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## Machetes and Firearms: The Organization of Massacres in Rwanda\*

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This article is a quantitative study of the use of machetes and firearms during the 1994 genocide in Rwanda, Kibuye Prefecture. The machete is an agricultural tool owned by most Rwandan households and is believed to have been the prime instrument of killing during the genocide. The article addresses the question to what extent individual characteristics of victims (gender, age, occupation) and aspects of the Rwandan genocide (location of atrocities, point in time during the genocide) determined the perpetrators' use of modern rather than traditional weapons to kill individual victims. An original database developed by the organization of the survivors of the genocide (IBUKA) is used. The data were collected from 1996 to 1999 and contain information on the deaths of 59,050 victims. Logistical regression analysis is performed to explain the use of either a traditional weapon or a firearm to kill the victims. The analysis shows that the probability of being killed with a firearm depended on the location where the victim was killed (more particularly, on whether or not the victim was killed in a large-scale massacre); on the commune of residence and the age of the victim; on the number of days after 6 April the victim was killed; and on interaction effects between the latter two variables and the gender of the victim. The importance of individual characteristics, location of atrocities and timing for the use of different kinds of weapons adds to our understanding of the organized nature of the Rwandan genocide.

### Introduction

In 1994, the popular press portrayed the Rwandan genocide as a tribal war between ethnic groups. Since then, scholarly research has rejected this view (Des Forges, 1999; Uvin, 1998; Prunier, 1995). Hatred between conflicting parties is very often one of the consequences of a conflict but rarely the

main cause of such a conflict. Hatred or grievance is not a necessary (and even less a sufficient) condition for genocide or less lethal ethnic conflicts to occur. Krain (1997) found that ethnic fractionalization is uncorrelated with the onset of genocide or political mass murder. The ethnic label put on many conflicts often masks the real reasons behind those conflicts. Econometric analysis of conflict data for many countries (Collier et al., 2003; Easterly, 2001; de Soysa, 2002) has demonstrated that income, export, governance, institutions, population density and the presence of mineral wealth significantly influence the probability of civil war or genocide, and that the inclusion of these variables weakens or eliminates the effect of an ethnic variable.

\* The first version of this article was written when the author was a research scholar from the Fund for Scientific Research, Flanders, Belgium. The author owes a debt of gratitude to the Fund for the grants that enabled two research stays in Rwanda in 1999 and in 2000. The author expresses his gratefulness to IBUKA for the permission to use their data file (see [http://www.hicn.org/data\\_resources.html](http://www.hicn.org/data_resources.html)). The author is indebted to Nils Petter Gleditsch, Glenn Martin and several anonymous referees for detailed comments and many remarks and suggestions that have improved the article. All remaining errors are the author's responsibility. Correspondence: [p.verwimp@hicn.org](mailto:p.verwimp@hicn.org).

Comparatively little research, and very little quantitative research, has been carried out on the use of traditional weapons and firearms. Notwithstanding the importance of small arms during conflicts, systematic studies of their use during intensive episodes of violence are nearly absent (Small Arms Survey, 2002: 155). Cross-national econometric studies rarely introduce variables capturing the presence of (small) arms among the population or variables measuring the quantity or quality of the firearms used by the army or the rebel groups involved in the conflict. Such studies often stress the curse of mineral wealth, but they neglect the fact that one does not kill a human being with a gallon of oil or a sparkling diamond. Without weapons, a conflict between groups, countries or factions among the population would not reach the toll on human lives that we have seen in the recent bloody conflicts in Sierra Leone, the Democratic Republic of Congo or Sudan, to name just a few.

This article presents micro-level evidence of the use of firearms and traditional weapons during the genocide in Rwanda. My intention is to contribute to the understanding of the importance of the use of weapons in Rwanda and, more generally, the importance of small arms and light weapons in other kinds of conflicts that target or include civilians, both as victims and assailants. The article offers a quantitative study of the use of weapons during the genocide in Kibuye Prefecture based on large-scale data collection in Rwanda. The article addresses the question to what extent individual characteristics of victims (gender, age, occupation) and aspects of the Rwandan genocide (location of atrocities, point in time during the genocide) determined the perpetrators' use of modern rather than traditional weapons to kill individual victims. If individual characteristics, location of atrocities and timing have an impact on the use of

different kinds of weapons, this will add to our understanding of the organized nature of the Rwandan genocide.

### Small Arms in Rwanda

In January 1994 (three months before the genocide), Human Rights Watch presented evidence that the government was buying weapons that would be paid for partly in cash and partly with the future harvest of the Mulindi tea plantation (Human Rights Watch, 1994: 14–18). The report states that the regime was distributing weapons among the population, thereby using the Rwandan administrative organization as part of a so-called civilian self-defence programme. For instance, in August 1991, Colonel Nsabimana, chief of staff of the Rwandan army, proposed to provide a gun for every administrative unit of ten households: 'at least one person per Nyumba Kumi should be armed' (unit of ten households; Human Rights Watch, 1994: 27). Human Rights Watch has documented how, in 1992–93, *burgomasters* (the head of the communal authority) ordered quantities of arms and ammunition that far exceeded the needs of their local police forces (Des Forges, 1999: 97–99). They ordered guns, Kalashnikovs, machine guns, grenades and large quantities of ammunition. The report also documents the purchase of arms by the rebels, the Rwandan Patriotic Front (RPF). Goose & Smith (1994: 86–96) describe and criticize the arms sales to Rwanda in detail.

According to a private source, three boxes of machetes were shipped from Belgium to Rwanda with the machetes hidden between sheets.<sup>1</sup> From the corporate sector, there is plenty of evidence that wealthy businessmen as well as the directors of state-owned companies used the resources at their disposal to

<sup>1</sup> Personal communication with the author, Kigali, August 2000.

import, transport and distribute firearms as well as traditional weapons (Guichaoua, 2002).

