



Accounting for Genocide: How Many Were Killed in Srebrenica?*

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Abstract. The takeover of the UN ‘safe area’ of Srebrenica by Bosnian Serb forces in July 1995 was followed by the killing of a large number of male Bosnian Muslim civilians, in what has been characterized as the worst massacre in Europe since World War II. This article is based on a report submitted as evidence to the UN International Criminal Tribunal for the former Yugoslavia (ICTY) in the case against General Radislav Krstić, who became the first person to be convicted of genocide at this Tribunal. This case also forms part of the genocide charges against Slobodan Milošević, Radovan Karadžić and Ratko Mladić. To our knowledge, this report is unique among genocide studies in its approach, using individual-level data to identify every victim in order to arrive at a highly reliable minimum estimate of the number of people killed. This was possible because of efforts by humanitarian organizations to register people who disappeared during the war as well as the availability of both pre- and post-conflict data on individuals. We conclude that at least 7,475 persons were killed after the fall of Srebrenica. We also present estimates of the probability of being a victim: more than 33% for Muslim men who were enumerated in Srebrenica in 1991.

Key words: Bosnia, conflict, genocide, mortality, war

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Résumé. Après leur prise de contrôle de la “zone protégée” de Srebrenica en juillet 1995, les forces serbes de Bosnie ont tué un grand nombre de civils bosniaques musulmans, perpétrant ainsi le massacre le plus grave dans l’histoire de l’Europe depuis la deuxième guerre mondiale. Cet article s’appuie sur le rapport remis au Tribunal pénal international pour l’ex Yougoslavie (TPIY) dans le cadre du procès du Général Radislav Krstić, qui fut la première personne à être reconnue coupable de génocide devant ce Tribunal. Ce crime fait également partie des accusations de génocide portées contre Slobodan Milošević, Radovan Karadžić et Ratko Mladić. À notre connaissance, dans le cadre

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des études consacrées au bilan de génocides, ce rapport représente la première approche utilisant des données individuelles pour identifier chaque victime de façon à aboutir à une estimation minimale extrêmement fiable du nombre total de victimes. Ceci a été rendu possible grâce aux efforts des organisations humanitaires pour enregistrer l'ensemble des personnes disparues pendant la guerre et grâce à l'existence de données individuelles portant à la fois sur les périodes avant et après le conflit. Au moins 7475 personnes ont été tuées après la chute de Srebrenica. Plus de 33% des hommes musulmans recensés en 1991 figurent au nombre des victimes.

Mots clés: Bosnie, conflit, génocide, guerre, mortalité

1. Genocide accounting

Accounting for genocide is not an exact science. Reliable sources on the number of casualties are often rare, resulting in more or less qualified 'guesstimates'. Most often, the parties to a conflict have an interest in either exaggerating or playing down the magnitude of atrocities, and objective sources may be hard to find. Methods used for estimating the number of people killed in genocides most often include critique of historical sources, primarily governmental archives, witness statements, and public documents. By such an approach one may be able to map pieces together to establish reasonable estimates of total casualties.

Demographic estimation techniques may also be employed to account for genocide. McCaa (2001) conducted a study comparing censuses taken before and after the Mexican revolution and estimated what the population development would have been in the absence of that conflict, assuming normal levels of mortality, fertility and migration. He used this to estimate the demographic consequences of that conflict. While this method of determining over-all population consequences may be central to demography, it cannot usefully establish the number of war or genocide victims since it fails to separate direct victims from those 'missing' because of abnormally increased mortality, reduced fertility and increased migration. In a similar study aimed at directly estimating the victims of the Cambodian civil war and of the Khmer Rouge regime, Heuveline (1998) used data from a pre-conflict census and a post-conflict electoral list to arrive at estimates of 'excess' mortality in the 1970s. Heuveline attempts to separate violent deaths from mortality caused by harsh living conditions.

A quantitative approach that has received much attention is the work of Rudolph J. Rummel (1994, 1997). Rummel's methodology is not based on demographic estimation techniques, but rather on using a large number of historical sources to identify low to high ranges for different "democides", and then assert a 'most likely' mid-estimate. While the method is certainly controversial, Rummel has received praise for his thorough and well documented studies.

