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► **To cite this version:**

Bosco Ndayishimiye, René Manirakiza, Christian Kakuba, Jean François Régis Sindayihebura, Emmanuel Barankanira. Household Size and Access to Education in Rural Burundi: The Case of Mutaho Commune. *Open Education Studies*, 2024, 6 (1), 10.1515/edu-2024-0019 . halshs-04613078

**HAL Id: halshs-04613078**

**<https://shs.hal.science/halshs-04613078>**

Submitted on 15 Jun 2024

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## Research Article

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# Household Size and Access to Education in Rural Burundi: The Case of Mutaho Commune

<https://doi.org/10.1515/edu-2024-0019>

received April 25, 2023; accepted May 17, 2024

**Abstract:** While education is recognized as a fundamental human right and an important factor in improving economic and social conditions, child schooling rates in Burundi show that there are still children of school-age who are not attending school and those who drop out very prematurely. This scientific study aims to highlight the relationship between household size and access to education in Mutaho commune (rural Burundi) by documenting the socio-demographic factors of the head of household likely to influence the schooling status of children aged 7–17. The hypothesis put forward in this study is that children’s schooling is influenced by household size. Data from a survey of 215 households in the Mutaho commune were analyzed using binomial logistic regression. The analysis shows that a large household size (OR = 5.463;  $p < 0.05$ ; 95% CI: 1.311–22.771) is negatively associated with the education of children aged 7–17 living in Mutaho commune. Reducing fertility should be an integral concern for all those involved in the fields of population, education, and development.

**Keywords:** household size, education, school attendance, Mutaho commune, Burundi

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## 1 Introduction

Education is an integral part of human rights. The first paragraph of Article 26 of the Universal Declaration of Human Rights states that education for all is a right and that it should be free, at least in the elementary and fundamental stages. It emphasizes the compulsory nature of elementary education and recommends that technical and vocational education should be made generally available and that access to higher education be open to all on the basis of merit (Nations Unies, 1948). Education is therefore at the heart of major international, regional, and national priorities.

International conferences have been organized by the United Nations to establish international guidelines for education. These include the World Conference on Education for All (EFA) held in Jomtien (Thailand) in March 1990, the World Education Forum held in Dakar in April 2000, the Declaration of the Millennium Development Goals in September 2000, the Special Session of the United Nations General Assembly on Children in May 2002, the Agenda 2030 setting the Sustainable Development Goals for 2015, the Incheon World Forum (South Korea, 2015), etc. In all these conferences, education, especially primary education, has been recognized as a key factor in sustainable economic development, improved social welfare, and gender equality (UNESCO, 2017).

At regional and sub-regional levels, Africa’s Agenda 2063, “Africa We Want,” aims for a prosperous Africa, based on inclusive growth and sustainable development, with the goal of having “well-educated citizens and a revolution in skills supported by science, technology and innovation” (African Union Commission, 2015). In the education sector, the East African Community’s Vision 2050 aims to build capacity in new information and communication technologies in member countries in order to encourage innovation and increase competitiveness (East African Community, 2016).

At the national level, the Burundian government has put in place national and sectoral policies and strategies to

meet its commitments in the field of education. These include free primary education since 2005, the First and Second-Generation Strategic Framework for Growth and Poverty Reduction (CSLP), Burundi Vision 2025, and Burundi National Development Plan (PND) 2018–2027. Nevertheless, EFA in Burundi remains an unachieved goal, with low literacy rates (ISTEEBU & ICF, 2017; MENRS, 2020).

The basic education system in Burundi is characterized by a high number of repeaters, resulting in gross enrolment ratios (GER) of over 100, or 111.0% for children aged between 7 and 12. In reality, this GER masks shortcomings, as many children who enrol in primary education (i.e., the first three levels of fundamental schooling, from first to sixth year) leave school before completing this level. According to the Ministry of National Education and Scientific Research (MENRS), the net primary school attendance rate is 85.1%. However, only 41.1% of children attend secondary school, while the survival rate at the end of secondary school is only 27.5% (MENRS, 2020). These latest rates show that there are still children of school-age who are not attending school and those who are leaving school very early (MENRS, 2020). The average length of schooling in Burundi is 3.0 years, whereas the expected length of schooling is 11.7 years, according to the United Nations Development Programme (UNDP, 2018). In a nation of exceptionally young people, where the under-18s represent 50% of the total population and the under-15s 49%, with an average fertility rate of 5.5 children per woman (ISTEEBU & ICF, 2017), it is important to understand whether demographic variables, especially household size, have any significant impact on access to education.

