



KATHOLIEKE UNIVERSITEIT
LEUVEN

Faculty of Economics and
Applied Economics

Department of Economics

A Quantitative Analysis of Genocide in Kibuye Prefecture,
Rwanda.

by

Philip VERWIMP

Development Economics

Center for Economic Studies
Discussions Paper Series (DPS) 01.10
<http://www.econ.kuleuven.be/ces/discussionpapers/default.htm>

May 2001



**DISCUSSION
PAPER**

A Quantitative Analysis of Genocide in Kibuye Prefecture, Rwanda

Philip Verwimp*
Ph.D Candidate
Fund for Scientific Research
Economics Department
Catholic University of Leuven, Belgium
Philip.verwimp@econ.kuleuven.ac.be

Abstract of the paper

This paper is a quantitative study of the genocide in the prefecture of Kibuye in Rwanda in 1994. We use an original data base developed by the organisation of the survivors of the genocide (IBUKA) who collected the data by house-to-house fieldwork. The data contain information on the age, sex, commune of residence before the genocide, the professional occupation of the victims, the place and date of death and the weapon used to kill, for a total of 59.050 victims of genocide. For one commune (Mabanza), we re-coded the data, present detailed statistics and perform an analysis of survival chances. From the analysis, we derive that Tutsi from the sectors of Mabanza commune whose Tutsi population did not (or only in limited numbers) go to the Gatwaro Stadium had a better chance to survive the genocide in Kibuye. For the whole of the prefecture, we present an estimation of the daily killing rate, estimations of the number of Tutsi killed in the major massacres and the weapons used. For over 25.000 victims for which the data file has complete information, we present a logistical regression explaining the use of either a traditional weapon or a fire-arm. The analysis shows that the probability to be killed with a fire-arm depended on the commune of residence of the victim, the age of the victim, the number of days after April 6 the victim was killed and on interaction effects between the latter two variables and the sex of the victim.

* The author is a research scholar from the Fund of Scientific Research (Flanders, Belgium). The author owes many thanks to the Fund for the grants that enabled two research stays in Rwanda in 1999 and in 2000. The author expresses his gratitude to IBUKA and in particular to F.R. Ruvukanduvuga for the permission to use their data file. It is worth emphasizing that the author can use the file without restrictions. Academic freedom in the use of the data file for the analysis of the genocide were unconditional. I am indebted to L.Berlage, S.Cook, S.Dercon, A.Desforges, W.Seltzer, and seminar participants in the Genocide Studies Seminar at Yale University for insightful and critical comments to a draft version of this paper. I am grateful to F. for the skillful editing of the paper. All responsibility for the paper remains with the author.

A Quantitative Analysis of Genocide in Kibuye Prefecture, Rwanda

1. INTRODUCTION

According to African Rights, the genocide in Kibuye Prefecture was the most thorough genocide of all the prefectures in Rwanda (African Rights, 1995, p. 394). Locked in between the Prefectures of Gisenyi in the north, Gitarama in the east, Cyangugu in the south and Lake Kivu in the west, the Tutsi from Kibuye had nowhere to flee. They were left at the mercy of their killers. The latter wanted to kill every man, woman and child known as Tutsi in their communes. Knowing that they could only count upon themselves, a large number of Tutsi, estimated in this paper at almost one quarter of all Tutsi who were killed in Kibuye Prefecture, mounted a strong resistance against the forces of genocide. In Bisesero, a mountainous area in Gishyita commune, these Tutsi succeeded in defending themselves for more than a month after the start of the genocide. One of the findings of this paper is that the fate of the Bisesero Tutsi was unlike the fate of all other Tutsi in the prefecture. As I shall document in the paper, seventy-five percent of the Tutsi from Kibuye were killed before the end of April 1994, the Tutsi of Bisesero forming the main exception.

The analysis presented in this paper is a statistical study of the genocide in Kibuye Prefecture. The main purpose of the study is to use diverse statistical tools to document the genocide, to show its mechanisms, its brutality and above all, its speed. Section two gives a brief profile and a map of the prefecture. Section three presents the main data file used for this study and a general overview of population figures. I discuss the shortcomings of the data file. In section four, I present analysis of survival chances for one commune. Section five presents an estimation of killing over time, which may be the main contribution of the paper. In order to keep the text readable, numerous computations are put in the appendix. I estimate mortality figures throughout the three months of the genocide in Kibuye in general and Bisesero in particular. Section six extrapolates figures from Kibuye together with other prefectures to Rwanda as a whole. In part seven, I do a detailed study of the use of firearms in the genocide in Kibuye. Part eight compares the results of the statistical analysis with documents written by the perpetrators of genocide and section nine concludes.

2. PROFILE OF THE PREFECTURE

2.1. Neglect and Interest

The Prefecture of Kibuye is situated in the west of Rwanda bordering the Kivu Lake in the west, the Prefecture of Gitarama in the east and the Prefecture of Gisenyi in the north. Before the genocide, there was no paved road linking the prefecture with other prefectures or with the capital Kigali. Kibuye was and is one of the poorest prefectures of Rwanda. In terms of per capita income, Butare and Gikongoro are poorer, but Kibuye was the least integrated in the Rwandan economy, as a result of the lack of transport infrastructure and the geographical location of the prefecture. Jobs giving access to off-farm income were in short supply. This means that the population lived by virtue of its soil, its cattle and its small intra-prefecture trade, even more than in other prefectures. There was trade with Zaire, especially in cattle products, but it remained small-scale trade. The main reason for the neglect of the prefecture by the Kayibanda and Habyarimana regimes was the absence of political representation from the prefecture at the highest level of government. Kayibanda favored Gitarama and Habyarimana favored Gisenyi. After Butare Prefecture, Kibuye counted the largest Tutsi population of Rwanda.

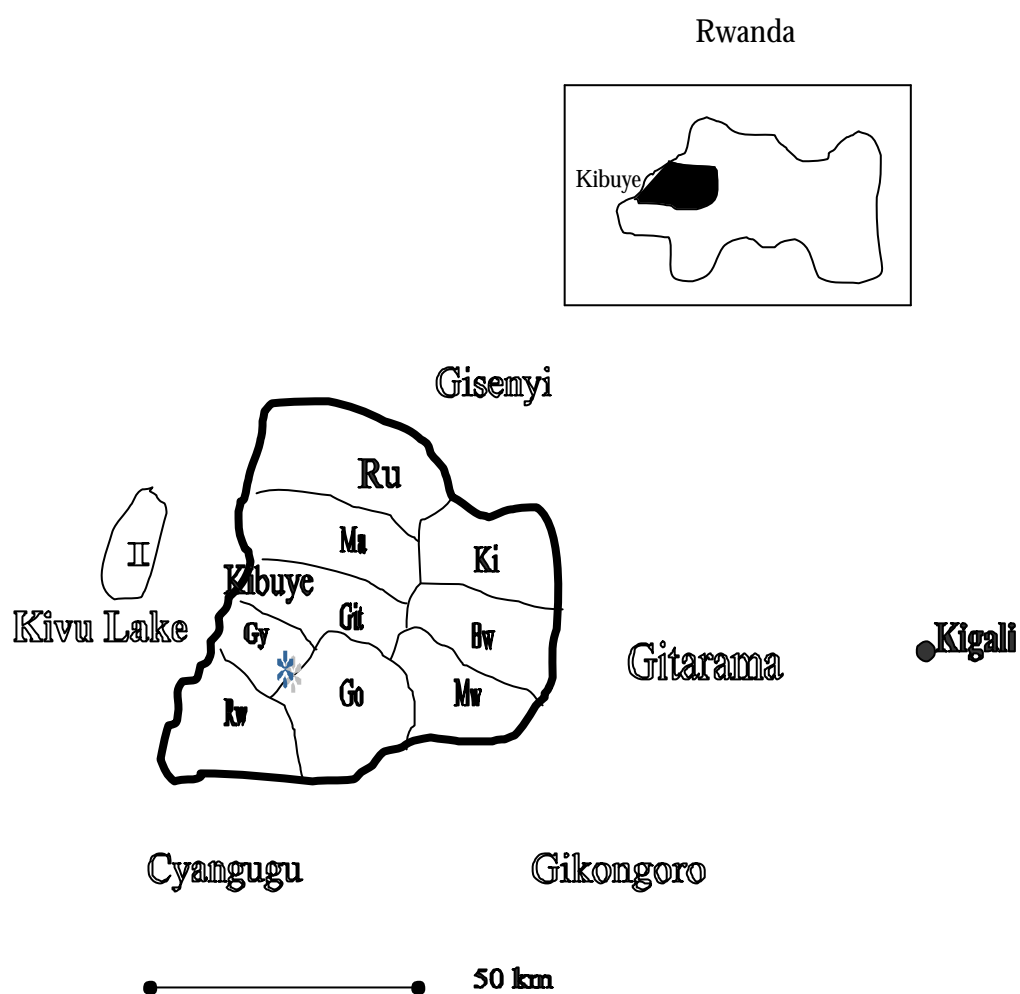
The tea-plantations and tea-factory in Gisovu Commune were the only object of interest for the Habyarimana regime. The plantation and the factory were managed by Ocir-thé and directed by Alfred Musema, member of the Akazu. Since Rwanda only had six tea-plantations, the Gisovu plantation was of considerable importance for export earnings. With the decline in the price of coffee at the end of the eighties, an increase in tea production and tea export became an important objective for the Habyarimana government. The local peasant population was very hostile to the establishment of the tea-plantation since their land was expropriated. The peasant families had to move to other, less fertile land or even migrate¹. All but one of the tea-plantations was state-owned. The value of tea production to the regime became clear in the event of war. In January 1994, Human Rights Watch writes that Rwanda bought a huge quantity of arms in exchange for 1 million US\$ in cash together with the future tea harvest from the Mulindi tea plantation². As in the case of Mulindi, the Gisovu plantation and factory were state-owned. Most of the tea producing facilities were financed by donor agencies, making the tea industry, and more specifically its high operating costs, a good

¹ Bart., F., *Montagnes d'Afrique, terres Paysannes : Le cas du Rwanda*, 1993, p. 456.

² Human Rights Watch Arms Project, 1994, p. 15.

example of rent-seeking by the Akazu members. Only the Akazu really benefited from tea production³.

2.2. Map of the prefecture



Communes of Kibuye

(Ru) Rutsiro; (Ma) Mabanza; (Ki) Kivumu; (Git) Gitesi; (Mw) Mwendo; (Go) Gisovu ;
 (Git) Gitesi ; (Gy) Gishyita ; (Rw) Rwamatamu

* Bisesero sector in Gishyita commune

³

I refer to P. Uvin's book on development aid and its relation with the genocide for a general discussion of rent-seeking in Rwanda and many examples.

3. DESCRIPTIVE STATISTICS

3.1. The 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 organisation of Rwandan society. Kibuye Prefecture is divided into nine communes. Each commune, having on average 50.000 inhabitants, is subdivided into several sectors. These sectors on their turn consist of several cells. Commune by commune, sector by sector and cell by cell, IBUKA collaborators went into all families of Tutsi survivors and of Hutu who did not participate in the genocide 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 the commune where they were doing the interviews or were familiar with it. 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 the choice of IBUKA to work only with survivors as enumerators, had a negative effect on the quality of the data collection process in some communes. There was one supervisor for each commune who was monitoring 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 nominative dictionary with the names of almost 60.000 victims of genocide of the prefecture published in December 1999. The project also registered whenever possible, the age and the profession of the victim, the place where the person was killed and the weapon that was used. The present paper uses the IBUKA data file to analyze the statistics of genocide in Kibuye Prefecture. It is worth emphasizing that the data file was not constructed for statistical purposes, but for the nominal documentation of genocide victims in Kibuye. The latter objective remains the prime value of the documentation project. Given the death toll among Tutsi, the very difficult living conditions after the genocide, the lack of training and adequate research facilities, the result of the project is all the more remarkable.

It follows that the use of the data file for statistical purposes is problematic. Firstly, the author did not take part in the data collection process and secondly, the quality of the data differs

substantially between communes and sectors. These problems should be clear from the outset of the paper. I tried to tackle them on several fronts: I did personal interviews of the enumerators and the supervisors of the data collection process and I applied statistical methods to correct for missing data. Since the enumerators were all survivors of the genocide in Kibuye Prefecture, it is possible that the number of victims was inflated or that respondents made up stories to satisfy the enumerators. From my interviews, I retain that most of the respondents were Hutu, who have, I believe, no incentive to inflate victim figures (on the contrary one would say). One also has the impression that Hutu who did not participate in the genocide feel a need to come forward with accurate information to clear themselves of guilt. This is important if one wants to avoid a whole ethnic group becoming identified with the perpetrator image. Some of the respondents indeed 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 event where data were doubtful, I decided not to use them. This is the case for the many victims whose date of death is not registered, but for whom the weapon used to kill the victim is nevertheless indicated. This seems strange and for these victims I did not use the data on the weapon in my analysis of weapons used to kill (I refer to section 3.4 for this).⁴ The organizers of the data collection process also intended to register the 'cause' of the death of a person. The different categories that were mentioned for the 'cause' of death in the registration books are: being Tutsi, being a Tutsi-friend, having a Tutsi physical look, political opposition, having a Tutsi mother. However, 98% of the entries indicate the first possibility, meaning that this part of the data collection failed.⁵ IBUKA has only registered the Tutsi victims of genocide and did not, or only sporadically, register persons who were killed for other reasons than being Tutsi.⁶

The published Nominal Dictionary gives the names of the victims of the genocide in Kibuye Prefecture. Looking at the original books that were used to collect the data however, I learned that information on the surviving members of each household was also collected (but not

⁴ I owe this remark to Alison Desforges. The distribution of all weapons used in the genocide (% for each weapon) however does not change very much when one includes these cases.