As described below, our study uses a very different approach. The expert report on which most of this article is based (Brunborg and Urdal, 2000), was submitted as evidence in the case against Radislav Krstić in the International Criminal Tribunal of the former Yugoslavia (ICTY). The nature of the project made it necessary to

be as specific and reliable as possible about the identities of the genocide victims from Srebrenica, which required that we present a list of names. It was also necessary to take a conservative approach, i.e., only including victims about whose identity we were virtually certain. This article exemplifies the technique of using individual-level data collected for other purposes to estimate the number of victims of an armed conflict. Moreover, the article describes how other types of data on individuals, e.g. censuses and electoral registers, can be used to corroborate the identified victims.¹

2. Prosecuting genocide

Why do individuals, groups or governments engage in genocide? Bookman (1997) points to the importance of demographic characteristics, arguing that many ethnic conflicts can be understood within the framework of a demographic struggle for power. She focuses on the relative strength of ethnic groups, and states that “the relationship between the size of an ethnic group and its economic and political power is usually positive” (p. 17). In Bosnia and Herzegovina, the most heterogeneous of the republics of the former Yugoslavia, the demographic struggle for power became vivid following the process leading to independence in 1992. The 1991 Bosnian population consisted of 44 percent Bosnian Muslims, 31 percent Serbs and 17 percent Croats. The relatively stronger growth of the Muslim population in the 1980s caused concern among Serbs of being ‘outnumbered’, and was used as an argument for a secession of the Serb areas by Bosnian-Serb leaders such as Radovan Karadžić, Ratko Mladić and Momčilo Krajišnik (Urdal, 2001). These ethno-nationalist leaders used such tools of ‘demographic engineering’ as targeted and arbitrary killings, rapes, destruction of houses, and expulsion to create ethnically homogenous areas in Bosnia and Herzegovina.

To date, the world has seen only a few ad hoc tribunals prosecuting persons for genocidal acts: The International Military Tribunals at Nuremberg and Tokyo after World War II, the International Criminal Tribunal for the former Yugoslavia (ICTY) in 1993, and the International Criminal Tribunal for Rwanda (ICTR) in 1994.² In July 2002 the UN General Assembly established a permanent International Criminal Court (ICC), following the ratification of the ICC Statute by 60 UN members.

There is often a question about numbers in war crime trials, especially in connection with genocide: How many people were killed? Article 4 of the ICTY Statute defines genocide as “*acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group*” (ICTY, 2000). A crucial issue is thus how many victims must be established to convict someone of genocide.

The war in Bosnia and Herzegovina started in the spring of 1992 and ended with the Dayton Peace Accords in November 1995. The total number of casualties in the armed conflicts in Bosnia and Herzegovina is contested. It is generally believed that approximately 200,000 of the pre-war population of around 4.3 million were

killed as a result of war activities, but there are other estimates ranging from 20,000 to 328,000 deaths (Brunborg, 2001: 230). The demographic consequences of the conflict lasting from 1992 to 1995 were, however, not limited to the relatively high death tolls. The 'ethnic cleansing' of large territories, in particular areas claimed by nationalist groups of Bosnian Serbs and Bosnian Croats, also caused substantial population displacements, both internally and externally. More than two million Bosnians were displaced by the war.³ Of all the atrocities committed during the war, the attempt to eradicate the male Muslim population following the capture of Srebrenica represents the gravest and most obvious example of genocide during the wars in the former Yugoslavia and has been characterized as the worst massacre in Europe since World War II (Honig and Both, 1996; Rohde, 1997).

All of Eastern Bosnia was occupied by the Bosnian Serb Army after 1992, except for a few areas, including Goražde, Žepa and Srebrenica (see appendix map). These areas, together with Sarajevo, were declared 'safe areas' by the UN Security Council in April 1994. In 1995, Srebrenica had been isolated for several years and the living conditions of the population, which included thousands of refugees from surrounding areas, were harsh. A Dutch contingent (DUTCHBAT) was posted in Srebrenica as peacekeepers, but it was small and lightly armed, and its mandate was unclear (NIOD, 2002).⁴ On 6 July 1995 the Bosnian Serb army (VRS), under the command of general Ratko Mladić, started shelling Srebrenica. The requested NATO air support was too late and too little and DUTCHBAT, which had neither the power nor the mandate to stop the attacks, also failed to protect the civilian population (NIOD, 2002). Fearing what would happen when the VRS took over the enclave, a group of men, numbering perhaps as many as 15,000, mainly of 'military age',⁵ started walking through the forested hills towards territories controlled by the federal Bosnian army. The long columns of these men were shelled and ambushed, many were killed as they were fleeing, while others were rounded up and taken away for execution. Those who remained in Srebrenica until the fall of the enclave were forced to walk to the UN compound in nearby Potočari, where the men were separated from their families, taken away and executed. The exact number of victims from Srebrenica is unknown.⁶ By 1999, ICTY exhumations had uncovered about 1,900 bodies, of which only a few have been identified.