The data were collected in the Commune of Mutaho, which, according to administrative data for the 2019–2020 school year, had 825 children enrolled in nursery education, 16,213 pupils in the fundamental level, and 1,274 pupils in post-fundamental education. The general educational situation, beyond these enrolments, is characterized by a shortage of schools and a low completion rate due to dropouts and repetition (UNESCO, 2021). For example, during the same school year, 80 pupils dropped out of nursery schools, representing a dropout rate of 9.7%. In the fundamental level, there were 2,127 dropouts, representing a dropout rate of 13.1%, while the same rate was 15.5% in the post-fundamental education, representing 198 dropouts for the 2019–2020 school year.<sup>1</sup>

However, scientific studies have shown that household size is a determining factor in access to education for

school-age children. On the one hand, several studies have shown that large household size has a negative impact on the schooling of children (Bougma, 2014; Kravdal, Kodzi, & Sigle-Rushton, 2013; Lachaud, 2015; Vogl, 2022). On the other hand, empirical studies show that children from small households are less likely to attend school than children from large households (Chabi & Attanasso, 2015). However, most of these studies used secondary data collected during censuses or household surveys.

The above considerations make it particularly interesting to study the relationship between household size and access to education. Is there a relationship between household size and children's schooling? If yes, what impact might household size have on access to schooling in rural Burundi, particularly in the Mutaho commune? It is with a desire to answer this twofold central question that this study is undertaken, in order to obtain evidence-based answers on the likely differential access to education based on household size.

In this study, we postulate that school attendance of children in Mutaho commune is influenced by household size and that large household size decreases the chances of its children attending school. On the one hand, this study uses a bivariate analysis of data from the household survey we conducted. On the other hand, we attempt to identify and show the share of family-related factors in explaining school attendance in the area of this study.

Researchers agree that education is a key factor in improving productivity through the acquisition of new skills, improving the health of mothers and children in the Third World, reducing fertility and mortality, accelerating the demographic transition, and achieving the demographic dividend (Bambara & Wayack-Pambè, 2019; Becker, 1985; Guengant, Kamara, & collab, 2011; Kamuragiye & Buzingo, 2019; United Nations, 2003). Indeed, the population of Burundi has grown very rapidly since the 1960s. However, around 90% of this population still lives in rural areas, mainly producing subsistence agriculture, which intensifies the pressure on available resources. This strong demographic growth is the result of high fertility over more than 50 years, coupled with a significant decline in mortality. With an average Burundian household size of 5 people and a total fertility rate of 5.5 children per woman (ISTEEBU & ICF, 2017), Burundi has a high fertility rate compared with the sub-Saharan African average of 4.7 children per woman (Tabutin & Schoumaker, 2020). The country is currently facing many challenges in terms of demographic growth, improving its human capital (in health, education, and professional training), employment, and governance (UNESCO, 2021). This is why a scientific study is needed to show the relationships between household size and access

<sup>1</sup> These data were collected in the Statistics and Planning Department of the Mutaho Communal Direction of Education (DCE), 2020.

to education in Burundi, particularly in rural areas, and why Mutaho Commune was chosen as the study area.

## 2 Literature Review

There is a rich and extensive literature on the relationship between education, population, and development. Several theories have been formulated on these concepts, particularly showing the interrelationships between them (Bambara & Wayack-Pambè, 2019; Becker, 1960; Guengant et al., 2011; Kamuragiye & Buzingo, 2019; Livenais & Vaugelade, 1993; United Nations, 2003). In this study, we focus on socio-economic theories and the theory of the demographic dividend.

Through socio-economic theories, the impacts of high population growth and its pressure on resources have been widely discussed and addressed in the studies of various researchers, particularly those of the twentieth century. Such is the case of the American economist (Becker, 1960), which, through its quantity–quality economic model, has shown that family size is negatively associated with household income. In addition, Blake (1989) has also shown that family size has a negative influence on school outcomes and employment; the reason why Mincer (1975) proposed that it is necessary to take into account not only the number of children but also their quality, assessed by their level of education.