A number of other sources inform about the presence of arms in urban or rural areas. A man identified only as Jean-Pierre documented the existence of dozens of hidden stocks of firearms in Kigali in January 1994 for the head of the Belgian Peacekeeping Force (Marchal, 2001: 133–140). Des Forges (1999: 106–108, 140) used Colonel Bagosora's diary to provide more details about the civilian self-defence programme and the distribution of weapons. Bagosora lists how many recruits should be trained, what kind of weapons they should receive and how recruits should be trained to use them. Realizing that the supply of firearms was limited, Colonel Nsabimana proposed that the civilian population should be instructed in the use of machetes, spears, swords, bows and arrows. Nsabimana also distributed a memorandum, dated 21 September 1992, in which he defined as enemies the Tutsi and their accomplices, more particularly all members of the RPF, the Tutsi inside the country and Hutu opponents of the regime (Des Forges, 1999: 62–63, 99–100). The military authorities at the national as well as the local level prepared themselves to fight an enemy not at the war front, but dispersed among the population. Firearms were handed out to communal

councillors, soldiers, army reservists and trained militia (Des Forges, 2003: 23). This policy was clearly meant to militarize the rural areas and to draw the rural population into the conflict, however far they lived from the frontline. Ordinary farmers were told to participate in the self-defence programme with their own farming tools. Table I shows that 83% of rural households owned one or more machetes at the time of the National Agricultural Household Survey (1984). Almost all surveyed households owned a hoe or a hack. In a radio address, four days after the February 1993 attack by the RPF, President Habyarimana advocated a self-defence force armed with traditional weapons, an idea he repeated in a speech to army commanders on 13 March when he called for the population to 'organise to defend itself' (Des Forges, 2003: 23–24).

From our knowledge of the distribution of arms to the civilian population (mostly machetes) and to the local police forces (mostly firearms), we can derive a general hypothesis on the objectives of the elite: *The objective of the regime was to kill as many Tutsi as possible under the constraint that firearms and bullets were in short supply.* We thus expect that firearms, grenades and bullets were not used at random but in a targeted and efficient way. We expect a high number of victims killed by firearms and grenades in places where Tutsi sought refuge or were told

Table I. Share of Rural Households Owning a Hoe (Ifuni), a Hack (Isuka), a Machete or an Axe, 1984 (%)

<i>Number owned</i>	<i>Hoe</i>	<i>Hack</i>	<i>Machete</i>	<i>Axe</i>
0	8.7	1.0	17.3	41.9
1	16.5	17.0	64.1	52.9
2	30.1	47.1	16.3	4.9
3	18.8	21.3	1.9	0.3
4	9.5	8.5	0.2	0
5+	10	5.0	0.2	0

N = 2,081 rural households.

Source: National Agricultural Household Survey (1984).

to go, such as schools, churches and sports stadiums. In these places, firearms and grenades could be used in a very efficient way to kill large numbers of Tutsi. Similarly, we expect to see a high percentage of killings with machetes and other traditional weapons in individual attacks outside large-scale massacres. The latter took place most often ten days to two weeks into the genocide. If we observe such patterns – the topic of the empirical tests in this article – then we may have added some insight into the organized nature of the genocide.

From the literature on armed conflicts, one expects that age and gender matter in the odds of dying by firearms. Young men are most often not only the main perpetrators of murder but also the main victims. Is this also the case in the Rwandan genocide? Perpetrators of genocide often first target specific individuals who may be able to resist genocidal policy, within the ranks of the perpetrating group itself or among the victimized group. We will be able to test this statistically by exploiting one of the few observable differences in rural Rwanda, having or not having a job outside agriculture. We expect the former group to suffer more from genocidal killing because holders of off-farm jobs in rural communities have high social status (De Lame, 1996).

From this, I derive five hypotheses:

- H1:* Younger adults were more likely to be killed by modern weapons than children and the elderly.
- H2:* Men were more likely than women to be killed by modern weapons.
- H3:* Persons employed outside the agricultural sector were more likely to be killed by modern weapons.
- H4:* The risk of being killed by a modern weapon was greatest some weeks into the genocide.

*H5:* The risk of being killed by a modern weapon was greatest in a large-scale massacre.

To see the non-trivial nature of these hypotheses, it may be useful to discuss the counterfactual: If the genocide had not been organized centrally, would one observe the same pattern of the use of firearms? This would mean that killers who happened to own a firearm spontaneously killed Tutsi along these same patterns. In order to see that the counterfactual is not a plausible alternative hypothesis, one has to understand that ordinary Rwandans do not own firearms. Neither do they spontaneously wield weapons against their neighbours. In order to overcome the collective action problem, the local and national organizers of the genocide gave money and promised jobs and parcels of land to potential participants in the killing operations. Participants were also allowed and encouraged to rape Tutsi women and to take them as concubines, a kind of reward for ‘patriotic’ behaviour (Verwimp, 2003).

Recall: the scale of the genocide; the speed of the genocide; the gathering and guarding of Tutsi in larger compounds such as schools, churches and stadiums;<sup>2</sup> the training of Interahamwe and their presence in many localities; the use of radio propaganda from the capital Kigali and the broadcasting of incitements to kill that went completely unpunished.<sup>3</sup> This does not mean there were no local initiatives, but it offers strong indications of central command and central organization. As it happens, local initiatives could take place only with central approval, either implicit or explicit.

<sup>2</sup> For an analysis of the speed of the genocide, the death toll and the determinants of survival, see Verwimp (2004).

<sup>3</sup> The 1991 population census showed that 58% of urban households and 27% of rural households in Rwanda owned a radio. In 1978, radios were found in only 18% of the households.