The war crimes committed in Srebrenica have led to several serious indictments by the ICTY. These indictments called for a thorough analysis of the magnitude of the atrocities in Srebrenica, evidence that would stand the scrutiny of the court. The research questions that guided the demographic project on Srebrenica were defined by the Office of the Prosecutor as:

- What was the minimum number of victims from Srebrenica who were killed by the VRS after the fall of the enclave on July 11 1995 who can be identified by name?
- What is the reliability of this list of victims?

The latter research question was added because of allegations that persons listed as Srebrenica victims were either fictive persons (i.e., they never existed), or that such listed victims had actually survived the war. The findings from this study (Brunborg and Urdal, 2000) were reported to the court in June 2000 in the trial against General Radislav Krstić. Krstić was sentenced to 45 years imprisonment in August 2001 for a number of charges, including genocide.⁷ The Srebrenica atrocities are also part of the indictments against Slobodan Milošević, Radovan Karadžić and Ratko Mladić.

In addition to the two research questions posed by the Office of the Prosecutor, we also want to assess the magnitude and demographic impact of the massacre. The following questions are concerned with these matters:

- What was the magnitude of the massacre relative to the pre-war population?
- From whence came the missing men to Srebrenica before the fall of the enclave?

3. Data sources and methods⁸

Several international and local organizations have collected data on persons missing after the fall of Srebrenica, including the International Committee of the Red Cross (ICRC) and Physicians for Human Rights (PHR). ICRC registered missing persons throughout the war period 1992–1995 “to help families establish the fate of their relatives who remain missing” (ICRC, 1998). Similarly, the American-based PHR registered missing persons with extensive detail to assist in identifying exhumed bodies, and to help families find out what happened to their missing relatives. Their list, the “Ante-Mortem database”, is essentially a compilation of data on people believed to be dead.

The data collection procedures of the two organizations were somewhat different. Hence some victims are only registered in one of the two lists. ICRC started the registration soon after the fall of the enclave, primarily to register persons believed to be in detention. At that time the memories of the people escaping from Srebrenica were still fresh. On the other hand, the family members were very distressed, suffering from emotional and physical fatigue, and usually not in possession of identification papers or other detailed documentation of the disappeared persons. Because of the chaotic situation some people reported as missing were later found to be living, and, therefore, ICRC removed such cases from the list of missing persons.⁹ PHR started its registration process about one year later, in July 1996, at a time when many Srebrenica survivors had resettled elsewhere in Bosnia and Herzegovina or had left for other countries. The PHR questionnaire included very detailed questions about the missing persons, such as particular physical characteristics and clothing, which was often emotionally difficult for the informants to answer. At the same time, the informants were often well prepared for the interview situation, with many providing identification papers for the missing persons.

Although the objectives and the procedures for the two registration activities seem somewhat different, it is our conclusion that the types of cases registered were very similar. Both activities were conducted to trace missing persons; more than 95 percent were registered by close relatives; and registration of persons known to be dead was accepted in several cases. The PHR list has fewer cases than ICRC. The main explanation for this is most likely that PHR started later and worked actively to register persons in only two areas (Tuzla and Sarajevo).

Fully four versions of the ICRC list of missing persons for Bosnia and Herzegovina have been published, the versions used by us, numbers 3 and 4, were released in January 1997 and July 1998, respectively. We merged these two, as well as a list of dead persons published together with version 4 of the ICRC list,¹⁰ and arrived at 19,403 persons for all of Bosnia and Herzegovina, after correcting for a few obvious inconsistencies. The PHR Ante-Mortem Database made available to us was updated in July 1999 and this was combined with additional information received from PHR in May and October 1999, for a total of 7,269 victims for Srebrenica.

Both organizations collected data on surname, first name, father's name, sex, date and place of birth, date and place of disappearance. Some information was only recorded by ICRC, such as municipality of disappearance, and other information only by PHR, such as ethnicity. In both lists there is a substantial amount of missing data. In the ICRC list the least frequently complete items are date of birth (65.4% complete) and date of disappearance (89.6% complete). However, the *year* of these events is included for almost everybody. For the PHR list the least complete items are date of birth (78.2%) and place of disappearance (80.7%). The other variables are recorded for almost everybody – but that does not necessarily mean that they are always correct. Errors are particularly common in the spelling of names of persons and places. Moreover, by comparing the two lists we know that although there are many errors, they are mostly small, in variables such as date of birth. Such errors are common all over the world in data collected through questionnaires in surveys and censuses.