The demographic dividend is defined as all the economic opportunities that a country obtains as a result of declining fertility. However, to benefit from the demographic dividend, it is necessary to invest in the development of human capital (especially in health and education), in economic policies that encourage job creation, and in good governance. According to Livenais and Vaugelade (1993), a certain level of education is required to understand the importance of vaccination, oral rehydration, bottle-feeding precautions, breast-weaning, circumcision, the harmful implications of female circumcision, and to assimilate the concepts of family planning. In this way, Pilon (2006) concluded that “education is a key factor in changing mentalities and adopting new demographic behaviours, because according to this author, education, especially for women, contributes to later marriage, reduced fertility and mortality (infant, child and maternal); yet women are the most educated, marry later, give birth to fewer children, care for them and themselves, etc.”

Recognizing that education is an important international human right and an important factor in the improvement of economic and social conditions (United Nations, 2003), several studies on the determinants of education

have been carried out in both developed and developing countries. Certain determinants have been considered significant by most researchers. These include institutional factors, generally based on the demand and/or supply of education (Livenais & Vaugelade, 1993; Pilon, 2006). They also include socio-demographic factors such as household size (Chabi & Attanasso, 2015; Kakuba, 2014; Kobiane, 2002), sex of household head (Mba Oyono, 2009; Pilon, 1996), age of head of household (Pilon & Yaro, 2001), and marital status of household head (Nganawara, 2016; Pilon, 1995; Pilon & Yaro, 2001). Finally, socio-cultural and economic factors associated with schooling include the education of the head of household (Bahri, 2024; Pilon, 1995), religion of the head of household (Nganawara, 2016; Pilon, 1995), the place of residence (Bahri, 2024; Kakuba & Pilon, 2023), household income (Chabi & Attanasso, 2015; Kakuba & Pilon, 2023; Kakuba, Nzabona, Asiimwe, Tuyiragize, & Mushomi, 2021), and main activity of household head (Mba Oyono, 2009; Pilon & Yaro, 2001; Pilon, 1995).

In summary, this review of the literature shows that children’s schooling is influenced by household size and other socio-demographic and economic factors of the households in which they live, the reason this study was carried out in a Burundian context.

## 3 Methods

In order to test our hypothesis and achieve our research objectives, we carried out quantitative data collection. The choice of this quantitative approach is motivated by the fact that it enables us to test the influence of household size on access to schooling by testing the influence of the other variables used, thanks to the statistical processing of the information collected (Giordano & Jolibert, 2016).

Our target population is children of school-age living in households in the Commune of Mutaho (Burundi). These are children whose ages are between 7 and 17. The choice of this age group is based on the Burundian education system, which officially sets the age of admission to the first year of fundamental school at 6 years (MENRS, 2020). Given that fundamental school lasts 9 years and post-fundamental school 3–4 years, the secondary school-leaving age is 18, hence the choice of 7–17 year olds.

Aware that this study focuses on the relationship between household size and access to education and that the phenomenon is likely to be observed at the household level, it was decided to survey households. Thus, given that the total number of households in the 18 hills of Mutaho Commune amounts to 18,449 households spread over the

55 sub-hills,<sup>2</sup> the sample size calculation led to a total of 215 households, based on the formula proposed by Gumucio (2011)

$$n = \frac{Z^2 \times p \times (1 - p)}{c^2},$$

where  $n$  is the sample size,  $Z$  is the value corresponding to a given confidence level (1.96 for a 95% confidence level, generally accepted in the social sciences),  $p$  is the percentage of the main indicator (89.4% value corresponding to the net enrolment rate in Gitega Province, in 2019), and  $c$  is the standard error, expressed in decimals (0.05 for the 5% margin of error). In addition, for this formula to be valid in our work area, it was necessary to take into account the sampling effect. Knowing that the sampling effect was not available for the Mutaho Commune, we selected that of Gitega province, which is equal to 1.4 according to the Burundi Demographic and Health Survey 2016–2017 (ISTEEBU & ICF, 2017).

By replacing the numbers in the above formula, we obtained

$$n = \frac{1.96^2 \times 0.894(1 - 0.894)1.4 \frac{1}{0.95}}{0.05^2} = 215.$$

The sample was selected in several stages. In the first stage, it was necessary to select a number of 10 sub-hills (reasoned choice) from the 55. First, all the sub-hills in the Mutaho commune were listed in alphabetical order. All households were then aggregated according to sub-hill. The sub-hills were selected with unequal probability. Once the sub-hills had been selected, the household sample size was allocated in proportion to the number of households in each sub-hill (Table 1 and Table A1). The sample of households was selected with equal probability (Agresti, 2018).