## A Brief Political History

The formation of the Rwandan state was the result of the century-long expansion of the central territory (ancient Rwanda) in which adjoining territories were put under the control of the King of Rwanda. This process took place in the 18th and 19th centuries, particularly under the reign of King Rwabugiri. The king's army consisted of warriors (*Intori*) equipped with long spears. The central state was characterized by a high degree of organization in which the king and his advisers decided on all important matters. This inner circle of power was always made up of a small group of Tutsi, originating from two clans. The large majority of Tutsi and Hutu had no access to power or privilege. The extent to which the two groups differed in their main economic activity is contested in the literature, but most scholars agree that before colonization people involved in cattle breeding were considered Tutsi, whereas cultivators were predominantly considered Hutu. A significant part of the land was reserved for pastures (*Ibikingi*).

The advent of colonialism (first by Germany, then by Belgium) brought far-reaching change to the country. The colonizers observed the socio-political composition of the elite and the peasantry and concluded that the Tutsi were a different race. Attracted by their high stature, facial characteristics and leading position in society, the colonizer (church and state) concluded that the Tutsi originated from northern Africa and that they were related to the Caucasian race, thereby genetically predestined to rule. The Hutu, on the other hand, were considered Bantu people, a black race, predestined to be ruled.

From 1959 to 1962, a Hutu-led revolution took political power out of the hands of the ruling Tutsi elite. Not only the elite, but

also thousands of Tutsi civilians were driven out of their homes and had to take refuge in neighbouring countries. Grégoire Kayibanda, a Hutu educated in missionary schools, became president and set up the First Republic. Following the revolution, the percentage of Tutsi in the Rwandan population declined sharply. Said to be 17.5% of the population in 1952, Tutsi were counted as 8.4% in 1991 (Des Forges, 1999: 40).

Habyarimana, defence minister in the Kayibanda government, took control in a coup d'état in 1973 that removed President Kayibanda from power. The main reason for this coup supposedly was that the Kayibanda regime favoured Hutu from Gitarama and other prefectures in the south.<sup>4</sup> While the landed interest of the northern elite (*Abakonde*) was preserved by the Hutu revolution, they were not given access to lucrative business opportunities and political power by the Kayibanda regime.

From 1974 to 1976, Habyarimana consolidated his political power. He outlawed political parties and created his own Revolutionary Movement for Development (MRND). According to Prunier (1995), the MRND was a truly totalitarian party: every Rwandan had to be a member of the MRND, and all *burgomasters* and *préfets* were chosen from among party cadres. Habyarimana institutionalized *Umuganda*, compulsory communal labour, and had peasants participate in village animation sessions to honour him. He starved or executed 56 businessmen and politicians closely related to the Kayibanda regime. All citizens were under tight administrative control. Every five years, the president was re-elected with 99% of the vote.

In October 1990, a group of about 7,000 Tutsi rebels, former refugees and their sons

<sup>4</sup> In a 1980 interview, Habyarimana mentions the ethnic problem as one of the reasons for his coup d'état (cited by Sato, 1980: 238; see also Verwimp, 2003).

attacked Rwanda from Uganda. They had brought equipment and arms from the Ugandan military. The following years were marked by a low-intensity civil war and ongoing peace negotiations. In 1993, a peace agreement was reached in Arusha whereby political power would be divided between the rebels and the government. Economic decline, political manipulation of ethnic animosities and civil war all contributed to the disintegration of Rwandan society in the 1990–93 period. Christophe Mfizi, close supporter of the president, broke with the MRND in 1992, after discovering state-sponsored massacres of Tutsi in several locations in northern Rwanda. He claimed that a group called the 'zero network' had penetrated the highest levels of government (Mfizi, 1992).

When, on 6 April 1994, President Habyarimana came back from a meeting in Arusha, his plane was shot down by two missiles over Kigali airport. Hutu extremists in his regime used the death of the president to turn Rwanda into hell on earth: in only 100 days, more than half a million (500,000 to 800,000) Tutsi and Hutu opponents of the regime were killed. A genocide, prepared by the network around Habyarimana, was executed with the participation of thousands of ordinary people.

## **Descriptive Statistics**

### *Method Used by IBUKA*

The organization of the survivors of the genocide, named IBUKA, has undertaken a large research project with the main objective of finding all the names of the victims of the genocide in Kibuye Prefecture. They proceeded alongside the administrative organization of Rwandan society. Kibuye Prefecture is divided into nine communes. Each commune, with on average 50,000 inhabitants, is subdivided into several sectors. These sectors, in turn, consist of several cells.

Commune by commune, sector by sector and cell by cell, IBUKA collaborators went into all families of surviving Tutsi and Hutu to find the names of the murdered Tutsi. The project was financed by the Dutch Embassy in Rwanda and employed about two hundred enumerators. The enumerators came from or were familiar with the commune where they were doing the interviews. The majority of the enumerators had high-school training behind them. It was not easy for IBUKA to find experienced enumerators, since almost all educated Tutsi were killed. This lack of experience, together with IBUKA's decision to use only survivors as enumerators, had a negative effect on the quality of the data-collection process in some communes. A supervisor for each commune monitored the work of about 20 enumerators, at least one enumerator per sector. The enumerators and supervisors did not receive any statistical or interview training. The result is a dictionary with the names of almost 60,000 victims of genocide in the prefecture, published in December 1999.<sup>5</sup>

Whenever possible, the project also registered the age and the profession of the victim, the place where the person was killed and the weapon used. The present article uses the IBUKA data file to analyse the statistics of genocide in Kibuye Prefecture. The data file was created not for statistical purposes, but for the documentation of genocide victims in Kibuye. This remains its main value. Given the death toll among Tutsi, the very difficult living conditions after the genocide, and the lack of training and adequate research facilities, the result of the project is all the more remarkable.