⁵ This is problematic, because it means that the IBUKA data file only contains Tutsi among the registered victims and not for example the Hutu widows of Tutsi husbands. The author could not verify the magnitude of interethnic marriage in Kibuye, which maybe sizeable, but should not be overestimated either.

⁶ It is interesting to see that the Government of Rwanda used the IBUKA scheme to make a national census of genocide victims in August 2000. Results of this national data collection process are not yet known at the time of writing.

published). This additional information can give empirical insight into the execution of genocide. The information on the survivors also deals with age, sex, profession and area of residence, comparable to those of the victims.

As with the victims, the quality of the data differs substantially between communes and sectors. Since the data on the survivors was not computerized, I decided to make a new database with victims AND survivors. In that respect I could also code the responses in a way that make the data more suitable for statistical analysis. Budget limitations allowed me only to organize the re-coding of one entire commune (Mabanza) and of half of the sectors of another commune (Gitesi). Needless to say, it would be interesting to re-code the remaining communes too. In some communes however, the benefit of re-coding would be small, because the data are bad, whereas in other communes the benefit would be great. In general, one cannot overcome the missing data problem. For some sectors of Gitesi for example, enumerators did not enlist ages or dates or professions of the victims nor of survivors. In that case, it makes no sense to re-code data. I decided nevertheless to re-code some sectors of Gitesi commune in order to learn as much as possible on the genocide in this commune. We come back to this in section four of the paper (see also appendix 2).

Table 1: Quality of the data collection process

Commune	ages	dates	places	survivors	re-coding worthwhile
Bwakira	+	-	+/-	+	yes
Gishyita	+	+	+	+	yes
Gisovu	+	+	-	-	no
Gitesi	+	-	-	-	partly
Kivumu	+	+	+/-	+/-	partly
Mabanza	+	+/-	+	+	yes
Mwendo	+	+/-	+/-	+	yes
Rutsiro	+	-	-	-	no
Rwamatamu	+	+	+	+	yes

data is good (+), data is average (+/-) or data is bad (-) where 'good' means that for most victims (or survivors) the data on that item were indeed collected. 'bad' meaning that data were not collected (missing) and 'average' meaning that data for some victims were collected and not for others.

As one can see, the quality of the data for Gitesi, Gisovu and Rutsiro communes is particularly poor. Gitesi commune in particular is an example of poor fieldwork.

I did not have access to the raw data of the 1991 census in Rwanda; tool demographers normally use it to analyze excess mortality. The present data file only contains data on the Tutsis who were killed during the genocide. The IBUKA project succeeded in finding 59.050 victims of genocide in Kibuye Prefecture, meaning 12 % (59.050 of 500.000) of the population of that prefecture. Table 2 presents the general figures. The figure of 59.050 is an underestimation since not all victims were registered and the Hutu victims were also not registered.

3.2. General Figures of Genocide in Kibuye Prefecture

Table 2: General figures of genocide in Kibuye Prefecture

	Number*	Percent
Total population of the Prefecture in 1991	473.920	100
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 population found by IBUKA	59.050	12,4
	Number	% of Tutsi**
Tutsi population registered as murdered	59.050	82,9
Tutsi population not registered as murdered	12.175	17,1

* I have no access to exact figures of the population size in March 1994. Total population in the prefecture probably reached 500.000 ($\cong 473.920 \cdot (1.03)^2$) by March 1994.

** Accounting for population growth, the figures become 78% registered as murdered and 22% not registered.

According to the 1991 census and the figures found by IBUKA, 12,4% of the population of Kibuye Prefecture was killed in the genocide, meaning approx. 80% of the Tutsi population. This means that 15 to 20% of Tutsi, (between 10.000 and 15.000 persons) survived the genocide in Kibuye Prefecture. Table 3 provides information on the genocide in each of the communes of the prefecture.

Since I did not have access to the 1991 population figures according to ethnic affiliation by commune, I cannot determine exactly how many Tutsi survived the genocide in each of the communes. Apart from this, the IBUKA data file gives a lot of other information that one would normally not find in census data. Since the file has, among other information, the dates and places of the massacres and the weapons used in the massacres, it is an unique source of information for the study of the genocide in Kibuye Prefecture.

Table 3: Victims of genocide by commune*

Commune	Number of inhabitants 1991*	Number of victims data file	% of population killed**
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	4472	10,2
Rutsiro	56.768	941	1,6
Rwamatamu	54.494	10.853	20,0
Total***	471.066	59.050	12,5

* I did not have access to 1991 census data on ethnic affiliation per commune.

** To be lowered by 0.5% when population growth between 1991 and 1994 is taken into account.

3.3. Distribution of killing through time with untreated data

IBUKA found 59.050 victims of genocide in Kibuye Prefecture. The dates on which these victims were killed are known for 25.716 persons, or in 43% of the cases. Table 4 lists the number of victims by commune as well as the number of victims whose dates of death are known. One can see that Gishyita, Rwamatamu and Gitesi count the largest number of victims; this is directly related to the high number of Tutsi living in these communes before the genocide. The number of victims with known dates of death is unequally distributed over the communes. We know the dates of almost all victims in Rwamatamu and Kivumu communes, but we know very few dates in Rutsiro commune and Gitesi commune. In the case of Gitesi commune, dates of death are lacking for almost all victims.

Table 4: Victims per commune and date of death known

Commune	Number of victims in the data file	Number of victims of whom date of death is registered	in %
Bwakira	4.674	1.381	29,5
Gishyita	11.273	4.221	37,4
Gisovu	3.003	1.640	54,6
Gitesi	11.118	135	0,01
Kivumu	3.934	3.265	82,9
Mabanza	8.782	3.566	40,6
Mwendo	4.472	2.028	45,3
Rutsiro	941	199	21,1
Rwamatamu	10.853	9.284	85,5
Total	59.050	25.716	43,5

Figure 1: Victims of Genocide in Kibuye Prefecture
Number of victims per day, untreated data, n=25.716

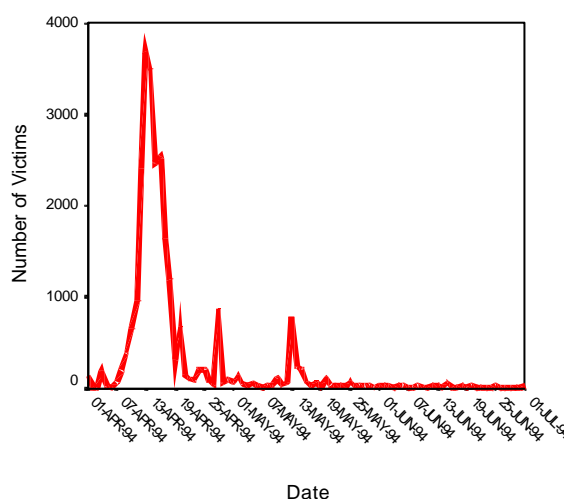


Figure 1 shows that the majority of Tutsi from Kibuye were killed in the first two weeks of the genocide. Later on (section five) we will go into more detail about the possible bias in this figure, but it is clear that the genocide in Kibuye was very intense in the first two weeks.

3.4. The weapons used

Table 5: Weapons used to kill Tutsi (all ages) with number of victims for each weapon

Weapon	Entire file		Dates of death known	
	Number	Percentage	Number	percentage
Machete	31.117	52,8	13.272	51.6
Club	9.779	16,6	4238	16.5
Gun, rifle	8.706	14,7	4575	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
Stone1	31	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

Table 5 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 only known for 43% of the victims. It seems highly unlikely that a witness remembers the weapon that was used to kill a person but cannot recall the date the event occurred. Of all the tables in this paper, table 5 best documents the brutality of the genocide. Most victims were hacked to death with traditional weapons such as a machete or a club. We do notice however the importance of firearms, being the gun or rifle and the grenade. From the 25.719 victims whose date of death is registered in the data file, 20,2% were killed by a firearm (gun, rifle or grenade). In section 7, we will analyze the weapons data in further detail.

4. ANALYSIS OF SURVIVAL CHANCES

During the fieldwork by IBUKA data on survivors in some communes were registered, but not computerized. Because of budgetary limitations, I could only computerize data for two communes. I decided to focus on the genocide in the center of Kibuye. Therefore, the data on the survivors from Mabanza and Gitesi communes was computerized. The fact that computer work for survivors had to be done, was used to re-code data of victims. The quality of the data for Mabanza commune made this a worthwhile investment. Data on places of death in Mabanza commune were computerized, but were not suitable for statistical analysis. Names of places e.g. were spelled out instead of numbered. This section will deal with Mabanza commune. Data and analysis for Gitesi are presented in appendix 2. Other communes where re-entry of the data would be worthwhile (but has not yet been performed) are Bwakira, Gishyita and Rwamatamu. Entry of survivor data and re-coding could specifically teach us something about survival chances in these communes. I will now present an analysis of survival chances for Mabanza commune. The underlying database is named 'the new database' to distinguish it from the IBUKA nominal database.

Table 6: Death and survival in Mabanza commune

<i>Table 6.1: Descriptive statistics</i>	
Total number of inhabitants registered in the 1991 census	63.460
Total number in 1994 (1991 figure * (1.03) ²)	67.325
Total number of Tutsi registered in new database	10.785
Total number of victims	9.257
Total number of survivors	1.477
Number of people without entry	51
Percentage of 1994 inhabitants killed	13,7%
Percentage of Tutsi in new database killed	86,2%
Percentage of Tutsi in new database survived	13,8%

After re-entry of the data for Mabanza commune, I found 9.257 Tutsi killed and 1.477 Tutsi who survived the genocide. This means that we have about 86% of the registered Tutsi in Mabanza commune killed in the genocide. This is 13,7% of the resident population. The fact

that I have 500 victims more in the re-coded data file compared to the IBUKA publication is because after that publication, more names of victims were found⁷.

Table 6.2: Places where the Tutsi residents of Mabanza were killed

Name or Location	Number of victims	% of victims
In the cell of residence	1.905	20,5
In another cell within the sector	836	9
In another sector within the commune	329	3,5
In the Gatwaro Stadium	3.359	36,2
In Nyamagumba	677	7,3
In Bisesero ⁸	300	3,2
In the Kivu Lake	18	0,2
At any another place	645	10,0
At an unknown place	1.188	12,8
Total	9.257	100
Total-unknown place	8.069	87,1

Table 6.2 gives a geographic insight in the genocide in Mabanza commune. We can see that about 20% of the victims (and 25% of those for which that place is known) were killed in their own cell of residence. Since we have no figures for other communes, it is difficult to compare. We know however that more than 1 out of 3 victims (36.2%) in Mabanza commune were killed in the Gatwaro Stadium. Since this percentage is very high, we expect that in other communes, more than 20% of the victims may have been killed in their own cell. In Figure 2, we also observe between-sector variation in Mabanza commune: two sectors in Mabanza commune, Kibirira and Nyagatovu, have more than 50% of all the victims residing in that sector (respectively 287 and 499) killed in their own cell. Not surprisingly, these sectors have very few residents who were killed in the Gatwaro Stadium. Kibingo sector has more than half of its victims killed in Nyamagumba. The latter place is the name given by the perpetrators of genocide to a hill in Kibingo sector. The name is the same name as that of a hill in Ruhengeri Prefecture where Tutsi were killed in 1963-1964⁹. Tutsi from the northern sectors (Kibingo and neighboring sectors) of Mabanza commune did not gather at the communal office, took

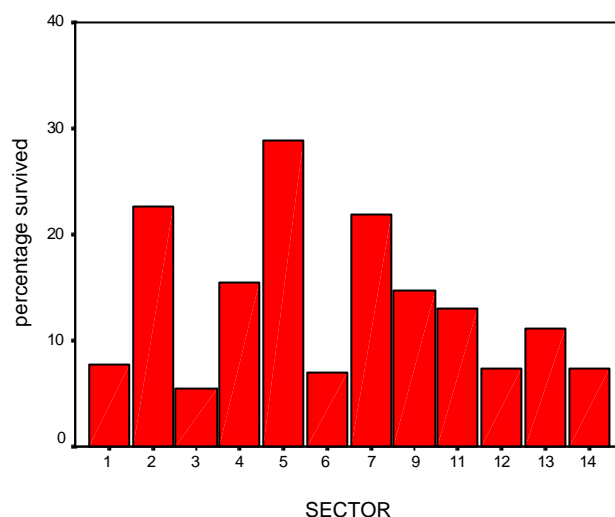
⁷ Author's communication with IBUKA, Kigali, August 2000.

⁸ 'Bisesero' means the hills of Bisesero (plural).

⁹ Interview Mabanza commune, November 11, 2000.

refuge at ' Nyamagumba ' and resisted the Interahamwe and the soldiers from April 9 to April 12.