With these methodological considerations in mind, the survey was carried out on a sample of 215 households, randomly selected from 10 sub-hills spread over 8 census hills in the Commune of Mutaho (Burundi). In this survey, data were collected using a specially prepared questionnaire and entered into the CSPro application. They were then exported to SPSS for processing and analysis.

Nine variables were identified as suitable for analysis. School attendance status was the dependent variable and eight independent variables. These were demographic factors (age of head of household, sex of head of household, and marital status of head of household), socio-cultural variables (religion of head of household and education of head of household), and socio-economic factors (household

**Table 1:** Sample size and distribution by sub-hill

No	Hills	Sub-hills	Households by sub-hill	Number of households
1	Masango	Gaheza	215	13
2	Gerangabo	Gerangabo	377	22
3	Mutaho	Hayiro	500	30
4	Nzove	Kibungere	241	14
5	Rurengera	Mibazi	530	31
6	Muririmbo	Muririmbo	606	36
7	Bigera	Ncaramba	334	20
8	Ngoma	Nyakabungo	158	9
9	Bigera	Nyarubuye	334	20
10	Bigera	Rukorobwa	333	20
<b>Total (n)</b>	<b>8</b>	<b>10</b>	<b>3,628</b>	<b>215</b>
<i>N</i>	18	55	18,449	3,628

Source: Authors, based on data from the Mutaho commune civil registry, 2019.

size, number of school-age children in household, and main activity of head of household). However, due to the collinearity effect between household size and the number of school-age children in the household (with a correlation of 0.75) and between sex and marital status of the head of household (with a correlation of 0.83), two variables were excluded from the analysis (sex of the head of household and number of school-age children) (Schoumaker, 2013).

All these variables had no non-response rate after filtering out children under 7. In fact, of the 215 households planned, it was deemed important to keep only those with children aged 7 or over (initially, households with pre-school children – aged 3–6 – were included), i.e., 180 households. With the six independent variables retained, the explanatory power of school attendance is 65.64% (area under the ROC curve = 0.6564). These results allow us to conclude that these variables provide a significant explanation for the phenomenon of school attendance.

The influence of household size on school attendance is analyzed from a multivariate perspective. Given the qualitative and binary nature of the dependent variable (coded 1 if all children in the household attend and 0 if the household has at least one child who does not), the method used was binomial logistic regression (Rizzi, 2013). The probability associated with the Chi-square test of the likelihood ratio to the complete model is less than 5% (LR chi2, df: 12;  $p < 0.05$ ), confirming the validity of the multivariate modeling approach.

Data processing and variable recoding were carried out using SPSS 25 software. Logistic regression was performed using Stata 15. Microsoft Excel was used to format tables and present data and results.

<sup>2</sup> Data collected in the Mutaho Commune's Civil registry office, Annual Report, 2019.

## 4 Results

The results of the binomial logistic regression show that of the six explanatory variables entered in the model, two variables are the only ones significantly associated with school attendance. These are the age of the head of household and household size. With regard to the age of the head of household, the results show that children living in households whose heads are aged 20–34 are 81.5% (OR = 0.185;  $p < 0.05$ ; 95% CI: 0.046–0.722) less likely to attend school than those living in households whose heads are aged 35–49 or over. As for household size, the results show that children living in households of small size (1–4 members) are 5.46 times (OR = 5.463;  $p < 0.05$ ; 95% CI: 1.311–22.771) more likely to attend school than those living in households of 5–6 or more members (Table 2).

## 5 Discussion

By cross-referencing demographic, socio-cultural, and economic factors with school attendance, our study in Mutaho

commune aimed to determine the role played by household size in access to schooling for children aged 7–17. The results of the study confirmed the significant influence of household size on school attendance in the Mutaho commune. Indeed, children living in small households, for example, with four or fewer household members, are 5.46 times more likely to attend school than children living in households with five or more household members.

These results converge with those of other authors, including Blake (1989) and Becker (1960), who, based on studies carried out in developed countries, demonstrated that household size is negatively associated with children's schooling. We should also mention the studies carried out in underdeveloped countries, including those by Bougma (2014), Kravdal et al. (2013), and Lachaud (2015) and Vogl (2022), which have proven that there is a negative relationship between family size and the children's average education.