Using the data for statistical purposes is problematic, since the author did not take

<sup>5</sup> The assignment of one enumerator to one sector prevented the duplication of records by different enumerators. Furthermore, to facilitate registration and monitoring and to avoid duplication, a number was given to each surveyed household. However, I have not checked the data specifically for duplication. See IBUKA (1999).

part in the data-collection process, and the quality of the data differs substantially between communes and sectors. I have interviewed a number of the data collectors and their supervisors and used statistical methods to correct for missing data. From my interviews, I conclude that most of the respondents were Hutu, who have no incentive to inflate the victim figures. I also had the impression that Hutu who did not participate in the genocide felt a need to come forward with accurate information to clear themselves of guilt. This is important if one wants to avoid identifying a whole ethnic group with the perpetrator image. Some of the respondents identified more with the survivors of the genocide than with the perpetrators. This is especially the case for Hutu widows of Tutsi husbands. In the empirical section of the article, several efforts were made to test for robustness of the results.

The organizers of the data-collection process also intended to register the cause of death of each person. The different categories used in the registration books were: being Tutsi; being a Tutsi-friend; having a Tutsi appearance; political opposition; and having a Tutsi mother. However, this part of the data collection failed, in the sense that IBUKA has registered only the Tutsi victims of genocide. They either failed to register, or registered only sporadically, those persons who were killed for other reasons than being Tutsi, such as Hutus married to Tutsis. A presentation and an analysis of the data for the mortality rate of victims in different communes can be found in Verwimp (2004). Another deficiency of the data collection is the absence of rape as a weapon used in the genocide. When a woman died of AIDS after 1994 and the disease was contracted because of rape in 1994, the woman is not registered as a casualty in the data. We were not able to investigate the resulting underestimation of deaths from such factors.

### *General Figures of Genocide in Kibuye*

Based on the 1991 census and the figures found by IBUKA, Table II shows that 12.4% of the population of Kibuye Prefecture was killed in the genocide, that is, approximately 83% of the Tutsi population. Table III provides information on the genocide in each of the communes of the prefecture. Strong variation exists between the numbers and the percentage killed in the communes. Since I did not have access to the 1991 population figures according to ethnic affiliation by commune, the exact number of Tutsi who survived the genocide in each of the communes could not be determined. Apart from this, the IBUKA data file provides a lot of other information that would normally not be found in census data, such as the dates and locations of the massacres and the weapons used. It is, thus, a unique source of information for the study of the genocide in Kibuye Prefecture. Table IV is a good example of one of the data problems. The weapon that was used to kill the victim is 'known' in 92% of the cases. The date of death, however, is known for 43% of the victims. Later, we discuss the treatment of missing values.<sup>6</sup> Of all the tables in this article, Table IV best documents the brutality of the genocide. Most victims were hacked to death with traditional weapons such as machetes or clubs. We do notice, however, the importance of firearms, being guns, rifles and grenades.<sup>7</sup> From the 25,719 victims whose date of death is registered in the data file, 20.2% were killed by a firearm. In the subsequent analysis, 'firearm' will be used as the umbrella term that includes guns, rifles and grenades.

<sup>6</sup> Missing values for the date of death do not necessarily question data reliability in general. Four to five years after the genocide, exact dates are more easily forgotten than the place of death and the weapon involved.

<sup>7</sup> Traditional arms are defined as all other instruments used to kill people that are not guns, rifles or grenades. The definition of firearms corresponds with the internationally used term 'small arms and light weapons'. All other tools used in the Rwandan genocide do not fit this term.

Table II. Genocide in Kibuye Prefecture

	<i>Number</i> <sup>a</sup>	%
Population registered as Hutu	399,470	84.3
Population registered as Tutsi	71,225	15.0
Population registered as Twa	1,490	0.3
Foreign, other or undetermined	1,735	0.3
Murdered Tutsi found by IBUKA	59,050	12.4
Total population of the prefecture in 1991	473,920	100
	<i>Number</i>	<i>% of Tutsi</i> <sup>b</sup>
Tutsi population registered as murdered	59,050	82.9
Tutsi population not registered as murdered	12,175	17.1

<sup>a</sup> I have no access to exact figures of the population size in March 1994. Total population in the prefecture probably reached 511,000 ( $\cong 473,920 \times 1.03^{2.58}$ ) by March 1994 (two years and seven months after the 1991 census). The prefecture represented 7% of Rwanda's population (7.1 million).

<sup>b</sup> Accounting for population growth, the figures become 78% registered as murdered and 22% not registered.

Table III. Victims of Genocide by Commune of Residence<sup>a</sup>

<i>Commune</i>	<i>Number of inhabitants, 1991</i> <sup>a</sup>	<i>Number of victims in data file</i> <sup>b</sup>	<i>% of population killed</i> <sup>c</sup>
Bwakira	53,555	4,674	8.7
Gishyita	43,090	11,273	26.1
Gisovu	39,365	3,003	7.6
Gitesi	61,341	11,118	18.1
Kivumu	55,361	3,934	7.1
Mabanza	63,460	8,782	13.8
Mwendo	43,632	4,472	10.2
Rutsiro	56,768	941	1.6
Rwamatamu	54,494	10,853	20.0
Total <sup>d</sup>	471,066	59,050	12.5

<sup>a</sup> I did not have access to 1991 census data on ethnic affiliation per commune.

<sup>b</sup> This does not necessarily mean that these victims were killed in the commune of residence.

<sup>c</sup> To be decreased by 0.5% when population growth between 1991 and 1994 is taken into account.

<sup>d</sup> As stated before, the IBUKA project registered only Tutsi killed and not Hutu.

## Analysis

Figure 1 presents the share of victims in each age group killed by a firearm. A clear pattern emerges: few children and elderly people were killed by firearms, while (relatively) many young adults were. Of all victims in their early 20s, 20–25% were killed by firearms, whereas for victims in their late 50s, the figure was 10%.