Figure 2 : Residence specific survival chances in Mabanza commune



Legend: *Buhinga 1, Gacaca 2, Gihara 3, Gitwa 4, Kibirira 5, Kigeyo 6, Kibingo 7, Mushubati 9, Nyagatovu 11, Nyarugenge 12, Rubengera 13, Rukaragara 14.*

Figure 2 shows Gihara sector to be the most deadly sector, only 5% of the resident Tutsi population survived. Gihara sector has two cells where all Tutsi were killed. This is also the case for three cells in Gitwa sector and one cell in Rukaragara sector. Sectors Mukura (8) and Ngoma (10) are left out of the graph because very few Tutsi lived in these sectors. In two cells in Mukura sector, all Tutsi were killed. There are cells with a lot of Tutsi where more than 90% of them were killed. On average, as we have seen, 86% of all Tutsi in Mabanza commune were killed.¹⁰ A Tutsi had the highest survival chance, on average, when she or he resided in Gacaca sector or Kibirira sector, respectively 24.5% and 30% of the Tutsi population in these sectors survived. One cell in Kibingo sector, with a relatively high number of Tutsi, had the highest survival percentage in Mabanza, namely 58%.

¹⁰

Among the 1.477 survivors, we counted 123 soldiers. The latter have been left out of the subsequent analysis since they were most probably not present in Mabanza during the months of April, May and June 1994

One important question one can try to answer with the geographical data is whether or not one's survival chances depended on the place of refuge. For this purpose we constructed a specific table (Table 6.3) with the overall survival percentage for each sector together with the percentage of people who died in the Gatwaro Stadium.¹¹

Table 6.3: General survival chances and death in the Gatwaro Stadium

Sector	% survived genocide	Gatwaro Stadium	
		% killed	number killed
Buhinga	8.6	62.8	615
Gacaca	24.5	54.5	192
Gihara	5.0	66.9	477
Gitwa	15.7	55.4	149
Kibirira	30.0	26.2	124
Kigeyo	7.4	67.1	753
Kibingo	22.3	2.3	22
Mushubati	14.9	47.9	444
Nyaragatovu	12.8	3.6	32
Nyarugenge	7.6	48.8	185
Rubengera	10.4	59.1	331
Rukaragara	6.5	8.5	35
Total	13.8	36.2	3.359

We then make two groups from the 12 sectors (Mukura and Ngoma have few victims to do the analysis with and are left out). The first group includes those sectors of which less than 50% of its victims died in the Gatwaro Stadium, the second group includes the sectors of which more than 50% of its victims died in the Gatwaro Stadium.

Group 1 : Buhinga, Gacaca, Gihara, Gitwa, Kigeyo and Rubengera

Group 2 : Kibirira, Kibingo, Mushubati, Nyaragatovu, Nyarugenge and Rukaragara

On average, 20.9% of the victims in the first group died in the Gatwaro Stadium, compared to 63.3% for the second group. We then compute survival chances for each group and test whether they are significantly different for both groups in Table 6.4

¹¹ I decided to pursue more detailed work on (differences in) survival chances thanks to an insightful discussion with Susan Cook.

Table 6.4: Survival chances in two different groups

Killed in or survived the genocide ?		% victims killed in Gatwaro St.		Total
		<50% Group 1	>50% Group 2	
Killed	number	4.609	4.590	9.199
	percent	83.1	89.6	86.2
Survived	number	939	530	1.469
	percent	16.9	10.4	13.8
Total	number	5.548	5.120	10.668
	percent	100	100	

Chi-Square Tests of the equality of survival chances					
	Value	df	Asymptotic Sign. (2-sided)	Exact Sign. (2-sided)	Exact Sign. (1-sided)
Pearson Chi-Square	96.898	1	.000		
Continuity Correction	96.345	1	.000		
Likelihood Ratio	98.256	1	.000		
Fisher's exact test				.000	.000
Linear-by-Linear Association	96.889	1	.000		
Number of valid cases	10.668				

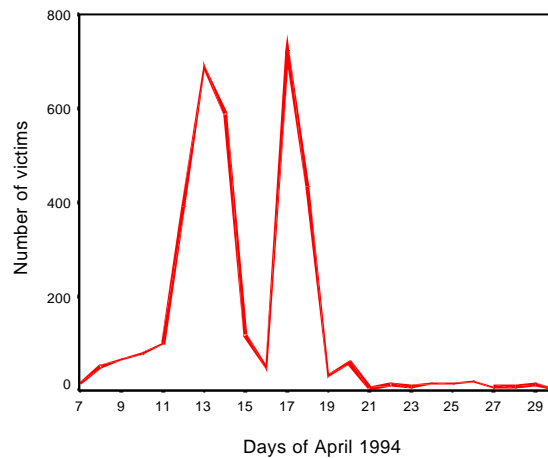
We find that Tutsi from sectors with few victims (in %) killed in the Gatwaro Stadium had a higher overall survival chance. From the first group, 16.9% survived the genocide, whereas only 10.4% from the second group survived. This difference is statistically highly significant, as shown by the test statistics. In general, we do not find a higher survival percentage in the sectors whose population sought refuge in 'Nyamagumba' and fought the Interahamwe there. We found 677 Tutsi who went to Nyamagumba, from two sectors in particular, Kibingo and Rukaragara. Both belong to our second group, but the survival percentage was much higher for Kibingo sector (22.3%) compared to Rukaragara (6.5%). Although few Tutsi from these two sectors went to the Gatwaro Stadium, we cannot draw general conclusions on the question whether fighting the Interahamwe increased one's survival chances. It seems that only escaping to Zaire or hiding really improved one's chances. From this, one can derive a behavioral guideline for persons targetted for extermination in the future : do not go where the crowd goes.

Table 6.5: Occupations of the victims of Mabanza

Name of occupation	Number of victims	% of victims
Pupil	2.486	26,8
Farmer	4.774	51,5
Teacher	97	1
Administrator	59	0,5
Businessman	41	0,4
Driver	20	0,2
Construction worker	21	0,2
Soldier	22	0,2
Doctor/nurse	16	0,17
Pastor/nun	9	0,1
Technician	3	0,03
Lawyer	3	0,03
All other occupations	35	0,3
Unknown occupation	1.671	18
Total	9.257	100

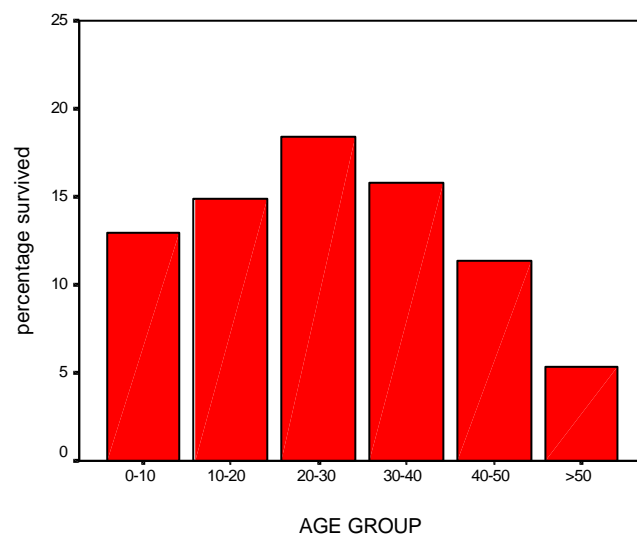
Table 6.5 gives an overview of the occupations of the victims of Mabanza commune. Because of the presence of a secondary school, this commune had more professionals compared to other communes. However, more than 90% of the adults whose occupation was registered, were farmers.

Figure 3: Distribution of killing through time, cases with known dates =3427*



* About 150 Tutsi from Mabanza whose date of death is known, died after April 30th, 1994; they are not included in the graph. In total, we have 3566 people in Mabanza whose date of death is known. Almost half of all the Tutsi from Mabanza commune of which we have the date, died either on April 13th or on April 17th. The former marks the attack on Nyamagumba and the latter the killing in the Parish of Kibuye and the Gatwaro stadium. It is more likely that the dates of the victims who died in these major massacres are known compared to victims who were killed in their houses, in the woods or on the hills : we have the dates of 50% of the victims killed in either Parish, Stadium or Nyamagumba, compared to 30% of the victims killed outside these major massacres. The major massacres are thus overrepresented in Figure 3, but the bias is not very large. It is not the case that off-farm occupations are over represented in the dates.

Figure 4: Age specific survival chances in Mabanza commune



Since death and survival are discrete events in statistical and demographic analysis, we can perform a logistical regression analysis with a survival dummy variable '0' for death and '1' for survived. We use age, sex and sector of residence as explanatory variables. The binary choice model, which is underlying the logistical regression, is derived in appendix 1. In the present estimation, 'the event occurring' is the survival of a person during the genocide in Mabanza commune. The following variables were included in the regression: Age, Age squared, Sex, Sex*Age interaction, occupational dummy and sector dummies except for the sectors Mukura and Ngoma (very few cases) and sector Buhinga which was used as the base-line. The number of people included in the regression is 8.289 (number for which we have complete information).

Table 7: Regression results, survival dummy is dependent variable

Explanatory Variables	B	S.E.	Sig
AGE	.0442 **	.0096	.0000
AGE ²	-.0011 **	.0001	.0000
SEX	.2312	.1447	.1101
AGE*SEX	.0110 **	.0051	.0311
OFF-FARM	.6589 **	.1391	.0000
SECTOR dummies			
GACACA	1.2155 **	.1675	.0000
GIHARA	-.3640	.2211	.0997
GITWA	.8141 **	.1847	.0000
KIBIRIRA	1.6166 **	.1517	.0000
KIGEYO	-.1128	.1743	.5177
KIBINGO	1.2329 **	.1462	.0000
MUSHUBATI	.7198 **	.1559	.0000
NYAGATOVU	.5897 **	.1590	.0000
NYARUGENGE	-.0324	.2207	.8833
RUBENGERA	.4016 **	.1956	.0401
RUKARAGATA	-.0456	.2334	.8452
CONSTANT	-2.9649 **	.1924	.0000

n=8.298

the effects are robust for other specifications of the logistical regression

** significant at the 5% level

Since the interpretation of the results requires some knowledge of the logistical procedure, we shall concentrate on the essential findings. All the variables, except the sex variable and four sector dummies, are significant ($\text{Sig} < 0,05$) meaning that these variables have a separate and statistically relevant link with our dependent variable, survival during the genocide.

The effects of the age variable is not linear, but quadratic. This means that a victim's probability to survive the genocide increases with age at low levels of age, reaches a maximum at the age of 20 ($0.0442 / (2*0.0011)$) and decreases again at high levels of age. *Women in general did not have a higher survival chance*, but older women did. Tutsi having a non-farming occupation had a higher survival chance than farmers and pupils. The latter result is puzzling and interesting at the same time. Were they better informed than poorer people and chose to flee earlier? Were they physically more able to flee? Did they have more cash to pay off Interahamwe? This regression exercise cannot give answers to these questions. All it can do is show that one's occupation did influence one's survival chance in Mabanza. Compared to Buhinga sector, Tutsi living in the sectors Gacaca, Kibirira, Kibingo had a relatively high survival chance.

5. THE DISTRIBUTION OF KILLING THROUGH TIME AND SPACE: ESTIMATION PROCEDURE AND RESULTS

5.1. Dealing with missing data

Since the number of dates of death known by commune is highly unequal, it is possible that Figure 1 offers a biased perspective of the distribution of killing through time. The bias occurs if the killings in the communes where we have little data differs substantially from the communes where we have a lot of data. The shape of the curve in Figure 1 suggests that most of the Tutsi of Kibuye were killed in the first weeks of April 1994. Further investigation has to show whether missing data change this shape.

In order to present a graph for the entire sample, we have to devise an estimation procedure that corrects for the lack of data in some of the communes. For the communes of Bwakira, Kivumu, Mabanza, Mwendo, Rutsiro and Rwamatamu, a simple and straightforward

estimation procedure was used. We consider the victims of which the dates are known as a representative sample of all the victims of that commune. This means we apply a weighing procedure where the weight by commune is adjusted according to the number of dates known for that commune. For example, for Mwendo commune, where we have almost half of the dates, each date is weighted with 2,2. This procedure thus assumes that the distribution of the dates of killing of the victims of which the date is known is representative for all the victims residing in that commune.

For the communes Gishyita and Gisovu a slightly different procedure was used for three reasons: firstly, we noticed that the date of death of the victims living in these communes varied a lot according to the place where they died. In these communes, it made a difference whether one was able to take refuge in the hills of Bisesero or not. The victims taking refuge in Bisesero died later than the victims who were killed in other places. Secondly, especially in Gishyita commune, where many Tutsi lived, the number of cases in which the date is known is larger for the victims who did NOT die in Bisesero. This means that if we apply the same weight for the whole commune of Gishyita, the estimation for the victims from Bisesero is biased. We would then proceed as if the distribution of the dates of death of the victims at Bisesero is the same as the distribution of the victims who died at other places¹². Thirdly, since it is important to know how many people died in Bisesero and when they died, we undertake a separate estimation for Bisesero. For these three reasons, the dates of victims from Gishyita and Gisovu communes are weighted according to whether they died in Bisesero or not¹³.

For the commune of Gitesi, not only the date of death is not registered in the IBUKA database, but also the place is not registered for more than 50% of the victims. At this point, the IBUKA database is unreliable. For Gitesi commune therefore, another weighing procedure was used. Table 8 gives an overview of the estimation procedure per commune.