Nevertheless, this relationship is far from being the model for every country in the world. Other researchers have found contradictory results. This is the case of studies carried out in some sub-Saharan African countries, which

**Table 2:** Binomial logistic regression results

Variables and modalities	N = 180	Odds ratio	p >  z	95% Conf. interval	
				Lower terminal	Upper terminal
<b>Household size</b>					
1–4 members	36	5.463	$p < 0.05$	1.311	22.771
5–6 members	73	1.000			
7 members and more	71	1.155	$p > 0.05$	0.528	2.53
<b>Age of household head</b>					
20–34 years	38	0.185	$p < 0.05$	0.046	0.722
35–49 years	121	1.000			
50 years and more	21	2.966	$p > 0.05$	0.746	11.788
<b>Religion of household head</b>					
Catholic	122	1.000			
Protestant	48	0.566	$p > 0.05$	0.264	1.213
Muslim/Jehovah's witness/Anglican	10	0.48	$p > 0.05$	0.118	1.951
<b>Education of household head</b>					
Yaga Mukama <sup>1</sup>	43	0.788	$p > 0.05$	0.334	1.858
Fundamental	95	1.000			
Post-fundamental	32	1.126	$p > 0.05$	0.216	5.854
University	10	0.262	$p > 0.05$	0.326	2.105
<b>Main activity of household head</b>					
Agriculture/livestock/artisan	102	1.000			
Trader/entrepreneur	34	0.671	$p > 0.05$	0.264	1.704
State/private/NGO civil servant	44	1.119	$p > 0.05$	0.239	5.242
<b>Marital status of household head</b>					
In union	159	1.000			
Out of union	21	0.651		0.232	1.824

Source: Authors.

<sup>1</sup>Yaga Mukama, literally "Speak Lord," is a Roman Catholic educational system that taught school-age children who did not attend school to read, write and recite the Church's catechism. It is comparable to the Koranic school in Muslim-dominated countries.

have proved that household size positively influences children's school attendance (Chabi & Attanasso, 2015). The reasons put forward to explain these results include the intervention of older siblings in the schooling of their younger siblings, which can contribute to improving education levels in large families.

However, in the Mutaho commune, as in the Burundian context in general, our finding is that an additional child in a household reduces the chances of his or her siblings attending school. Given that smaller households are more likely to send their children to school than larger ones, this highlights the negative effects of large families on the schooling of rural children and young people. These findings also demonstrate the negative influence of demographic pressure on children's schooling in this rural environment, where around 90% of Burundi's population lives, earning their living mainly from subsistence farming and livestock (BCR, 2011; UNFPA, 2016). In the context of climate change and land dwindling, households are under the haunts of monetary poverty, famine, disease, etc., and schooling suffers as a result (PNUD, 2019; Sindayihebura & Nkunuzimana, 2020).

The results of this study also show that the age of the head of household is closely related to school attendance at the 5% significance level. Nevertheless, as mentioned above, the results are worrying insofar as we would expect younger heads of household to understand the benefits of schooling better than older ones and that as the age of the head of household increases, there are more children who fail and consequently drop out of school for various reasons. However, these results are in line with those of other researchers, including Degan and Guezo (1986), who, based on a sample of 120 households and 526 school-age children in Benin, demonstrated that young adults are more reluctant to send their children to school than older people (Pilon & Yaro, 2001). Conversely, Mba Oyono (2009) has shown that the age of the head of household is among the social determinants of children's school attendance with the lowest explanatory power.

In the rural context of Burundi, as in the Mutaho commune, young household heads do not yet have sufficient means to support their families. In fact, the over-exploitation of agricultural land means that the work in the fields is no longer sufficient to provide a livelihood, and these heads of household often leave for the towns or other regions or countries where there is a demand for labor (provinces of Bujumbura Mairie, Bujumbura, Bubanza, Makamba, Western Tanzania, and Eastern Democratic Republic of Congo). As a result, these heads have no opportunity to influence their children's schooling, even if they would like to. The members of their households often suffer from neglected diseases such

as anemia, chronic malnutrition of children, etc., as well as lack of schooling (Kamuragiye & Buzingo, 2019; Manirakiza, 2008; Sindayihebura, Manirakiza, & Nganawara, 2022).