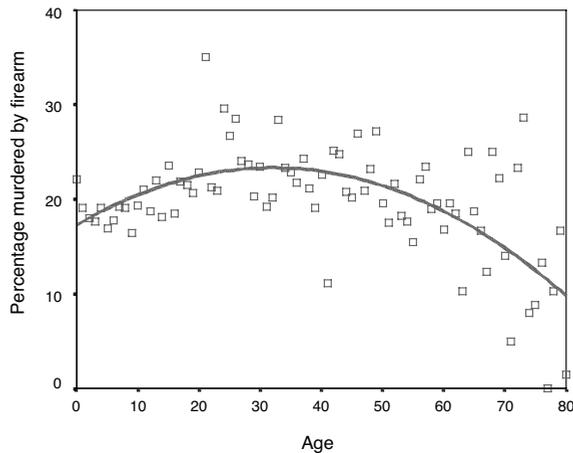
## *The Organization of Massacres*

For about 40,000 victims (two-thirds of the sample), I was able to find out whether or not the victim died in a large-scale massacre. A massacre is defined as an event where at least 100 people were killed in one specific location in less than three days. From the data in the IBUKA file, 43.6% of the victims whose location of death is registered were

Table IV. Killings by Type of Weapon (%)

Weapon	<i>Entire file</i>		<i>Dates of death known</i>	
	Number	%	Number	%
Machete	31,117	52.8	13,272	51.6
Club	9,779	16.6	4,238	16.5
Gun, rifle	8,706	14.7	4,575	17.8
Grenade	1,058	1.8	609	2.4
Drowned	847	1.4	486	1.9
Hoe, hack	444	0.8	328	1.3
Buried alive	442	0.7	340	1.3
Latrines	437	0.7	150	0.6
Spear	421	0.7	209	0.8
Burnt alive	401	0.7	226	0.9
Pick-axe	337	0.6	192	0.7
Stoned	131	0.2	84	0.3
Hanged	100	0.2	35	0.1
Sword	79	0.1	50	0.2
Starvation	23	0.0	15	0.1
Tractor	12	0.0	7	0.0
Other	636	1.1	197	0.8
Unknown or missing	4,020	6.8	659	2.6
Total	59,050	100	25,719	100

Figure 1. Share of Tutsi Murdered with a Firearm: Realized Probability by Age



N = 25,719

killed in such massacres. Several thousand entries had missing values at the location of killing. In the further analysis, I will use a

dummy variable for death in a massacre (1 if massacre, 0 if not) when it was known where the victim was killed (see Appendix A).

### *Occupation and Gender*

Of the registered victims, 28,465 were farmers, 1,949 had an occupation outside farming, 13,955 were pupils and 8,925 were below age 7 (see Table V). These figures confirm that Rwanda in general and Kibuye specifically is a very rural society. Only a small minority of the working population did not farm. This is basically true for Hutu as well as for Tutsi. The former may have been more present in public administration and the latter more in commerce, but more than 90% of the people of both groups were farmers. Whereas in the past, Tutsi may have been more involved in cattle breeding than Hutu (see Newbury, 1988; De Lame, 1996), in the early 1990s, there was no longer any clear ethnic specialization in agriculture or cattle breeding. Depending on wealth, Hutu as well as Tutsi owned cattle and grew crops. The IBUKA data file does not mention the landholdings or the number of cattle of the victims and makes a distinction only between farming and non-farming.<sup>8</sup> Table V shows the occupation of the victims, together with the weapons that were used to kill them. In each category, for those whose date of death is registered, a slightly higher percentage of people killed by a firearm is observed. I do not have an immediate explanation for this. Generally, non-farmers ran a much higher risk than farmers of being killed by a firearm.

More men than women were killed during the genocide in Kibuye (30,528 men and 28,471 women, plus 51 unknown victims of genocide). As far as weapons are concerned, the difference between men and women is less than for age and occupation. Men were only slightly more often killed by firearms.

<sup>8</sup> More research is needed to investigate in what respect real or perceived ethnic labour specialization and inequalities in landholdings and cattle played a role in the genocide. For existing sources, see Des Forges (1999), Uvin (1998), André & Platteau (1998) and Verwimp (2003).

### *Regression Analysis*

**Specification of the Model** In this section, I test with logistic regression analysis whether or not individual characteristics of a victim as well as general aspects of the genocide determined the perpetrator's use of a firearm rather than a traditional weapon. In order to show the robustness of the effects, several logit regressions were performed for different specifications of the model. In all regressions, the dependent variable is a binary choice variable having the value 1 for a firearm and 0 for all other arms. In Appendix C, I left out date of death and other variables as regressors in order to have as many cases as possible included in the analysis. All variables, except gender, show the same sign and the same level of significance. The level of significance of the gender variable changes over the different regressions, but this is not surprising, given that almost the same percentage of men and women were killed by firearms. The inclusion or exclusion of a small number of cases – as a result of missing variables other than gender in these cases – can then have an influence on the significance level of the gender variable.

Interaction regressors of gender with other variables show consistent and significant effects. Apart from the weapon used, the age and the gender of victims, data collection in two communes (Gitesi and Rutsiro) was almost completely missing and unsatisfactory. In all regressions except Models 5 and 6, these two communes were dropped from the analysis. Keeping the very few observations with complete data in these two communes in the regression analysis would misrepresent the effect of communal dummies. A comparison of Model 6 (the two communes included) with Model 7 (two excluded) shows that this drop does not affect the results.