¹² The Tutsi living in Gishyita commune were not only killed in the hills of Bisesero, but also in the Mugonera Hospital, in the Catholic Church of Mubuga and in other places throughout the commune.

¹³ When I use Bisesero, I mean the hills (plural) in Bisesero sector where the Tutsi of Gishyita, Gisovu, Gitesi and Rwamatamu took refuge and defend themselves against the forces of genocide.

Table 8: Different weighing Factors

One weighing factor	two weighing factors	three weighing factors
Bwakira	Gishyita	Gitesi
Kivumu	Gisovu	
Mabanza		depending on when and
Mwendo	depending on	where they died
Rutsiro	whether they died	- Somewhere in the commune
Rwamatamu	in Bisesero or not	between April 15 and 19
		- in Bisesero
		- in all other places

To repeat, in order to estimate the distribution of killing through time, we need to weigh the victims with known dates of death. Depending on the commune the weighing factors differ. For most communes we only need one weighing factor, namely one that multiplies each victim with known date to arrive at the total number of victims in that commune.

For Gishyita and Gisovu, we use two weighing factors, depending on the place of death, namely in Bisesero or not in Bisesero. We therefore needed to determine first how many people died in Bisesero, otherwise we cannot use reliable weighing factors. The same is true for Gitesi commune. Since dates are lacking for Gitesi, we needed to determine first the number of victims at several places in the commune before applying weighing factors in the time distribution. This was done with the help of the re-coded data in appendix 2.

In order to keep the text readable, the estimation procedure for Bisesero is presented in the appendix 3. In order to do our estimation for Bisesero, we also had to look at the number of Tutsi killed in Kibuye town. The latter helps us to calculate the number for Bisesero. Without the figure for Bisesero (which is of course also an estimation) one cannot determine the weights needed for the distribution through time. In order to calculate the number of Tutsi who died in Bisesero, a number of assumptions had to be made.

On the basis of the IBUKA data, my own re-coding of the Mabanza and Gitesi data and a number of assumptions specified in the appendix 3, I estimate the number of Tutsi who died in Bisesero at 13.000, of which 6.800 from Gishyita, 1.333 from Gisovu, 3.700 from Gitesi, 700 from Rwamatamu and 400 from Mabanza commune.

5.2. Estimation results by day for Kibuye Prefecture

With the 13.000 estimate for Bisesero and the weighing procedure for each commune and for Bisesero, we can present a table and a graph of the distribution of killing through time in Kibuye prefecture. The method namely considers the victims in Bisesero of which we have the dates of death as a representative sample of all the victims of Bisesero. To calculate these victims is important because the Tutsi at Bisesero, on average, died later than the other Tutsi. This accordingly gives you another distribution through time. Since we only have the dates of 2.500 victims who died in the hills of Bisesero, these people are giving a weighing factor 5,2 to arrive at 13.000 (my best estimate).

According to the IBUKA data, 340 people died before April 6. From other sources, it is known that several people were killed in the first months of 1994 in different attacks, but 340 in five days seems to be a high number. We were not able to verify this information, but it may very well be that enumerators registered 'April 1' instead of 'May 1', meaning that we may be dealing with registration errors. We find support for this reasoning when we notice that the number of people registered as killed in the first week of May is very low. When one adds the figures of April 1 to the figures for May 1 (and April 2-5 to May 2-5) we may get more correct figures for killing in the first week of May. We realize the importance of knowing exactly how many people were killed before April 6 for the study of the genocidal process, but from a statistical point of view, these numbers make no big difference. That is why we decided to include them in the presentation

Measured in numbers of people killed per day, the genocide in Kibuye reached its peak in the middle of April. 75% of Kibuye's Tutsi killed during the genocide were killed in the first few weeks. After 50 days (by the end of May), the genocide was almost completed in Kibuye, leaving 59.050 dead. This makes a daily average of 1.200 Tutsi killed. The first few weeks however show a much larger number of people killed per day. Between April 7^h and April 21st, about 3.000 Tutsi (75% of 59.050 divided by 15 days) were killed on average every day with April 13th as peak showing an estimated 6.408 (10.8% of 59.050) people killed that day. A day later an estimated 6.206 people were killed. The most deadly weekend during the genocide in Kibuye Prefecture was probably April 16 and 17 with 4.800 and 5.300 people killed each day respectively.

We stress that the figures presented in table 9 are estimations, not exact numbers.

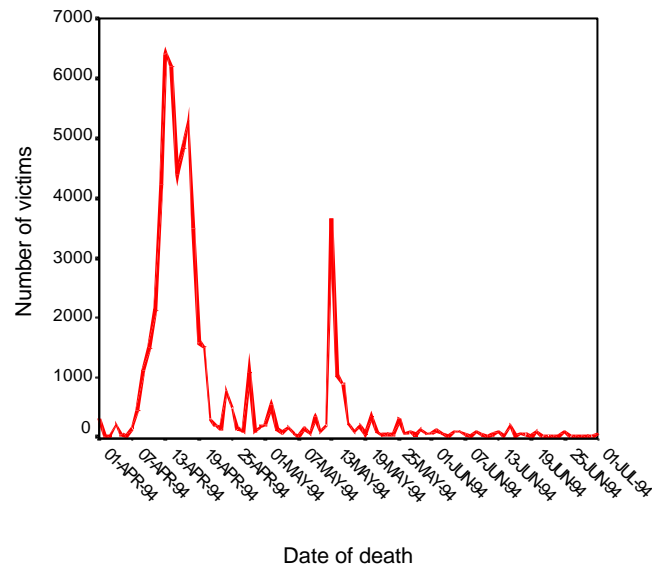
Table 9: Victims of genocide in Kibuye Prefecture (including Bisesero) per day

Date	Number of Tutsi killed that day of which date is known	Weighted number of Tutsi killed that day (applying 'best estimate')	Percentage of Tutsi killed that day	Cumulative percentage
April 1	134	134	0,2	0,6
April 2	7	7	0,0	0,7
April 3	7	7	0,0	0,7
April 4	175	175	0,3	1,1
April 5	17	17	0,0	1,2
April 6	11	20	0,0	1,2
April 7	63	160	0,3	1,5
April 8	193	445	0,8	2,2
April 9	379	1.133	1,9	4,2
April 10	655	1.503	2,5	6,7
April 11	952	2.135	3,5	10,1
April 12	2.398	4.238	7,1	17,2
April 13	3.683	6.408	10,8	28,1
April 14	3.492	6.206	10,5	38,6
April 15	2.468	4.416	7,4	46,0
April 16	2.525	4.839	8,2	54,2
April 17	1.629	5.296	9,0	63,2
April 18	1.194	3.488	5,9	69,1
April 19	312	1.392	2,3	71,4
April 20	681	1.506	2,5	73,9
April 21	146	300	0,5	74,4
April 22	100	208	0,4	74,8
April 23	84	163	0,3	75,1
April 24	203	772	1,2	76,3
April 25	207	501	0,9	77,2
April 26	76	142	0,2	77,4
April 27	43	93	0,2	77,6
April 28	870	1.099	1,9	79,5
April 29	59	101	0,2	79,7
April 30	81	179	0,3	80,0

Table 9 : Continued

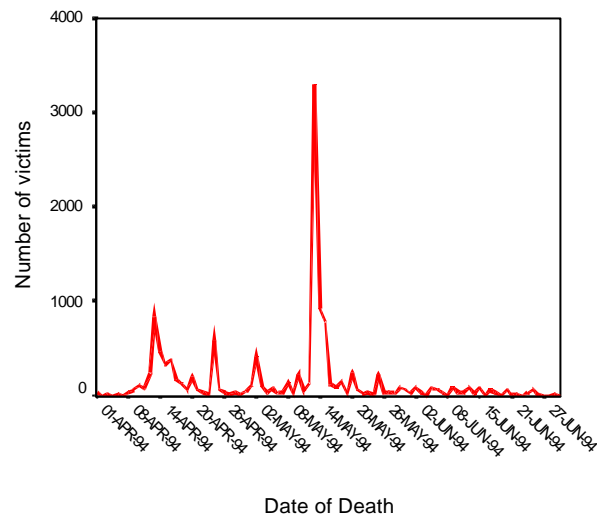
Date	Number of Tutsi killed that day of which date is known	Weighted number of Tutsi killed that day (applying 'best estimate')	Percentage of Tutsi killed that day	Cumulative percentage
May 1	67	212	0,4	80,4
May 2	136	547	0,9	81,3
May 3	39	146	0,3	81,6
May 4	32	86	0,1	81,7
May 5	51	173	0,3	82,0
May 6	22	62	0,1	82,1
May 7	9	37	0,1	82,1
May 8	36	157	0,3	82,4
May 9	28	66	0,1	82,5
May 10	103	342	0,6	83,1
May 11	37	100	0,2	83,3
May 12	57	205	0,4	83,7
May 13	782	3.654	6,2	89,9
May 14	227	1.029	1,7	91,6
May 15	203	902	1,6	93,2
May 16	69	231	0,4	93,6
May 17	24	111	0,2	93,8
May 18	53	209	0,4	94,2
May 19	20	54	0,1	94,2
May 20	97	361	0,6	94,8
May 21	26	93	0,2	95,0
May 22	14	40	0,1	95,1
May 23	14	52	0,1	95,2
May 24	13	44	0,1	95,3
May 25	71	291	0,5	95,8
May 26	21	69	0,1	95,9
May 27	0	0	0	95,9
May 28	33	93	0,2	96,1
May 29	15	46	0,1	96,2
May 30	34	131	0,2	96,4
May 31	13	65	0,1	96,5
All of June and later	771	2.120	3,5	100,0
Total	25.716	59.050		100

**Figure 5 : Victims of Genocide in Kibuye Prefecture
number murdered per day , treated data, n=59.050**



From the data, we learn that killing started immediately, especially in the communes of Rutsiro, Mabanza, Rwamatamu and Gishyita.. The graphs that were published in the Nominative Dictionary of IBUKA are approximately correct, but do not do apply the weighing factors. The main difference between the graphs in the dictionary and the present graphs is that the former underrepresent the number of Tutsi killed on May 13th. While figure 5 clearly shows the first two weeks of the genocide in Kibuye as the period in which most Tutsi were killed, it also details two other devastating days, namely April 28th and May 13th. The latter date is known in the survivor community as the date on which Interahamwe from all over Rwanda assembled in Bisesero to kill the Tutsi there who succeed in resisting the genocide. For several weeks, the Tutsi at Bisesero mounted a formidable resistance against the forces of genocide. Using the steep hills, gathering and throwing stones and implementing a method of strategic fighting (Kwivunga sha), they succeed in staying alive. Against attackers with overwhelming firepower, they had no chance anymore. Figure 6 in particular shows the extra-ordinary death path of the Bisesero Tutsi. The second peak, April 28 and 29 are the days of the massacre at Kiziga Hill in Rwamatamu commune.

Figure 6 : Victims of Genocide at Bisesero
Number of Tutsi murdered per day, treated data, n=13.000



6. EXTRAPOLATION FOR RWANDA

Extrapolating the estimation results for Kibuye and combining this with numbers of killed Tutsi put forward in the literature, we can make an approximation of the killing in the entire country. I want to stress that the following table is only a tentative approximation and should not be regarded as a careful count. I used my own calculations for Kibuye and calculated all the other figures from the Human Rights Watch publication "Leave none to tell the story". I added the numbers in that publication for the major massacres that occurred during the indicated days in Gikongoro and in Butare. The figures are only rough estimations. I also took the 500.000 number from HRW as the estimated number of victims. From census data we know that Kibuye, Gikongoro and Butare taken together have about half of the Tutsi population before the genocide. Since it was difficult to get estimates for massacres in the other prefectures, I extrapolated the number killed in these three prefectures for the whole of Rwanda.

Table 10 : Estimation (by extrapolation) of killing over time*

	Kibuye	Butare	Gikongoro	3 pref.	Rwanda**
April 6-10	3.000		10.000	13.000	25.000
April 11-14	20.000		25.000	45.000	87.000
April 15-18	20.000	20.000	20.000	60.000	115.000
April 19-22	2.000	35.000	15.000	52.000	100.000
April 23-26	2.000	35.000		37.000	70.000
April 27-30	2.000	10.000		12.000	23.000
Total April	49.000	100.000	70.000	219.000	420.000
May-June	11.000	20.000	10.000	41.000	80.000
Total	60.000	120.000	80.000	260.000	500.000

* I repeat that this table should not be read as if I do not think that there were no killings in Butare Prefecture before April 15. I am only interested in gross figures, not in exact calculations here.

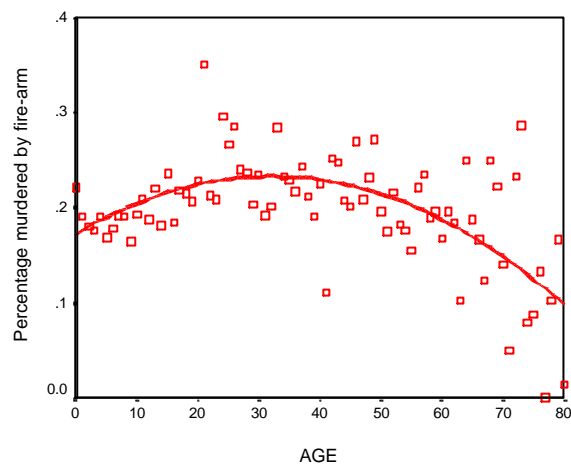
** Extrapolation is done starting from the sum of the three prefectures and using the HRW estimate of 500.000 as a baseline. I rounded off to thousands, avoiding the use of hundreds.