Both organizations collected information on missing persons from a greater spatial and temporal domain than only from the fall of Srebrenica. ICRC covered all of Bosnia and Herzegovina for the whole period of armed conflicts, while PHR worked mainly on Srebrenica but collected information also on persons who disappeared elsewhere in Eastern Bosnia earlier in the conflict. A major challenge for the project was to separate out just persons who went missing in connection with the fall of Srebrenica in July 1995.

Both ICRC and PHR collected some information that could be used to identify Srebrenica victims. ICRC did not pose any precise question on this to the families but their own definition of Srebrenica-related disappearances was based on the stories told by the informant, which usually started with: "During the fall of Srebrenica" or "After the fall of Srebrenica". This information was not made available to the authors, however. PHR asked a specific question on the fall of

the enclave: “Did he/she disappear after the fall of Srebrenica in July 1995?” This information was used in conjunction with data as to the place and date of disappearance for each person,¹¹ then to define the Srebrenica victims. Both lists provide information on the place and date of disappearance and the authors were assisted by experts on the Srebrenica investigations to define the exact places from where Srebrenica victims could have disappeared on different dates.

To arrive at a total number of victims, the two lists of missing persons were merged.¹² In this process we investigated whether there were records in the two sources that represented the same individual. Items that were used as criteria for defining whether two records were for the same or for different persons were surname, first name, father’s name, date of birth, place of birth, and to the extent possible date and place of disappearance. Due to misspellings and missing information, this was not a straightforward task. In cases that were impossible to distinguish due to lack of data, we decided to take a cautious approach not to inflate the number, thus assuming that they were for the same person.

We further investigated how the records of missing persons matched pre- and post-conflict information for each individual. Since the ICRC list contained persons whose fate was still unknown, we wanted to examine whether people on the list of missing persons showed up in registers of survivors of the war. One major register of survivors was available to us: the OSCE Voters’ register for the 1997 and 1998 elections. This register contained information on some 2.8 million individuals living in Bosnia and Herzegovina or abroad, who actively registered to vote in these elections. The two lists were matched based on surname, first name, date of birth, and to some extent place of birth. Two items that would have made it easier to match the two lists were only available in one or the other source: the Father’s name was only available in the lists of missing persons and the unique ID number¹³ was only recorded in the Voters’ register.

The lists of missing persons were also matched with the 1991 Census records. This was first done to counter allegations that persons registered as missing had never existed, but it has also been used to compute more accurate descriptive statistics on the victims. Because of the war, the records of the 1991 Census had not been checked and revised after the optical scanning of the enumeration forms, and a plethora of errors existed in the files. Nevertheless, a comparison of the census files with the consolidated list of missing persons succeeded in identifying 87% of the missing persons in the 1991 Census. The failure to match the remaining 13% was primarily due to data quality. The matching was conducted on the basis of information on surname, first name, father’s name, date and place of birth, and place of disappearance.

To investigate whether our minimum estimate of victims was likely to be far off the actual number of persons killed, we applied a method referred to as dual (or multiple) systems estimation. The method, which will be described in more detail in section 5 below, is suitable to estimate the size of the actual population when we

know the degree of overlapping between two or more independently collected data sets.

4. Arriving at a minimum number of Srebrenica missing

After merging the ICRC and the PHR lists, we arrived at a *consolidated list of missing persons* for all of Bosnia and Herzegovina, including all ICRC and PHR records, but with only one record for each person.¹⁴ 7,490 records on the consolidated list are Srebrenica-related, according to the strict criteria that were applied (Table 1). In addition to expanding the total number of missing persons, the combination of the two sources corroborated the available data as well as provided additional information when data were missing in one of the sources. For example, 75.5 percent of the Srebrenica-related records on the consolidated list have full date of birth, compared to 53.5 percent and 79.1 percent on the ICRC and PHR lists, respectively.

The comparison of the list of missing persons and the Voters' register 1997/98 resulted in a total of nine Srebrenica-related matches. The identities of these nine persons were checked with the 1991 Census for Eastern Bosnia and we are convinced that these matches are matches of the same people and not a mix-up of persons with the same name and identical or similar date of birth. These matches imply that these nine persons either survived Srebrenica, or that their identities have been misused when registering to vote. Six of the nine persons were reported independently *both* to ICRC and PHR, decreasing the likelihood that the inconsistencies are due to fraudulent registration of missing persons – and increasing the likelihood that they are due to fraudulent registration to vote. In any case, the number of such inconsistencies is very small, only 0.1 percent of the approximately 7,500 missing persons. This indicates that there was no large-scale campaign to register living persons as missing or to misuse missing persons' identities to vote.