**Clustering on Massacre Sites** Almost half of all victims in Kibuye Prefecture were killed

Table V. Occupations and Weapons Used

<i>Occupation</i>	<i>Entire file</i>			<i>Date of death known</i>		
	<i>Number</i>	<i>Killed by firearm</i>	<i>%</i>	<i>Number</i>	<i>Killed by firearm</i>	<i>%</i>
Farmers	28,465	4,972	17.5	12,905	2,646	20.5
Non-farmers	1,949	621	31.9	772	240	31.1
Pupils	13,955	2,619	18.8	6,527	1,375	21.1
Children < 7	8,925	1,195	13.4	3,857	705	18.3
Missing <sup>a</sup>	5,756					
Valid total	59,050	9,407	17.6	24,061	4,966	20.6

<sup>a</sup> Occupation or weapon used or both are missing.

in large-scale massacres. A massacre was defined as an event where at least 100 people were killed in one specific location in less than three days. This means that the killings of people in these massacres and the weapons used cannot be seen as independent cases in our sample. Indeed, the use of weapons depends, among other things, on the location where the killings took place. In the case of a grenade, for example, each use probably killed several people. One way to solve this is to use a robust estimation technique that clusters on the event of a massacre. In the absence of clustering, the standard errors are underestimated. This is the case for Model 2. Clustering affects the standard errors and variance–covariance matrix of the estimators but not the estimated coefficients. Models 3 and 4 therefore present clustered logit regressions, with the event of a massacre as the cluster variable. Models 3 and 4 are the regressions with the most accurate estimation techniques. Unfortunately, I had to drop one more commune from the analysis (Mwendo), since I was not able to conclude from the data whether or not a large number of victims originating from this commune died in a large-scale massacre. I included dummies for communes, and Bwakira commune is used as the baseline.

The following variables were included in the analysis:

- *weapon* used (firearm: gun, rifle or grenade = 1, other weapons = 0);
- *age* and *age squared*;
- *gender* (female = 1; male = 0);
- *gender\*age* interaction;
- *occupation* dummy (off-farm work = 1, on-farm work or pupil = 0);
- the *number of days after 6 April* the victim was killed;
- *number of days after 6 April squared*;
- *gender\*number of days after 6 April* interaction;
- *gender\*number of days after 6 April squared* interaction;
- *massacre* dummy (1 if the victim was killed in a massacre, 0 if not); and
- dummies for *communes*.

The regression results presented in Tables VI and VII show that the probability of the victims in Kibuye Prefecture being killed by a traditional weapon or a firearm depended on the person's age, his or her occupation, the place of residence before the genocide, the location where the killing took place, the number of days after 6 April the person was killed and interaction effects of these variables with the gender of the victim.

Table VI. Accounting for Type of Weapon Used

<i>Variable</i>	<i>Model 1</i>	<i>Model 2</i>
<i>Individual level</i>		
Age	.0329*** (9.86)	.0302*** (8.31)
Age <sup>2</sup>	-.0004*** (-9.52)	-.0003*** (-7.57)
Gender	-.1958* (-1.66)	.056 (0.46)
Gender*age	-.0072*** (-3.88)	-.0063*** (-3.10)
Off-farm	.5454*** (5.69)	.7065*** (6.70)
Days after April 6	.1157*** (17.29)	.0522*** (7.42)
Days after April 6 sq.	-.0014*** (-12.96)	-.0005*** (-5.15)
Gender*days after	.060*** (4.64)	.018 (1.49)
Gender*days after sq.	-.0017*** (-6.32)	-.0007** (-3.02)
<i>Commune and massacre dummies</i>		
Massacre		2.191*** (44.23)
Gisovu	1.124*** (6.81)	.6078*** (3.53)
Gishyata	1.1417*** (7.38)	.1408 (0.89)
Kivumu	1.5108*** (9.69)	.9590*** (6.01)
Mabanza	3.152*** (20.94)	2.3064*** (14.98)
Mwendo	.5965*** (3.35)	
Rwamatamu	2.398*** (16.21)	2.6472*** (17.42)
Constant	-4.851*** (-28.85)	-5.060*** (-29.35)
N	23,650 not weighted not clustered	21,536 not weighted not clustered
R <sup>2</sup>	0.11	0.20
Log likelihood	-10,577.96	-8,930.64

\*\*\* significant at the 1% level, \*\* significant at the 5% level, \* significant at the 10% level.  
z-values in parentheses.

Table VII. Type of Weapon Used, with Clustering

<i>Variables</i>	<i>Model 3</i>	<i>Marginal effect</i>	<i>Model 4</i>	<i>Marginal effect</i>
<i>Individual level</i>				
Age	.0302*** (4.40)	.0039	.0408*** (3.94)	.0049
Age <sup>2</sup>	-.0003*** (-4.30)	-.00005	-.0005*** (-3.97)	.00006
Gender	.056 (0.22)		.079 (0.26)	
Gender*age	-.0063*** (-2.75)	-.0008	-.0088*** (-3.06)	-.0010
Off-farm	.7065*** (5.88)	.1149	.8313*** (6.55)	.1314
Days after April 6	.0522* (1.90)	.0068	.0564** (2.48)	.0068
Days after April 6 sq.	-.0005 (-1.59)	-.00007	-.0006** (-2.04)	-.00007
Gender*days after	.018 (0.63)		.017 (0.50)	
Gender*days after sq.	-.0007 (-1.09)		-.0006 (-0.90)	
<i>Commune and massacre dummies</i>				
Massacre	2.191*** (8.34)	.3337	2.282*** (6.77)	.3050
Gisovu	.6078 (0.86)		.051 (0.09)	
Gishyata	.1408 (0.19)		-.457 (-0.74)	
Kivumu	.9590 (1.48)		.5705 (1.06)	
Mabanza	2.306** (2.40)	.4517	2.307*** (3.35)	.4156
Mwendo				
Rwamatamu	2.647*** (4.09)	.4122	2.30*** (4.53)	.3962
Constant	-5.060*** (-7.35)		-4.898*** (-9.14)	
N	21,536 not weighted clustered		39,488 weighted(†) clustered	
R <sup>2</sup>	0.20		0.28	
Log likelihood	-8,930.64		-15,126.89	

\*\*\* significant at the 1% level, \*\* significant at the 5% level, \* significant at the 10% level.