Table 10 suggests that between April 15th and April 18th, *more than* 25.000 were killed every day in Rwanda. This can be traced back to the major massacres in that period : For Kibuye in the Gatwaro Stadium and the Parish of Kibuye, for Butare in Cyahinda church complex in the commune of Nyakizu and for Gikongoro in Kibeho church. The figure of 25.000 is my approximation of the average number of people killed between April 11th and April 22nd : $87.000 + 115.000 + 100.000) / 12 \cong 25.000$

7. ANALYSIS OF THE WEAPONS USED IN THE KILLING PROCESS

7.1 Focus on age

**Figure 7 : Murdered with a firearm
Realized probability by age**



The dots in figure 7 present the percentage of victims of each age that were killed by a firearm. Statistical software allows to draw a line (best fitted quadratic expression) through the cloud of these dots. A clear pattern emerges: few children and elderly people were killed by firearms and (relatively) many young adults. 20 to 25% of all victims in their early twenties were killed by firearms whereas for victims in their late fifties the figure was 10%. In a regression analysis (table 12) we will see that this age-effect is statistically significant.

7.2 A word on occupation and gender

From the IBUKA data file, we learn that 30.843 of the registered victims were farmers, 15.494 were pupils, 2.003 had an occupation outside farming and 10.710 victims were registered with unknown occupation. These figures confirm the basic characteristic of Rwandan society in general and in Kibuye in specific, namely the fact that it 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 used to be more involved in cattle breeding than Hutu, in the early nineties, there was no outspoken ethnic specialization in either agriculture or cattle breeding anymore¹⁴. Depending on wealth, Hutu as well as Tutsi held cattle and grew crops. The IBUKA data file does not mention the landholdings or the number of cattle of the victims and makes only a distinction between farming and non-farming.¹⁵ In table 11, I show the occupations of the victims, together with the weapons, that were used to kill the victims. I only use data on victims for whom the date of death, the occupation and the weapon is known. The pupils are also taken apart because this category is determined by age, which we already treated in the previous section. From a total of 21.293 victims for whom we have information on occupations, 772 (5% of the adult victim population) had a non-farming occupation. We notice that 30% of them were killed with a firearm. This percentage is significantly higher than that for farmers and pupils.

Table 11 : Occupations and weapons used

Occupation	number	killed by firearm	%
Farmers	13.589	1902	14
Non-farmers	772	231	30
Pupils	6.932	1039	15

More men than women were killed during the genocide in Kibuye, 30.528 men and 28.471 women (with 51 unknown) according to the IBUKA file. As far as the weapons are concerned, the difference between men and women is less outspoken compared to the differences by the age and occupations. Slightly more men than women (in absolute figures as well as in percentages) were killed by bullets.¹⁶

¹⁴ Historically, it may be more correct to say that people involved in cattle breeding were, over time, considered Tutsi. I refer to the literature on this important and complex topic, e.g. Newbury (1988), De Lame (1996).

¹⁵ More research is needed to investigate in what respect real or perceived ethnic labor specialization and inequalities in landholdings and cattle played a role in the genocide. Sources are f.e. A. Desforges (1999), P.Uvin (1998), C.André and J-Ph. Platteau (1998).

¹⁶ In the regression (table 12) gender appears to be significant in interaction with other variables.

7.3. Inequality until death ? A regression analysis of the weapons used to kill

The scholarly community involved in genocide research agrees on the use of traditional weapons as the main killing instruments in the Rwandan genocide. Less agreement is reached on the importance of firearms during the genocide. In this section, I shall test statistically whether or not firearms were used indiscriminately of the victim's person. In the previous sections, we discussed five variables that each may have had an effect on the weapon used to kill an individual during the genocide in Kibuye Prefecture. These variables were the date of death, the commune of residence, the gender of a person, the occupation and the age of this person. A statistical procedure, logistical regression analysis, allows one to trace the specific effect of each of these variables on the weapon that was used to kill the person in question. The logistic analysis is performed for those cases in which the dates of death were known, namely 43% of entire sample. We assign the value '0' in the event the victim was killed with a traditional weapon and the value '1' in the event the victim was killed with a firearm. The latter variable is either a bullet or a grenade. Our fifth variable is now a binary variable, (0 or 1) which is necessary to perform a logistical regression. The question we want to answer here is the following: are the independent variables able to explain the way in which the victim was killed, namely with a firearm or with a traditional weapon? The binary choice model is derived in appendix 1. In the database, we have 20.419 victims between April 6 and June 30 for whom we have complete information, meaning no missing data for any of the variables to be used in the regression analysis. It first needs to be said that I did not have a lot of choice on the question which variables to include in the regression. Apart from the mentioned variables, I also have the name of the place of death of the victim. I could not include the place of death since the data contain hundreds of places where people were killed and these places, as we have seen earlier in the paper, were not coded. We did include dummies for communes. Remember that we left out Rutsiro and Gitesi communes because of lack of data. Bwakira commune is used as base-line commune and the effects of other communes are thus fixed effects relative to Bwakira commune.¹⁷ The following variables were included in the analysis: age, age squared, sex (female=1), sex*age interaction, occupational dummy (off-farm work is 1), number of days after April 6, number of days after April 6 squared, sex*number of days after April 6 interaction, sex*number of days after April 6 squared interaction and dummies for communes.

¹⁷ One can use any other commune as base line.

Table 12 : Regression results, dependent variable weapon used¹⁸

Variable	B	S.E.	Sig
AGE	.0345 **	.0041	.0000
AGE ²	-.0005 **	.0000	.0000
SEX	-.1342	.1285	.2963
SEX*AGE	-.0067 **	.0021	.0016
OFF-FARM	.5200 **	.0801	.0000
DAYS after April 6	.1147 **	.0069	.0000
DAYS after April 6 sq.	-.0014 **	.0001	.0000
SEX*DAYs after April 6	.0491 **	.0135	.0003
SEX*DAYs after April 6 sq.	-.0015 **	.0003	.0000
COMMUNE dummies			
GISOVU	1.2435 **	.1753	.0000
GISHYATA	1.2841 **	.1642	.0000
KIVUMU	1.5782 **	.1660	.0000
MABANZA	3.2234 **	.1604	.0000
MWENDO	.6327 **	.1884	.0008
RWAMATAMU	2.4434 **	.1576	.0000
CONSTANT	-4.9339 **	.1838	.0000

n= 20.419

the effects are robust for other specifications of the logistical regression

** significant at the 5% level

The probability of the victim in Kibuye Prefecture to be killed by a traditional weapon or a firearm depended on the person's age, his occupation, the place of residence before the genocide, on the number of days the after April 6 the person was killed and on interaction effects of these variables with the sex. All the variables determine the 'choice' the killer made between a traditional arm or a firearm.

The effects of the age and days-after variables are not linear, but quadratic. This means that a victim's probability to be killed with a firearm increases with age at low levels of age; it reaches a maximum at age 34,5 ($0.0345 / (2 * 0.0005)$) and decreases again at high levels of age. This is also true for the days-after-April-6 variable : the probability to be killed with a firearm

¹⁸

Gitesi and Rutsiro communes are left out because of lack of data.

increases as the days move away from April 6, but decreases again towards the end of the genocide. The significance of the results on age and number of days after April 6 in fact confirms that middle-aged people (20 to 40 years of age) were more likely to be killed with firearms and that the genocide reached its most intensive period (meaning here the period in which the probability to be killed by a firearm was highest) after a few weeks.

Since the sex variable by itself is not significant, *women in general did not have a smaller chance* to be killed by a firearm. The significance of sex (or gender for that matter) reveals itself in combination with other variables (see below). The only variable capturing (part of) the socio-economic situation of the victim is the occupation variable. In the regression, victims with a non-farming occupation (a small minority in Rwanda) have the value '1' on the occupation dummy. The regression shows that non-farmers had a higher probability to be killed with a firearm compared to farmers and pupils.

Both the age and days-after-April-6 effects interact with the sex variable. A woman's probability to be killed by a firearm, compared to a man, decreases with her age (sex-age interaction negative and significant). For the days-after-April-6 variable, there is an additional positive effect for women at the beginning of the genocide and a negative effect towards the end of the genocide. This means that the probability of women to be killed by a firearm was higher, compared to men, a few weeks into the genocide (the period that I label 'the most intensive period'), and lower, compared to men, towards the end of the genocide. Although all these effects are significant (that is the reason why I present them), one should not overestimate their magnitude. The effects, especially the magnitude of the squared effects, are small. The effects of the communes of residence are also significant and on top of that they are very strong. This means that the probability of being killed by a firearm was high for residents of Rwamatamu and Mabanza communes compared to Bwakira. The regression does not tell *the reasons why* these communal dummies are significant and strong. Apart from Mabanza (see below), this is a question open for research. The effects are not due to the enumerators, since 15 to 20 enumerators were doing the data collection in one commune and the commune where one can speak of commune-wide bad data collection is left out of the regression.

In section four, I researched Mabanza commune in more detail. The reason why the probability of a Tutsi from Mabanza commune to be killed by a firearm was the highest in the entire prefecture was that many victims from Mabanza were killed in the Gatwaro Stadium. In that stadium, the perpetrators of genocide installed machineguns in the tribunes and fired at the crowd who were locked in the Stadium. Reasons for high prevalence of killing with firearms in a commune might be the size of the local stock of firearms, the presence of army-units in a commune, the participation of militia armed with firearms from another prefecture, to name but a few. A reason for the high prevalence of killings with traditional weapons in a commune might be the distribution of machetes to the local population. Detailed on-site investigations are necessary to confirm or refute this hypothesis. From the statistics however, it is clear that significant differences between the use of firearms existed between the communes.¹⁹

On a more general level, the results of the logistical regression show the organized character of the genocide. If age, occupation, commune of residence, the number of days after April 6th and the sex (interaction) variables all prove significant to explain the weapon used, then genocide was all but a random process. Indeed, one can read this regression analysis as statistical evidence of the organized character of the genocide in Kibuye prefecture.

As reasons why young Tutsi men who were working in the modern sector of the economy had a higher probability of being killed with bullets than other victims, we can only find one: in a number of cases, killers had to economize on bullets and thus used firearms only against the people in the village who could mount resistance. These people in turn were most likely young men aged 20 to 40 with a respected status in the commune or sector. That may have been one reason why they were killed by bullets. But again, the reasons behind this statistically significant effect cannot be derived from the analysis, but have to be found by other means. The present result only tells us that there is a significant effect and gives us some insight in the genocide, but cannot give waterproof explanations.

¹⁹

There are not many sources with which to compare the results from this logistical regression. An observation from the previously mentioned French officer, Lt. Colonel Stabenreth, 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...". As I said before, most of the refugees at Gatwaro Stadium came from Mabanza commune and 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.

8. REPORTS AND DOCUMENTATION OF GENOCIDE IN KIBUYE PREFECTURE

8.1. The content of reports and letters written by the prefect

In this section of the paper, I use the words of the perpetrators of genocide without giving much comment. I quote from the reports in order to show what they themselves wrote about the crime. In the next section, I discuss the use of the words in *italics*. The following reports and letters were obtained from Human Rights Watch : (own numbering of the document in brackets)

- A detailed report by the Prefect of Kibuye of the day to day events in all the communes between April 6 and April 10 dated on April 11. (k1)
- The report of the meeting of the security committee of Kibuye Prefecture on April 11, 1994 (k2)
- A letter of the Préfet to all the Burgomasters concerning the self-defense program of the population, on April 30th, 1994 (k3)
- A letter from the Préfet of Kibuye Prefecture to the Minister of the Interior and Communal Development, on May 5, 1994 (k4)
- A letter from the Minister of Interior and Communal Development to the military commander in Gisenyi asking to send troops to Kibuye Prefecture to support an operation in the sector of Bisesero, Commune of Gishyita, dated June 18, 1994 (k5)
- A undated letter addressed to the Minister of Interior and Communal Development concerning the management of Gisovu Commune. (k6)

In his first report during the genocide (k1) the Préfet of Kibuye , Dr. Clément Kayishema, gives a detailed overview of the situation in the communes and of his measures taken during the first days of the genocide. I quote from this report²⁰: On April 7, Kibuye was scheduled to receive a visit by the Special representative of the UN, Dr Jacques Roger Booh-Booh, but he did not come because of the events in the country. The same day the Préfet reports *rumors of interethnic clashes*, especially in the communes of Gishyita, Rwamatamu and Mabanza. On the night of April 7 to April 8, the Préfet reports *trouble* in all the communes of Kibuye Prefecture, but he adds that it are still *rumors* and that the local officials are trying to calm down the population. One *rumor* for example is that a group of people is going to cut the telephone lines of the Mugonero hospital in Gishyita commune. In Kivumu commune, the Préfet reports that two children of a Tutsi family are killed and the women wounded. On April 8, the Préfet

²⁰ Since the report contains several pages, I am only taking out the information that seems most important to me.

reports that Hutu in Gitesi commune want to organize *security walks* at night. The Préfet also reports the decisions of *the security committee* of the prefecture on the morning of April 8. The names of the members of this *security committee* meeting are mentioned in the document.