## 6 Conclusions

The aim of this study was to identify the demographic, socio-cultural, and economic factors likely to influence school attendance in Mutaho commune for children aged 7–17 and to show the role played by household size in access to education in Mutaho commune. These results show that large household size is negatively associated with school attendance among children in fundamental and post-fundamental school (aged 7–17) in Mutaho commune at the 5% significance level. The age of the household head also has an influence on children's school attendance at the 5% significance level. School attendance rates increase with the age of the household head. Nevertheless, this finding is worrying insofar as young household heads were expected to understand the benefits of schooling. Conversely, it was expected that an increase in the age of the household head would correspond to children dropping out of school for a variety of reasons. The results obtained in the present study allow us to raise other questions. These include the role of other, non-family factors in children's school attendance. In future studies, we will be looking to deepen our research, in particular by documenting other non-family determinants of school attendance. Given the impact of household size on children's school attendance, fertility reduction should be a priority concern for all those involved in population, education, and development.

**Funding information:** The authors state no funding involved.

**Author contributions:** All authors listed in this article have made a substantial and intellectual contribution to this study. They have also read and approved the final manuscript for publication.

**Conflict of interest:** The authors state no conflict of interest.

**Declaration for human participants:** Data were collected from household heads who signed a consent form allowing their responses to be processed for scientific purposes, and the results of the study have been approved by the thesis committee at the University of Burundi. The principles of

the Declaration of Helsinki, such as consent, confidentiality anonymity, etc., were respected.

**Data availability statement:** All data are included in the content of the article.

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## Appendix

Selection of sample sub-hills is shown in Table A1.

**Table A1:** Selection of sample sub-hills

No	Sub-hills	Households/sub-hill	Aggregate households	Sampling interval	Sample sub-hills
1	Gaheza	215	215	1	<b>Gaheza</b>
2	Gasenyi	215	430		
3	Gatare (Kivoga)	221	651		
4	Gatare (Nzove)	241	892		
5	Gatongati	490	1,382		
6	Gatunga	215	1,597	1,845	
7	Gerangabo	377	1,974		<b>Gerangabo</b>
8	Giharahata	328	2,302		
9	Gitaba	554	2,856		
10	Gitongo	345	3,201	3,690	
11	Hayiro	500	3,701		<b>Hayiro</b>
12	Kabungere	288	3,989		
13	Kagwa	376	4,365		
14	Karehe	288	4,653		
15	Kavumu	500	5,153		
16	Kayaga	288	5,544	5,535	
17	Kibungere	241	5,682		<b>Kibungere</b>
18	Kidasha	204	5,886		
19	Kirehe	500	6,386		
20	Kivoga	220	6,606		
21	Kiziba	214	6,820		
22	Mariza	323	7,143		
23	Massango	214	7,357	7,380	
24	Mibazi	530	7,887		<b>Mibazi</b>
25	Mirama	260	8,147		
26	Mishehe	327	8,474		
27	Muhororo	288	8,762	9,225	
28	Muririmbo	606	9,368		<b>Muririmbo</b>
29	Mushikanwa	500	9,868		
30	Muzenga	323	10,191		
31	Mwumba	554	10,745	11,070	
32	Ncaramba	334	11,079		<b>Ncaramba</b>
33	Ngoma	158	11,237		
34	Ngoro (Nord-Sud)	204	11,441		
35	Nkongwe	260	11,701		
36	Nyabikenke_Bigera	334	12,035		
37	Nyabikenke_Mutaho	500	12,535		
38	Nyabisaka	273	12,808	12,915	
39	Nyakabungo	158	12,966		<b>Nyakabungo</b>
40	Nyakeru	204	13,170		
41	Nyakumba	220	13,390		
42	Nyamugari	345	13,735		
43	Nyamugosi	220	13,955		
44	Nyangungu	288	14,243		
45	Nyangwe	288	14,531	14,760	
46	Nyarubuye	334	14,865		<b>Nyarubuye</b>
47	Nyarure	605	15,470		
48	Nzove	240	15,710		
49	Rubagabaga	500	16,210		

(Continued)

**Table A1:** *Continued*

No	Sub-hills	Households/sub-hill	Aggregate households	Sampling interval	Sample sub-hills
50	Rubizi	287	16,497	16,605	
51	Rukorobwa	333	16,830		<b><i>Rukorobwa</i></b>
52	Rurengera	530	17,360		
53	Ruvumu	490	17,850		
54	Rwisabi	327	18,177		
55	Saga	272	<b>18,449</b>		
Total	<b>55</b>	<b>18,449</b>		18,450	

Source: Authors, based on data from the Mutaho commune civil registry, 2019.