5	132	114 764	1 598	71.8	142
Kirundo	82.3	137	99 129	1 656	59.9	90
Makamba	57.3	160	87 546	1 751	50.0	82
Muramvya	70.0	85	69 274	1 213	57.1	101
Muyinga	70.5	128	85 416	1 155	74.0	88
Mwaro	61.5	84	62 100	1 538	40.4	93
Ngozi	75.4	143	123 181	1 806	68.2	98
Rutana	72.9	142	62 304	1 141	54.6	86
Ruyigi	76.0	137	70 381	1 203	58.5	79
Burundi	66.9	2 367	1 516 624	27 434	55.3	100

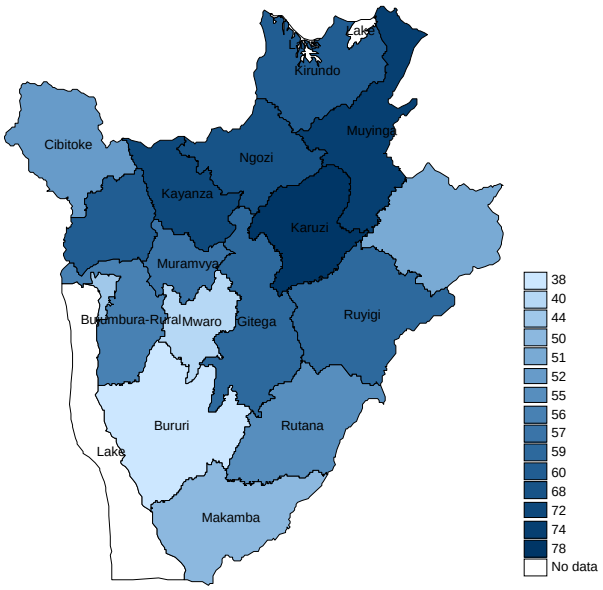
Source: Authors based on MINEDUC data and poverty estimates. See also République du Burundi, 2008

Figure 1. Pupil-teacher ratio and poverty incidence



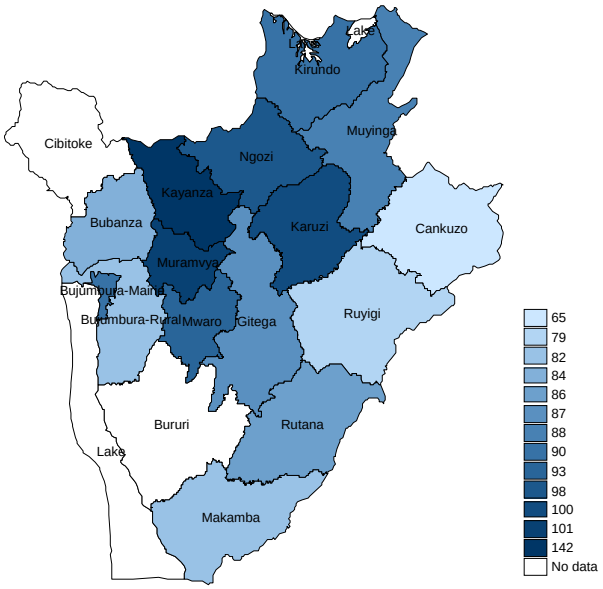
Source: Authors based on MINEDUC data (see also Republic of Burundi, 2008) and poverty incidence estimates from the QUIBB survey

Figure 2. Students per classroom, public primary schools



Source: MINEDUC, 2007-08 school year. See also République du Burundi, 2008

Figure 3. Pupil-teacher ratio, public primary schools



Source: MINEDUC, 2007-08 school year. See also République du Burundi, 2008

What could be the likely bias involved? Assuming for simplicity that the salaries of primary school teachers are similar across provinces, if we consider a pupil-teacher ratio of, say, 70 in some of the poorest provinces as compared to, say, 50 in less poor provinces, unit costs for teachers in poorer areas would be 71% of those in better off areas. Given that salaries (most of which are for teachers) account for 87% to total recurrent costs in 2006 *(see Table 3),* if we further assume that other recurrent costs are similar between provinces, then the overall primary unit costs in poorer provinces would be at 75% of the cost in better off provinces. This is a substantial difference. On the other hand, because of the high rate of poverty in most of the provinces, the share of children in the various quintiles would differ but not by a very large amount depending on where the children live (as exception to that statement is Bujumbura Mairie). As a result, one could expect that the benefit incidence estimates provided in Table 4 could be a few percentage points off, with the resu lts that would be obtained with better cost data closer to a uniform allocation across quintiles than is showing in the table at the primary level.

One last point is worth emphasizing again before concluding. As mentioned in the introduction, an issue with traditional benefit incidence analysis as used here relates to the definition of the quintiles. In order to make comparisons between groups, or to assess whether the share of total benefits received by any given group can be considered as equitable, it is standard to compare the share of the benefits received by a group to the group's population share in the total population. The issue is that public services often target specific groups, rather than the population as a whole, so that when comparisons are made using groupings related to the population as a whole we may again observe a bias. Table 5 presents the estimates of total education funding received by five quintiles of the population, and not quintiles of children in age of primary school. Thus, even if each quintile were to receive 20% of total education funding, the poorest quintiles are likely to account for more than 20% of the children in age of schooling since poorer families tend to have more children. This implies that the proportion of education funding received by child in age of schooling will be even lower than suggested in Table 5 in the poorest quintile as compared to higher quintiles. In order to assess the fairness of the distribution of public spending for education, one could present the data according to the target population group, which here would mean estimating the share of funding that goes to the various quintiles of children in age of schooling, rather than the various population quintiles. This is not done here because the focus of the study as a whole is on an analysis of the share of funding for various social programs that reaches quintiles of population, but it is important to be aware of the bias in traditional incidence benefit analysis when target populations are the focus.

5. Conclusion

This paper provided estimates of benefit incidence for public spending for primary, secondary, and higher education in Burundi based on budget data as well as the latest available multi-purpose household survey with information on household usage of education services. It turns out that the bottom quintile in terms of consumption levels receives 15.2% of total public education spending while the top quintile obtains 28.6% of total spending. The regressive distribution of the benefits from public education spending is due to the weight of secondary and especially higher education in the budget, and the relative lack of enrollment at those levels among the (rural) poor. These estimates should probably be considered as more favorable than the actual distribution of spending because differences in unit costs of providing education between provinces could not be taken into account and it is likely that the resources allocated per student in poorer and more remote areas are lower than in urban settings. While these results need not imply by themselves the need to reallocate expenditures (a much more detailed analysis would be needed before making such a recommendation), they do point out the fact that the poor tend to benefit less from public education spending than the better off.

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