They decide that

- the fuel of the Petrorwanda fuel station is reserved for security,
- public meetings are forbidden until further notice,
- the permission to circulate for hotel personnel and visitors should be analyzed case by case and
- a number of vehicles are allocated to certain communes and communal police.

The report continues the overview of the events in the communes in the afternoon of April 8. Several refugees from Kayove arrive in Rutsiro and Mabanza communes. There is a *rumor* that the Tutsi of Bisesero are going to attack the Hutu of Bisesero. Tutsi would hide arms at the Hospital. In the night of April 8 to 9, about 300 *refugees* are signaled in the communal Bureau of Rwamatamu together with their cows and goats. On April 9, the security committee of the prefecture meets again and decides that

- no shooting between 6 p.m. and 6 a.m.
- authorization needed from the Burgomaster to travel to another commune
- closing of the markets near the Kivu Lake
- Allocate 500.000 Rwandan Francs from account 90.002 at the Commercial Bank of Rwanda to buy urgently needed fuel.

The report continues with the overview of the situation in the communes with a great deal of attention to Gishyita commune. The Burgomaster of that commune asks for urgent intervention of the gendarmes. The Tutsi of Mabanza commune have gathered at the communal bureau. In Mwendo commune, 11 criminals are arrested but taken to Kibuye center because the prosecutor of Birambo does not dare to do investigations. The burgomaster of Gisovu reports he has found two motorbikes and that some people are carrying guns. *Refugees* from Muko commune in Gikongoro arrive in Mwendo commune.

On April 10, the Préfet reports that the Hutu of Gishyita are *discouraged* because the Tutsi seem to have firearms. In Mabanza commune, the houses of the Tutsi are burning in several sectors and almost all Tutsi have gathered in at the communal bureau. A schoolteacher was killed by a grenade. In Mwendo commune, several houses of Tutsi are burning in Gashari sector but the gendarmes have intervened. Tension is rising and the *refugees* from Muko are relocated to the

primary school. In Rutsiro commune one has started to kill the cows and two people have died. The UNAMIR soldiers have left Kibuye on April 10 and relocated at Butare. The only expatriates who remain in Kibuye are religious people and some health workers. A list with their names is attached to the report.

Document (k2) is a short listing of all events on April 11. It relates the presence of 1000 *refugees* in Mwendu commune, mainly originating from Muko commune and 3000 refugees in Mabanza commune who *are threatened* by people from Rutsiro commune. There is a *rumor* that gendarmes are going to rob the Commercial Bank of Rwanda in Kibuye (Gitesi commune). The council tries to find solutions for the short supply of fuel and vehicles. They buy fuel, the Préfet decided to empty the MRND youth fund. The communes have requested additional policemen, firearms and ammunition, but the Préfet reports that it is *up to the communes themselves to provide this*. The measures of the April 9 meeting are repeated adding that *a mobilization campaign in the framework of pacification* will be undertaken. After this meeting, which lasted from 10 a.m. to 1 p.m., the members of the committee formed two groups to visit several communes. This activity was labeled a 'visit to the field' in the report (k2).

Document (k3) informs the burgomasters of the decision by the government of Rwanda to install *a civilian self-defense program*. The government wants the population to organize controls, set up roadblocks and look for *infiltration* by the Inkotanyi. In that respect, the burgomasters should recruit persons who will receive training from military reserve personnel. These persons should be physically and morally apt, of good conduct and with a certain credibility in the eyes of the population.

Letter (k4) addresses the security report for the April 11 to April 30 period to the Interior Minister²¹. The Préfet, author of this letter, states that that period was characterized by *inter-ethnic killings* in almost the whole prefecture, a massive displacement of people and livestock, looting and destruction of houses and of public buildings. He continues that calm is gradually returning from April 25 onwards and that people take up their normal activities again. There is, the Préfet writes, *a small area of insecurity in the Bisero area* bordering Gishyita and Gisovu communes. In the remainder of the letter, the Préfet reports seven disquieting facts among which, the absence of funds, the climate of vengeance between people and the arguments over the distribution of looted goods, abandoned fields and houses by the population.

²¹ The author is not in the possession of that report.

Document (k5) is a letter addressed to the military commander in Gisenyi by the minister of the interior. By governmental decision, the minister orders the commander to supply troops to Kibuye for a search operation in Bisesero (in French “operation de ratissage”). This operation should be terminated at the latest by June 20.

Document (k6) is a complaint against the burgomaster of Gisovu commune, Ndimbati who is accused of *mismanagement of his commune*. The letter is not dated but features a receive stamp dated July 8, 1994. The burgomaster is accused of looting furniture, raiding cattle, stealing money from the local bank, stealing 73 metal sheets from a medical center and killing 7 persons including 2 soldiers. These seven persons were residents of Gishyita commune and as a result of the killing, there is increasing tension between the people of Gisovu and Gishyita communes. That is why the author of the letter proposes to replace the burgomaster.

8.2. The (un)reported facts and the use of population statistics

As in Nazi-Germany, the word ‘genocide’ was never used to describe the killings. The Préfet used ‘the war’, ‘inter-ethnic rivalries’, ‘security measures’ to describe the acts of genocide. When the Préfet gives an overview of the ‘events’ in Kibuye in the first week of the genocide (April 6- 10) (k1) and in his report of April 11 (k2), he mentions the burning of houses, the displacement of people, the presence of refugees and sometimes he also reports the killing of a few people. Compared to the statistics presented in the first part of this paper, the figures of murdered people in the reports of the Préfet are ridiculous. One person killed in Kivumu, 3 persons killed in Mabanza, he writes...whereas in fact more than 5000 Tutsi were killed at the end of the first week.

The Préfets’ statement that on April 7 especially the communes of Mabanza, Rwamatamu and Gishyata were ‘hit by interethnic clashes’ seem to correspond, at least as far as the date and the communes are concerned (the description of the ongoing events is something else), with the early killings in these communes derived from the IBUKA data file. This means that from two independent sources, we can state that the genocide started in all communes on April 7, but was especially fast in the three communes mentioned. These reports from the Préfet of Kibuye, Dr. Kayishema Clément, are official documents of a leading official in Rwanda. The Préfet was the highest authority in his prefecture but did not have close contact with the population when compared to the burgomasters. Notwithstanding the language used by the Préfet, we can derive from his reports that the genocide in Kibuye Prefecture started immediately after the death of president Habyarimana. The population of Kibuye did not wait

one day but started killing on April 7. The speed of the genocide in Kibuye Prefecture is incredibly high, as documented by the IBUKA figures, which is an indication that many Hutu joined the killing campaign. Thus the reports of the Préfet only give a glimpse of the real facts. It was virtually impossible for the Préfet to make a day to day head count of all the victims in his prefecture, but as Alison Desforges writes

“Administrative officials recorded changes in the population extremely carefully before the genocide, nothing births, deaths, and movement into and out of the commune on a monthly as well as a quarterly basis. With this data, officials knew how many Tutsi, whether male or female, adult or child, lived in each administrative unit, information useful in any attempt to eliminate them. Prefect Kayishema was so concerned about the accuracy of this data that he took time in early May to review census data submitted by burgomasters for the last quarter of 1993. He found errors in at least two of the reports, that of Mabanza, which recorded the increase in female Tutsi as fifty-two instead of fifty-three, and that of Rwamatamu where an error of seven was made in accounting for the male Tutsi population and an error of six was made in recording that of female Tutsi.”²²

This makes it clear that population statistics in Kibuye Prefecture and especially the accurate reporting system of demographic changes that existed in Rwanda before the genocide became a deadly tool in the hands of the prefect. Desforges writes that during the genocide, administrators gave orders to register all displaced persons immediately. (p. 240). She also refers to documents where the burgomaster of Bwakira commune asked councilors to submit a list of household heads who had died, the number of people in the household killed and the number who had fled (p. 240-241). The use of statistics in the pursuit of genocide is not unique to Rwanda. In a recent paper, W. Seltzer shows the intricate involvement of statistics and statistical systems in the planning and advancement of the genocide against the Jews of Europe in Nazi-Germany, Poland, France, the Netherlands and Norway²³. What is highly disturbing in the Rwandan case is the fact that the international community did not take action against the registration of ethnicity on the identity cards of Rwandans when this could have saved thousands of lives. According to Desforges, influential donors overlooked the systematic discrimination against Tutsi before the genocide and did not insist on the elimination of ethnic affiliation on the cards that served as death warrants for many Tutsi in 1994 (p. 17) Indeed, as the statistics helped the Préfet to pursue genocide as accurately as possible, the identity cards (one of the visible outputs of a statistical system) helped the Interahamwe to sort out Tutsi from a crowd of people.

²² Desforges, A., *Leave none to tell the story*, Human Rights Watch, 1999, p. 239.

²³ Seltzer, W., *Population Statistics, the Holocaust and the Nuremberg Trials*, *Population and Development Review* 24 (3), 1998.

The Préfet did not only trace Tutsi, he organized the massacres himself and chose a euphemistic language to talk about them. I did not find a word about the massacre in Gatwaro Stadium for example. However, this does not mean that we should totally discredit his reports. When, in document (k4) the Préfet writes that “calm” gradually returned from April 25 onwards, he means that most Tutsi from Kibuye had been killed by then. From the end of April, the Préfet tried to restore ‘normality’ in the prefecture. As if nothing had happened, children had to go back to school and adults back to work.

The group of Tutsi that defended themselves in Bisesero where among the few Tutsi that were still alive. The Préfet describes this in his letter (k4) as a “small area of insecurity”. Survivors of the massacres at Bisesero told African Rights researchers they have seen the Préfet several times at Bisesero. He was considered one of the leading organizers of the genocide²⁴. The Préfet, together with Obed Ruzindana (rich businessmen), Alfred Musema (director of the tea factory in Gisovu) and the burgomasters of Gisovu and Gishyata drove around in their cars and in the trucks of the tea factory to deliver interahamwe and soldiers to the massacre sites²⁵.

The answer of the Préfet that the communes themselves have to provide firearms and ammunition can be understood in the context of the national policy of self-sufficiency.²⁶ This policy did not only mean that each household should produce their own food, but also that each commune should take care of itself, making that each prefecture and in the end Rwanda can care for itself. As it was national policy before the genocide that Rwanda should solve its own problems, or find Rwandan solutions for its problems, the genocide itself was interpreted as a Rwandan solution to its own problem. Every cell, sector, commune or prefecture should solve its own problem; that is how political leaders tried to transmit their messages to local officials. Only when resistance was too great and local officials could not manage the situation, the higher level would intervene. This was the case in Bisesero where the burgomaster of Gisovu sent someone with his car to Cyangugu to call John Yusufu Munyakazi to Bisesero because the interahamwe from Bisesero could not ‘do the job’ by themselves. It was with the help of this relentless mass murderer that the Tutsi of Bisesero lost the unequal battle. (African Rights pp. 29-30).

²⁴ Resisting Genocide, p.18 and 28. I do not have access to testimonies by survivors in the course of judicial procedures at the International Court in Arusha, where the Préfet Clément Kayishema is currently imprisoned. Such testimonies could shed light on the exact role of the Préfet during the genocide in Kibuye.

²⁵ Ibidem, and p. 51.

²⁶ I refer to another paper of mine where I discuss the development and peasant ideology of the Habyarimana regime, paper published in the November 2000 issue of the *Journal of Genocide Research*.

9. CONCLUSIONS

In this paper, I have presented a statistical analysis of the genocide in Kibuye Prefecture, Rwanda. I used the data file collected by IBUKA and assumed that the data in this file are (fairly) reliable. I discussed the numerous data problems of this file. For two communes, Mabanza and Gitesi, I re-coded the data on victims to use them for statistical purposes and also computerized data on survivors. From the regression analysis, I derive that middle aged Tutsi had a better survival chance than the very young and the very old, especially when they did not join the crowd at the Gatwaro Stadium. Fleeing gave the highest probability to survive the onslaught. The effects of several sector dummies in the regression are very significant, indicating that one's survival chance indeed depended on the sector of residence. The reason for this is that the Tutsi population of half of the sectors of Mabanza went to the Stadium whereas the Tutsi of the other sectors did not (or not so much) go to the Stadium.

In order to calculate the distribution of killing through time, I first had to estimate the number of people killed in the hills of Bisesero. This was only possible with the help of some assumptions to overcome gaps in the data file, especially for the commune of Gitesi. My best estimate for the number of Tutsi killed in the hills of Bisesero is 13.000. Using this number, I then calculated the number of Tutsi killed every day in the entire prefecture. The results from this calculation confirm what the scholarly community already knows, namely that the speed of the genocide was incredibly high. 75% of the Tutsi of Kibuye were already killed by the 22nd of April, meaning a daily average of 3000 for the first two weeks of the genocide. And this is only for one prefecture.

The paper also features a statistical analysis of the weapons used in the genocide. Half of Kibuye's murdered Tutsi population was murdered with a machete, one in six with a club and one in six with a firearm. The place of residence before the genocide, the age and gender of the victim and the victim's occupation all proved statistically significant in a regression determining the weapon (a binary variable) used to kill a particular victim. Combined with the speed of the killing, these results could only have been obtained, we believe, with broad participation of Hutu peasants in the genocide. As Minna Schrag, a former prosecutor with the International War Crimes Tribunal for Yugoslavia, observed at a 1997 conference on the use of quantitative data and analysis "data can help us tell the story of the crime ". (from W. Seltzer, p. 543). From the data, I conclude that speed, accuracy and resistance are the keywords in the story of the genocide in Kibuye.