(†) STATA 9.0 does not allow one to use non-integer weights. The weights used are therefore the nearest integer value of the figures presented as weights in Appendix D.

**Weighting Procedure** Because data on victims from some communes or massacres were more complete (i.e. data on all variables are available for more cases) than from others, the data have to be weighted in order to correct for cases that had to be dropped. The weighting procedure was as follows. We first determined whether or not a person was killed in a massacre. We then calculated the total number of victims per massacre and the number of victims with known dates of death in these massacres. We assigned a weight to each case representing the cases without date known for each massacre. Then, we calculated the number of people in each commune who did not die in a massacre and again assigned weights representing the number of people without date of death in each commune. This procedure yielded 18 different weights, one for each massacre and for each commune. These weights are listed in Appendix D.

**Discussion** In all of the models, the effects of *age* and *days-after* variables are quadratic, rather than linear. This means that the probability that the victim was killed with a firearm initially increases with age and decreases again at high age. This is also true for the *days after 6 April* variable: the probability of being killed with a firearm increases in the first weeks of April and decreases towards the end of the genocide. The significance of the results on *age* and *number of days after 6 April* tells us that young adults were more likely to be killed with firearms compared to children and old people and that the use of firearms reached its most intensive period several weeks into the genocide.

Since the *gender* variable, by itself, is not significant in the most accurate models, women in general did not have a smaller chance of being killed by a firearm. The significance of *gender* reveals itself in combination with other variables. Both *age* and *days*

*after 6 April* effects interact with the *gender* variable. In Model 1, the probability of a woman being killed by a firearm, compared to that of a man, decreases with age (*gender\*age* interaction negative and significant). For the *days after 6 April* variable, I found an additional positive effect for women only in Model 1 and Model 8 at the beginning of the genocide and a negative effect towards the end of the genocide. The effects, especially the magnitude of the squared effects and the interaction variables, are small. Once we introduce the *massacre* dummy, the clustering and the weighting, these interaction effects lose their significance. This means that, once we account for the organized nature of the genocide (as in Models 3 and 4), the *gender\*age* effect remains, but the *gender\*days after* effect disappears. Thus, older women did have a smaller risk of being killed by a firearm, but no other gender effects seem to emerge from the analysis. This effect is linear. The introduction of an interaction term between *gender* and *age squared* resulted in a non-significant effect.

The only variable capturing the socio-economic situation of the victim is *occupation*. In the models, non-farmers have a significantly higher probability of being killed with a firearm compared to farmers and pupils. Compared to a farmer, a person with an off-farm job had a 13% higher probability of being killed by a firearm. This is a strong marginal effect.

The effects of the *massacre* dummy and the *commune* dummy variables, however, are stronger than the individual effects, demonstrating that the location where the victim was killed (in particular, whether or not the victim was killed in a large-scale massacre), as well as the commune of residence of the victim, had a strong impact on the kind of weapon (firearm versus other) that was used. The probability of being killed by a firearm was 30% higher in large-scale massacres and 40% higher for residents of Mabanza and

Rwamatamu communes compared to Bwakira (the baseline). Firearms were used more frequently in certain locations and events, especially in large-scale massacres, where many Tutsi were killed at the same time and in the same place. This was the case in the Gatwaro Football Stadium (with many Tutsi from Mabanza commune) on 16, 17 and 18 April; in Rwamatamu commune on 12, 13 and 28 April; and in Biramba on 13 and 14 April, as well as in Bisesero and in several other massacres. When the *commune* dummy variables for Mabanza and Rwamatamu remain statistically significant and positive after controlling for massacres and clustering on massacres, this means that the Tutsi residents of these communes had a higher probability of being killed by a firearm even when they were not killed in one of the large-scale massacres.

### Interpretation and Lessons Learned

The effect of the dummy for Mabanza on the probability of being killed with a firearm was stronger than for any other commune in Kibuye Prefecture. Many victims from Mabanza were killed in Gatwaro Stadium, where the perpetrators of genocide fired with machine guns at the crowd locked up inside the stadium.<sup>9</sup> The high prevalence of killings with firearms in a commune may have resulted from the size of the local stock of firearms, the presence of army units in a commune or the participation of militia armed with firearms from other communes. A reason for the high prevalence of killings

with traditional weapons in other communes might be the distribution of machetes to the local population. Detailed on-site investigations would be needed to confirm or refute this hypothesis. From the statistics, however, it is clear that significant differences in the use of firearms existed between the locations of killing and between the communes.

The reason why young Tutsi and men who were working in the modern sector of the economy had a higher probability of being killed with firearms, compared to other victims, can be inferred from the constraint on the behaviour of the perpetrators: they had to save on ammunition and, thus, used firearms only against those people who could mount resistance. These people, in turn, were young to middle-aged men with a respected status in the commune.

The strong marginal effects are not due to the enumerators, since 15 to 20 enumerators were doing the data collection in one commune and the communes with bad data collection were left out of the regression.

At a more general level, the results of the logistical regression support the five hypotheses that were outlined earlier. Clearly, the genocide had an organized nature and was not a random killing spree. In the sample, in 17.7% of all cases where the weapon is known, the weapon is a firearm. In the absence of any organization behind the genocide, we would not observe clusters of victims gathered in schools, churches and stadiums where many (in several massacres, 60–80%) of the victims were killed by firearms instead of traditional weapons. If age, gender, occupation, the number of days after 6 April and, above all, the location of killing and the residence of a victim prove significant to explain the weapon used, then genocide was anything but a random process.