Appendix 1 : the binary choice model

The binary choice model is derived as follows²⁷ :

The probability of having $y = 1$ instead of zero can be written as

$$\text{Prob}\{y = 1\} = G(x_k, \beta) \quad (1.1)$$

where G is a functional form containing the vectors x and β .

Usually, the functional form is restricted to

$$G(x_k, \beta) = F(x_k' \beta) \quad (1.2)$$

where F is a cumulative distribution function

It is possible to derive a binary choice model using a latent variable presentation of the model

$$y^* = \sum_k \mathbf{b}_k x_k + \mathbf{e} \quad (1.3)$$

where y^* is an unobserved latent variable and ε symmetrically distributed with zero mean and cumulative distribution function $F(\varepsilon)$. What we observe is a dummy variable y , a realization of a binomial process, defined by

$$y = 1 \quad \text{if} \quad y^* > 0 \quad \text{and} \quad y = 0 \quad \text{otherwise}$$

therefore

$$\begin{aligned} \text{Prob}(y = 1) &= \text{Prob}\left(\sum_k \mathbf{b}_k x_k + \mathbf{e} > 0\right) \\ &= \text{Prob}\left(\mathbf{e} > -\sum_k \mathbf{b}_k x_k\right) \\ &= 1 - F\left(-\sum_k \mathbf{b}_k x_k\right) \end{aligned} \quad (1.4)$$

The specific functional form of F depends on the assumptions that one makes concerning the distribution of ε . In case of the binary logit model, we assume that ε follows a logistic distribution. This distribution is similar to the standard normal distribution but instead of a variance of 1 it has a variance of $\pi^2/3$.

²⁷ We follow the approach taken in Liao, T.F, Interpreting probability models, Quantitative applications in the social sciences series, Sage publications, 1994.

In that case

$$\text{Prob}(y=1) = L\left(\sum_k \mathbf{b}_k x_k\right) = \frac{e^{\sum_k \mathbf{b}_k x_k}}{1 + e^{\sum_k \mathbf{b}_k x_k}} \quad (1.5)$$

The model in (1.5) is the binary logit model, it represents the probability of the event occurring ($y=1$). In the two estimations presented in this paper, 'the event occurring' is the survival of the genocide in the first regression and the use of a firearm in the second regression.

Appendix 2 : Death and survival in Gitesi commune

Gitesi commune, which is Kibuye's 'urban' commune, had a numerous Tutsi population before the genocide. Unfortunately, the quality of the data collection on the genocide was weak. It is this lack of good data that made me visit Gitesi commune in October 2000. I wanted to find out more about the genocide in that commune. Together with a re-coding of the data, the visit to Gitesi commune yielded the following information:

- From April 6th till April 11th, the large majority of the Gitesi Tutsi stayed in their homes²⁸. They did not gather by the thousands in front of the communal office as did the Tutsi from Mabanza. This explains why, after April 11, the Tutsi of Gitesi were killed at a large number of places throughout the entire commune, more dispersed than the Tutsi of Mabanza commune.
- The dispersion also explains why fewer dates on which the killings happened were recorded. Members of the same household fled in different directions and did not know about the fate of their household members.
- The burgomaster apparently did not actively pursue the genocide, neither did he oppose it. He behaved more as a bystander. This may give an additional explanation of the dispersion of the Tutsi from Gitesi, at least in the first few days of the genocide.
- A number of Tutsi of Gitesi came to Kibuye town center from April 12 onwards; many of them however were killed in other places throughout the commune.

As I indicated at the beginning of the paper, the quality of the data for Gitesi commune is poor. Re-coding is only a worthwhile undertaking if it gives the researcher additional and new information. Looking at the registration books for Gitesi commune, I decided that re-coding would be worthwhile for half of the sectors, namely the sectors Burunga, Buye, Bwishyura,

²⁸ Interview, Gitesi commune, October 31, 2000.

Gitarama, Kayenzi and Rurangwe. The results are presented hereafter. The procedure is thus the same as for Mabanza commune, except that for the latter, we re-coded all the sectors.

Table 13: Descriptive statistics for Gitesi commune

	6 sectors	full*
Total number of inhabitants registered in the 1991 census	30.950	61.900
Total number in 1994 (1991 figure* (1.03) ²)	32.835	65.670
Total number of Tutsi registered in new database	6.269	12.538
Total number of victims	5.425	10.850
Total number of survivors	832	1664
Number of Tutsi without entry	12	24
Percentage of 1994 Tutsi killed	16,5%	16,5%
Percentage of Tutsi in new database killed	86,5%	86,5%
Percentage of Tutsi in new database survived	13,2%	13,2%

* This extrapolates the findings of the six re-coded sectors to the entire commune (12 sectors) (* with 2). The latter column does not give exact figures thus.

The re-coded sectors make up half of the population of Gitesi commune. From the data, we learn that about 16,5% of the population in these sectors was killed, totaling 5.425 victims from a population of 33.000 just before the genocide. These victims represent 86,5% of the Tutsi population in the six re-coded sectors, leaving 832 survivors. Using the information for the re-coded sectors to give approximate figures for the entire commune, we estimate that 10.850 Tutsi residing in Gitesi commune were killed and 1.664 survived.

Table 14 : Places where the Tutsi residents of Gitesi commune were killed

Name or location	Number of victims (6 re-coded communes)	Entire commune	% of victims
In the cell of residence	1.149	2.298	21,1
In another cell within the sector	175	350	3,2
In another sector within the commune	21	42	0,3
In the Gatwaro Stadium	359	718	6,6
In Bisesero ²⁹	180	360	3,3
In Parish of Kibuye	233	466	4,3
In Karongi (sector Gitwa)	443	886	8,1
In the mountains	1.591	3.182	29,3
In the Kivu Lake	13	26	0,2
At any another place	45	90	0,8
At an unknown place	1.216	2.432	22,4
Total	5.425	10.850	100
Valid total	4.209	8.418	77,5

Table 15 : Places of refuge*

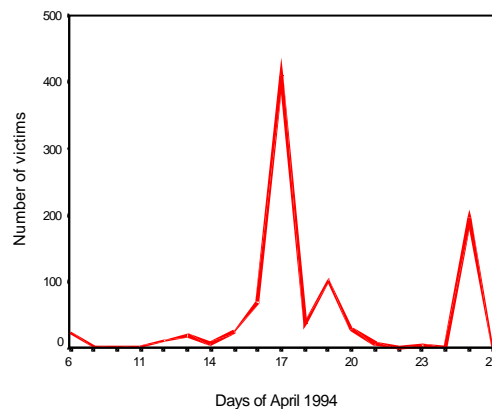
<i>Tutsi from the re-coded sectors</i>	<i>sought refuge</i>
Burunga	in Kibuye ville (Parish et Stadium)
Buye	at Karongi hill, in the mountains
Bwishyura	in Kibuye ville, Lac Kivu, Karongi
Gitarama	in the mountains
Kayenzi	in the mountains
Rurangwe	in the mountains
<i>From the other sectors</i>	
Bubazi	in the mountains
Gasura	Karongi, Nyamishaba secondary school
Gitesi	in the mountains
Kagabiro	Paroisse Mubuga, in the mountains
Mbogo	in the mountains
Rubazo	Paroisse Mubuga, in the mountains

* source : author's interviews in Gitesi commune

²⁹ As mentioned earlier, 'Bisesero' means the hills of Bisesero.

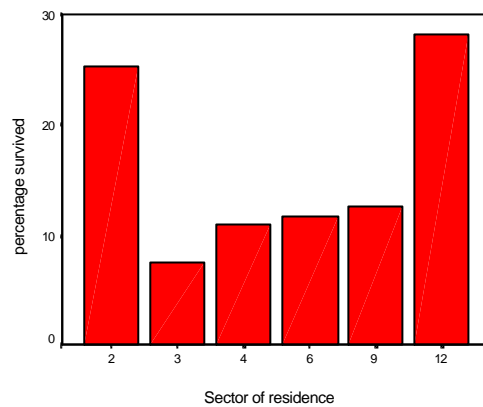
Since in one out of four and a half cases the place of the killing was unknown and one out of three places is coded as "in the mountains", it means that we have no details on the place of death of half of the victims in our database (see table 14). Even after re-coding, we cannot fill the gap left by the enumerators from Gitesi commune. Only interviews can bring additional information. The persons interviewed said that a large part of the Tutsi population of Gitesi commune was dispersed throughout the commune. This was their explanation why they used the broad category "in the mountains", just as in the IBUKA file. They would add that a considerable number (they did not know how much) first sought refuge at Karongi hill and afterwards continued to Bisesero.

Figure 8: Distribution of killing through time, n=948 cases



Since all Tutsi killed on April 17th of whom this date is known, come from sector Bwishyura and since all Tutsi killed on April 26th of whom that date is known, come from sector Gitarama, figure 8 may overestimate the number of people that died on these two dates when we take all sectors into account. Since April 17th is the day of the massacre in the Parish of Kibuye, the same remark about over representation applies to figure 8 as it did for figure 3.

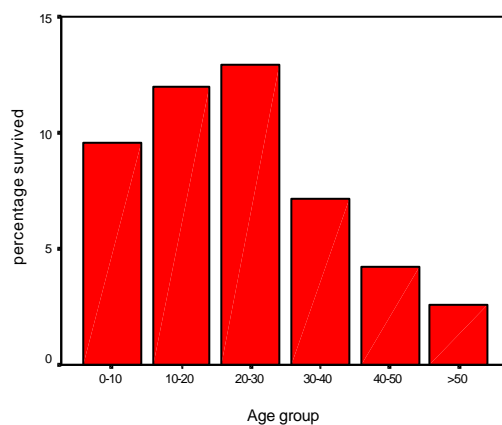
Figure 9 : Residence-specific survival chances in Gitesi commune



Legend : Burunga 2, Buye 3, Bwishyura 4, Gitarama 6, Kayenzi 9, Rurangwe 12.

Figure 9 shows that sector Buye was the most deadly sector among the re-coded sectors and that considerable between-sector variation existed in Gitesi commune. This observation corresponds to the statement of a person I interviewed in Gitesi. The interviewee said that in Buye practically all Tutsi were killed. However the person failed to give reasons for the between-sector variation in survival chances.

Figure 10 : Age-specific survival chances, only sectors Burunga, Bwishyura and Gitarama



For figure 10, I could only use data for sectors 2, 4 and 6 since enumerators in the other sectors did not register the age of the survivors. That is also the reason why I did not perform a regression analysis as I did for Mabanza commune.

Appendix 3 : estimation procedure of killing through time

Gishyita and Gisovu communes

My assumptions are not random, but based on the available information in the data file. For Gishyita commune, I can trace 5.800 people (out of 11.273) who died in the hills of Bisesero, because the place of death is mentioned in the data file. This figure is the 'sure' estimate for Gishyita. I also trace 4.000 people who did not die in the hills of Bisesero. This leaves about 1.473 Tutsi from Gishyita who may or may not have died at Bisesero. Their place of death is unknown or unclear in the database. Since a lot of people died in the hills of Bisesero, it is more likely that the exact place is not known, in any case more likely than when they were killed in Mugonera hospital or in another place in the commune. I therefore assume that 1.000 out of these 1.473 (two thirds) were also killed in the hills of Bisesero. This gives an estimated 6.800 Tutsi from Gishyita, meaning three out of five Tutsi from Gishyita, were killed at Bisesero. For Gisovu commune, I find at least 1.000 people (out of 3003) who died in Bisesero (the place is indicated in the data file) and 1.500 who died in other places³⁰. As in the case of Gishyita, I assume that 333 out of the remaining 503 (two thirds) also died in the hills of Bisesero. This makes 1.333 Tutsi of Gisovu, meaning 44% of its killed Tutsi population, who died in Bisesero.

Table 16

commune	total number of Tutsi killed	not killed in Bisesero		killed in Bisesero		in %
		sure	assumed	sure	assumed	
Gishyita	11.272	4.000	4.473	5.800	6.800	60
Gisovu	3.003	1.500	1.668	1.000	1.335	44

³⁰ About 500 of Gisovu's Tutsi population was killed at Kiziga Hill, commune of Rwamatamu.

Gitesi and Mabanza communes

From interviews in the commune, we know that a considerable number of Tutsi from Gitesi commune managed to take refuge in Bisesero. African Rights writes that Tutsi who survived several massacres in Kibuye and Gitesi arrived in Bisesero³¹. The Tutsi from Gitesi commune more specifically survived or escaped from massacres at the Gatwaro Stadium, the Parish of Kibuye and the Home of St.-Jean. From the IBUKA file however, one can derive that the majority of Tutsi who were killed at these places had their residence in Mabanza commune. I refer to table 17 for the figures of Mabanza and Gitesi commune.

Table 17: Commune of residence*

Place of death	Mabanza	Gitesi
Gatwaro Stadium	3.359	718
In Bisesero	300	360
In the mountains	177	3.182
Other specified places	4.233	4.158
Unknown	1.188	2.432
Total number of victims	9.257	10.850

* Source IBUKA data file. In the text, I discuss the data problems for the commune of Gitesi. We note that for Gitesi commune, the unknown places were added to "in the mountains" in the IBUKA file, a procedure that I did not use in the re-coding of the data. The figures for Gitesi commune are extrapolations from a re-coded file of 6 sectors.

The observation from the data file that the majority of Tutsi killed in Kibuye center came from Mabanza commune is corroborated by interviews with survivors and the eye-witness account of a German expatriate doctor who stayed in Kibuye center until his evacuation in mid-May. He recalls that survivors told him that thousands of Tutsi from Mabanza commune gathered at the communal office. During two days at the communal office the Burgomaster told them not to leave the compound. Tutsi from other communes of Kibuye arrived and then the Burgomaster told them that he had received the order to send everybody to Kibuye

³¹ Resisting Genocide, African Rights, p.11.

town. On Wednesday 13th , they were taken to Gatwaro Football Stadium in Kibuye town center.³²

Doctor W. Blam, working for the German Development Cooperation writes that (from April 11 and April 12 onwards):

“the next few days, waves of refugees, most of them from Mabanza, arrived and by Friday (15th), more than 10.000 were concentrated in the town of Kibuye. More than 5000 in the Gatwaro Football Stadium next to the hospital (where he was residing), several thousand at the Catholic parish and an undetermined number with friends or parents and already at the isles close to the Kivu Lac.”³³

Doctor Blam also writes that these refugees were telling horrible stories of terrible massacres against groups of refugees in Rutsiro commune (p.108). The figures of (at least) 10.000 refugees on the whole and 5.000 in Gatwaro Stadium corresponds with other figures, gathered by military officers. African Rights quotes two French officers who did on-site investigations some time after their arrival

“Colonel Patrick Sartre told Reuters that at least 4.500 Tutsis, including women and children, were slaughtered in the Kibuye Stadium on April 16 and 17. He calculated that about twelve thousand Tutsi had been murdered in those two days, at the church, in the stadium and in the surrounding countryside. Lt. Colonel Eric de Stabenrath told Keith Richburg of The Washington Post that he found 4.300 bodies piled on top of each other in Kibuye’s church and seven to nine thousand more bodies in a sports stadium. 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. He concluded that between eighty and ninety-five percent of the Tutsi population had been destroyed in this area.”³⁴

Exactly how many Tutsi were killed in the Gatwaro stadium is difficult to say. Doctor Blam says he saw more than 5.000 refugees before the massacre, Colonel Patrick told Reuters 4.500 people were slaughtered in the stadium, Lt. Colonel Stabenrath counted seven to nine thousand bodies and the IBUKA dictionary project traced 4.179 names of victims who died in the stadium. The latter figure is an underestimation since we do not know the exact place of death of a considerable number of victims.

³² Rwanda, death, despair and defiance, African Rights, 1995, pp.395-396

³³ Blam, W. Genocide as ‘modern’ political instrument, original text published in German in H. Schürings (ed.) Ein Volk verlässt sein Land. Krieg und Völkermord in Ruanda, Köln, 1994. Author’s translation from the French version published in Jean-Pierre Chrétien, Le défi de l’ethnisme, Karthala, 1997, p.108. The French text was checked and authorized by the author, Doctor W. Blam.

³⁴ African Rights, Rwanda : Death, Despair and Defiance, 1994, p. 289.repeated in the 1995 edition p.416 and p. 424.

In contrast to the Tutsi from Mabanza commune, a considerable number of Tutsi from Gitesi commune were not trapped in the town center. The exact number is difficult to determine given the unspecified place 'in the mountains' in the data file. This does not mean that ALL the Gitesi refugees reached Bisesero. Gitesi indeed is an adjacent commune to Gishyita, but Bisesero sector in Gishyita commune borders Gisovu commune and not Gitesi commune. Moreover, with all the killing throughout the communes, a large number of Tutsi were killed on the roads, in their houses and while hiding with friends. From my re-coding of half of the Gitesi sectors, we learn that (when we extrapolate for the whole commune) one out of three Tutsi from Gitesi were killed in either Bisesero (3.3%) or "in the mountains" (29.3%), while 8.1% were killed in Karongi and for 22.4%, the place is unknown. Because of the lack of reliable data, we have to make two arbitrary assumptions: we assume that two out of three people who died "in the mountains" reached Bisesero and that one out of two people whose place of death is unknown also reached Bisesero. This gives a total of $3,3 + 19,5 + 11,2 = 34\%$ of the Gitesi victims, meaning about one third or 3.700 (out of 10.850) Tutsi from Gitesi. The assumptions of course are the weakest part of this estimation.³⁵

The distribution over time of the remaining 7.150 (not killed in Bisesero) victims of Gitesi commune is also based on my re-coded data file and observations from eyewitnesses. From the 948 people killed from Gitesi of which we have the date, 642 (67%) were killed between April 15th and April 19th, with 400 (62% of 642) on the 17th, the day of the massacre in the parish of Kibuye. This, I agree, very limited source of information, combined with information from interviews (African Rights, Doctor Blam and author's interviews in Gitesi), allow us to make the following (rudimentary) assumptions: Since the major massacres in that commune took place from April 15 to April 19, I assume that 4.300 (60% of 7.150) died during these days, with a concentration on April 16, 17 and 18. Because of lack of accurate data, I distributed these 4.500 victims as follows: Friday 15th (250), Saturday 16th (250), Sunday 17th (2.000)³⁶, Monday 18th (1.000) and Tuesday 19th (800). As a consequence, I assume also that the remaining 2.850 (=10.850-3.700-4.300) Tutsi from Gitesi commune followed the distribution of the entire prefecture. This is plausible given the evidence that Tutsis who were hiding in the hills were hunted down throughout the territory of the entire prefecture and throughout the three months of the genocide. All weighing factors for each of the dates are thus augmented, proportionally to the number of people who died on that date, to account for

³⁵ These assumptions are indeed arbitrary, but table 11 provides at least some support for it.

³⁶ 2000 is only 46% of 4300, meaning less than the 62% represented by the 400 victims out of 642 which died between April 15 and 19. These 400 however almost all come from one of the re-coded sectors. Taking the whole commune into account, this sector represents probably less than 62% of the people killed on April 17th. We also refer to our discussion of figures 6 and 4. In order to avoid overestimation for April 17th, I assumed 2000 and not 2666, the latter corresponding to 62% of 4300.

these remaining 2.850 victims. The data file also shows a small number of Tutsi from Mabanza who died in Bisesero. Because Mabanza commune is not bordering Bisesero sector in Gishyita commune, I estimate that only a very small percentage of the 'unknown' in the Mabanza file reached Bisesero.

As for Rwamatamu commune is concerned, most Tutsi were killed in the commune itself and early in the genocide. Few people managed to escape to Bisesero. In the database, I found about 9.000 Tutsi from Rwamatamu who were not killed at Bisesero. This leaves about 1.000 refugees who could have reached Bisesero. The presence of Tutsi from Rwamatamu at Bisesero is corroborated by interviews with survivors³⁷. The result is presented in table 18.

Since only the commune of Mabanza and half of the commune of Gitesi were re-coded, I decided to stay with the overall figure of 59.050 victims found by IBUKA as a baseline for the estimation over time, thus not accounting for the (small) differences in number of victims I found for both coummunes after the re-coding.

Table 18: Number of Tutsi killed in Bisesero

Commune of residence	Minimum or 'sure' estimate	Probable or 'best' estimate	Maximum estimate
Gishyita	5.800	6.800	7.300
Gisovu	1.000	1.333	1.500
Gitesi ³⁸	600	3.700	4.000
Rwamatamu	400	700	1.000
Mabanza	300	400	800
Total number	8.100	12.933	14.600

³⁷ Resisting Genocide, African Rights, p. 11.

³⁸ Again, I want to stress that the difference between the minimum estimate and the best estimate for Gitesi commune is due to the lack of data in the IBUKA file. It should be clear by now that I want to stay as close to the data as possible. When the data do not tell me where the victim died, or only died 'in the mountains', I cannot be sure that they died in Bisesero. That is where assumptions play a role. I do not think that 8100 people were killed at Bisesero, the 8100 is the bare minimum which we can be sure of. On the same token, we can almost be sure that more Tutsi from Gitesi died in Bisesero then Tutsi registered as such in the data file. Statistics give you tools that allow you to go beyond 100% certainty. My best estimate on the basis of what we know of the genocide in Kibuye prefecture and Bisesero is 13.000. This is the figure that I believe is the closest I can get to reality. 13.000 is the figure that I can reasonably defend, given the information in the database plus some necessary assumptions to fill the gaps of the database. Some mistakes in the data or some adjustments in the number of people from Gitesi commune who died in Bisesero (for example because one is not sure whether they died on Karongi hill or on Bisesero hill) would not make a big change to the 13.000 figure. Taking a 10 percent error into account, one can argue that between 11.700 and 14.300 Tutsi were killed in Bisesero between April 6, 1994 and July 1, 1994.

The 13.000 figure is my best estimation, based on the IBUKA file together with my re-coding and some assumptions for Gishyita, Gisovu and Rwamatamu communes that are pretty close to reality and two assumptions for Gitesi commune that may be less realistic. Changing the assumptions however would not make a big difference. My minimum estimate for the number of Tutsi at Bisesero is therefore 8.100 (which is surely lower than the real number) and my maximum estimate is 14.600. The minimum is based on the number of victims in the IBUKA file where the place is mentioned in the data file³⁹.

The 13.000 estimate is lower than figures in other publications, but the author believes it is a good estimate because it is based on large-scale data collection⁴⁰. African Rights, for example, writes that 50.000 people were killed in Bisesero. This is an overestimation. Given the total number of victims in Kibuye Prefecture (59.050) found by IBUKA, the figure of Tutsi killed in Bisesero given in the African Rights publication (50.000) is too high. Granted that the IBUKA figure may be an underestimation and that the IBUKA figure only contains Tutsi living in Kibuye before the genocide, the African Rights figure of 50.000 for Bisesero alone remains very high nonetheless. This is because it would mean that either 10% of the population of the entire prefecture (or two thirds of all the Tutsi from Kibuye) had gathered at Bisesero or either that a large number of Tutsi from Gitarama, Gisenyi, Gikongoro or Cyangugu Prefectures had found refuge in Bisesero. Both hypothesis seem highly unlikely given the sheer impossibility to travel long distances for a number of people large enough to reach 50.000 at Bisesero⁴¹.

³⁹ If future research shows that most Tutsi from Gitesi did not die 'in the mountains' as is mentioned in the IBUKA file, but were killed in other major massacres in Gitesi commune, the figure of 13.000 Tutsi killed in Bisesero has to be revised downward (with one or two thousand) and the figure for the Parish has to be revised upward. On the other hand, if future research shows that more than 3.700 Tutsi from Gitesi commune reached Bisesero, my estimate for Bisesero has to be revised upward (with one or two thousand).

⁴⁰ Provided of course that the IBUKA dictionary research project did not fail to find a lot of victims, which I assume not to be the case here. If future research shows that the dictionary is incomplete, the estimate has to be revised upward.

⁴¹ I do not think my estimation of the number of victims in the Hills of Bisesero diminishes the great value of the interviews published in 'Resisting Genocide'. Indeed, both the horrible suffering and human power of survivors is very well documented in that publication and it continues to be the standard work on Bisesero.

LITERATURE AND DOCUMENTS CONSULTED

- African Rights, Rwanda : Death, Despair and Defiance, 1995.
- African Rights, Resisting Genocide, Bisesero April-June 1994.
- Bart, F., Montanges d'Afrique, Terres Paysannes : le cas du Rwanda, Bordeaux, 1993.
- Blam, W. Genocide as 'modern' political instrument, original text published in German in H. Schürings (ed.) Ein Volk verlässt sein Land. Krieg und Völkermord in Ruanda, Köln, 1994. Authors translation from the French version published in Jean-Pierre Chrétien, Le défi de l'ethnisme, Karthala, 1997.
- Desforges, A., Leave none to tell the story, Human Rights Watch, 1999.
- Human Rights Watch Arms Project, 1994.
- IBUKA, data file Kibuye Dictionary Project, Kigali, Rwanda, 1999
- Liao, T.F, Interpreting probability models, Quantitative applications in the social sciences series, Sage publications, 1994.
- Letter of the Préfet to all the Burgomasters concerning the self-defense program of the population, on April 30th, 1994
- Letter of the Préfet of Kibuye Prefecture to the Minister of the Interior and Communal Development, on May 5, 1994.
- Letter by the Minister of Interior and Communal Development to the military commander in Gisenyi asking to send troops to Kibuye Prefecture to support an operation in the sector of Bisesero, Commune of Gishyita, dated June 18, 1994.
- Report by the Préfet of Kibuye of the day to day events in all the communes between April 6 and April 10 dated on April 11.
- Report of the meeting of the security committee of Kibuye Prefecture on April 11, 1994.
- Seltzer, W., Population Statistics, the Holocaust and the Nuremberg Trials, Population and Development Review 24 (3), 1998.
- Undated letter addressed to the Minister of Interior and Communal Development concerning the management of Gisovu Commune.
- Uvin, P. Aiding Violence, the development enterprise in Rwanda, 1998.
- Verwimp, Ph., Development Ideology, the Peasantry and Genocide, *Journal of Genocide Studies*, November 2000 and Working Paper, Genocide Studies Program, Yale University, 1999.
- World Bank, Rwanda agricultural strategy review, 1991.