<sup>9</sup> There are not many sources on this event, but an observation from Lieutenant Colonel Stabenreth, a French officer, does give some indications: 'From his investigations, he established that the Tutsi refugees who had sought shelter at the stadium had been attacked by soldiers and militia who had shot until they had run out of ammunition'. The officer concludes from his investigation that the Tutsi in the stadium were killed with firearms. My statistical result also corresponds to the observations of eyewitness Doctor Blam, who heard the intervention of firearms and grenades during the massacre in the stadium.

## Appendix A. Massacres in Kibuye Prefecture in April 1994 and Number of Victims Registered in Data File

<i>Place</i>	<i>Commune</i>	<i>Dates</i>	<i>Victims</i>
Birambo	Bwakira	13–14	583
Bisesero	Gishiyta	3 months	6,549
Church Kibuye	Gitesi	16–18	833
Church Mubuga	Gishiyta	16–17	419
Church Nyange	Kivumu	15–16	1,638
Gatwaro Stadium	Gitesi	13–18	3,477
Kibingo	Rwamatamu	12–13	434
Kizenga	Rwamatamu	18	1,824
Mugonero Hospital	Gishiyta	16	541
Murangara	Gishiyta	11–12	1,025
Ngoma	Gishiyta	16	399
Nyamagumba	Mabanza	13–14	672

Several thousand victims were killed in 'Bisesero' or 'in the mountains'. In order to determine whether or not these killings were part of a massacre that fits our definition, I looked at all places that belong to the mountain range of Bisesero (e.g. Karongi, Muyira, Uwingabo) and considered the victims who were killed at these places as victims of the massacre at Bisesero. This makes sense, because massacres were committed at Bisesero during the entire period of the genocide. I estimated that a total of some 13,000 people were killed in Bisesero between 6 April and 30 June. For the estimation procedure of the number of victims at Bisesero, I refer to Verwimp (2003).

The number of victims who were killed in these massacres represents the victims who resided in the communes of Bwakira, Gisovu, Gishiyta, Kivumu, Mabanza and Rwamatamu at the time of the genocide and whose place of death was registered. The victims in the Parish of Kibuye, for example, came largely from the commune of Gitesi. Since data collection was not performed well in this commune, these victims, numbering several thousand, do not appear in the table.

I considered victims as victims of a massacre (dummy = 1) when it was registered that they died in one of the 12 massacres that I identified in the data. For the entry 'in the mountains' in the commune of Mwendu, I could not find out if these victims were killed in a massacre or not.

## Appendix B. Description of Variables in IBUKA Data File

<i>Variable</i>	<i>Valid N</i>	<i>Mean</i>	<i>Std.dev.</i>	<i>%</i>
Age	58,297	25.21	19.04	
Gender	58,258			Male 51.7
Occupation	48,646			Off-farm 4.6
Days after 6 April	25,106	12.86	11.82	
Massacre <sup>a</sup>	40,626			Yes 43.6
Weapon	54,534			Firearm 16.4
Total N	59,050			

<sup>a</sup> As defined in the text, a massacre is an event where, in the course of less than three days, at least 100 people were killed in one specific location. We have 40,626 victims in the database where we know whether or not they were killed in such an event.

Appendix C. Regression Results, Dependent Variable is Weapon Used<sup>a</sup>

<i>Variable</i>	<i>Model 5</i>	<i>Model 6</i>	<i>Model 7</i>	<i>Model 8</i>
Age	.04543***	.0402***	.0406***	.0285***
Age <sup>2</sup>	-.00061***	-.00056***	-.00055***	-.0004***
Gender	-.09910**	.0882**	.0756*	-.3296***
Gender*age	.0099***	-.0087***	-.0083***	-.0074***
Off-farm	.	.6788***	.5546***	.4611***
Days after April 6				.08226***
Days after April 6 sq.				-.0012***
Gender*days after April 6				.0812***
Gender*days after April 6 sq.				-.0022***
Constant	-2.0260***	-1.9817***	-1.9323***	-2.3948***
N	54,505 (entire file)	53,080 (entire file)	41,409 (2 comm. left out)	23,650
R <sup>2</sup>	0.009	0.012	0.011	0.026

\*\*\* significant at the 1% level, \*\* significant at the 5% level, \*significant at the 10% level.

<sup>a</sup> Gitesi and Rutsiro communes are left out because of lack of data.

Appendix D. Weights Used in the Weighted Regression in Model R4<sup>a</sup>

<i>Massacre site/commune</i>	<i>Count</i>	<i>Date known</i>	<i>Weight</i>	<i>Integer weight</i>
Birambo	583	265	2.2	2
Bisesero	6,549	2,488	2.63	3
Church Mubuga	419	370	1.13	1
Church Kibuye	833	730	1.14	1
Church Nyange	1,638	1,466	1.12	1
Mugonero Hospital	541	324	1.67	2
Kibingo	434	421	1.03	1
Kizenga	1,824	1,145	1.59	2
Murangara	1,025	542	1.89	2
Ngoma	399	190	2.1	2
Nyamagumba	672	656	1.02	1
Gatwaro Stadium	3,477	1,370	2.53	3
Bwakira	3,871	1,046	3.7	4
Gishyita	3,440	1,227	2.8	3
Gisovu	1,435	784	1.83	2
Kivumu	2,198	1,763	1.24	1
Mabanza	3,549	1,321	2.68	3
Rwamatamu	8,434	7,507	1.12	1

<sup>a</sup> In order to determine the weights, we first looked at the number of victims in each large-scale massacre for which we have the date of death. Weights were then computed to adjust for the total number of victims in each massacre. Then, the remaining victims per commune of residence were computed and weights were given again to adjust for the number of victims without known date of death. Integer weights were used because STATA 9.0 does not allow for non-integer weights.

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