To be conservative, we have subtracted the nine missing persons found on the OSCE Voters' register from the total number. Moreover, we have also subtracted six missing persons from Srebrenica who have been found to be alive since ICRC published its version 3 in January 1997, but whose identities have not been disclosed to us. However, some or all of the six may be among the nine found in the Voters' register. Thus, the number of investigated cases where persons registered as missing may be alive is a minimum of 9 and a maximum of 15.

At least 7,475 persons have been found to be dead or missing after the fall of Srebrenica, according to our conservative criteria. This number does not, however, include 148 cases of missing persons who may be Srebrenica-related according to either the ICRC or the PHR lists, but where the information is inconsistent or incomplete with regard to date and place of disappearance.

Moreover, the number does not include an unknown number of persons *not* reported as missing. This situation could arise for a number of reasons: there was nobody left to report the missing because the entire family had been killed; family

Table 1. Srebrenica-related missing and dead persons

	Number of records
On both ICRC and PHR lists	5,712
On ICRC list only	1,586
On PHR list only	192
<i>Srebrenica-related missing persons registered by ICRC and/or PHR</i>	7,490
Found in Voters' Registers 1997 and 1998	-9
<i>Srebrenica-related victims, excluding persons found in the Voters' Registers</i>	7,481
Found alive by ICRC since Jan. 1997 (identities unknown to us)	-6
<i>Srebrenica-related victims</i>	7,475

members were too sick or too old to be able to do the reporting or too disillusioned to find it worthwhile to do so; family members may have left the Tuzla area before the registration process was underway. There may also have been cases where persons were not reported as missing because their families were convinced that they were dead and therefore not meeting the registration criteria. Lastly, some persons may not have been identified as Srebrenica-related because the information contained in the lists was lacking or incorrect.

Thus, the actual number of Srebrenica victims is likely to be somewhat higher than 7,475. But the authors have not, during fact-finding missions and other sources, come across virtually any cases of persons missing or killed after the fall of the enclave that have not been reported. A further indication of the high degree of completeness of the ICRC list is that PHR registered only 192 Srebrenica-related persons not already on the ICRC list. Also, only a couple of the about 60 bodies which had been identified among those exhumed in Srebrenica-related graves by late 1999, were not already on the ICRC and PHR lists.¹⁵

5. Estimating the likely number of victims

Fully 5,712, or 76 percent, of the missing persons were found on *both* lists, which can be regarded as two independent samples of the total population of missing persons. Moreover, each individual is uniquely identifiable so that we know whether he or she is present in each sample. This enables us to make an estimate of the number of disappearances not appearing on any of the two lists, by applying multiple systems estimation (Sekar and Deming, 1949; Marks et al., 1974), also called the capture-tag-recapture technique (Bishop et al., 1975).¹⁶ Ball et al. (2002) have used a similar approach to estimate the number of victims in Kosovo in 1999.

The two samples can be assumed to be independent since the data were collected at different times, by different people, via different questionnaires, and for different purposes. The only link between the two samples that we are aware of is that PHR entered the ICRC registration number of a missing person when a person was registered with the same name and date of birth as a person on the ICRC list, which was public and widely available.

Let $N(I)$ be the number of persons in the ICRC list, $N(P)$ be the number of missing persons in the PHR list, and $N(B)$ be the number of persons who appear on both lists. Then, under independence, the maximum likelihood estimator of the total number $N(T)$ of missing persons is, after deleting the 9 persons found in the Voters' Registers:

$$N(T) = \frac{N(I) * N(P)}{N(B)} = (5,706 + 1,584) * (5,706 + 191) / 5,706 = 7,534.$$

This number is only marginally higher, 53 persons or 0.71 percent, than the minimum number given in Table 1, 7,481.¹⁷

However, aggregation may have concealed effects of differential reporting for different age groups. To investigate this we stratified the population into 5-year age groups for men and into two age groups for women (below 50 years and 50+). In this case the maximum likelihood estimator is

$$N(T) = \sum_{i=1}^{17} \frac{N_i(I) * N_i(P)}{N_i(B)} + \sum_{j=1}^2 \frac{N_j(I) * N_j(P)}{N_j(B)},$$

where $i = 1, \dots, 17$ denotes age group of men and $j = 1, 2$ denotes age group of women.

This barely affected the total estimate, which increased by only 2 persons to 7,536. It is interesting to note, however, that the estimate of missing persons increased relatively more for older men (1.4 percent for men over 50) than for younger men (0.5 percent for men under 30), and more for women (3.4 per cent) than for men (0.7 percent). This could indicate that young men had more surviving family members to report their disappearance and that women who went missing often had missing husbands as well, implying that it was less likely that they were reported as missing.

6. Who were the Srebrenica victims?

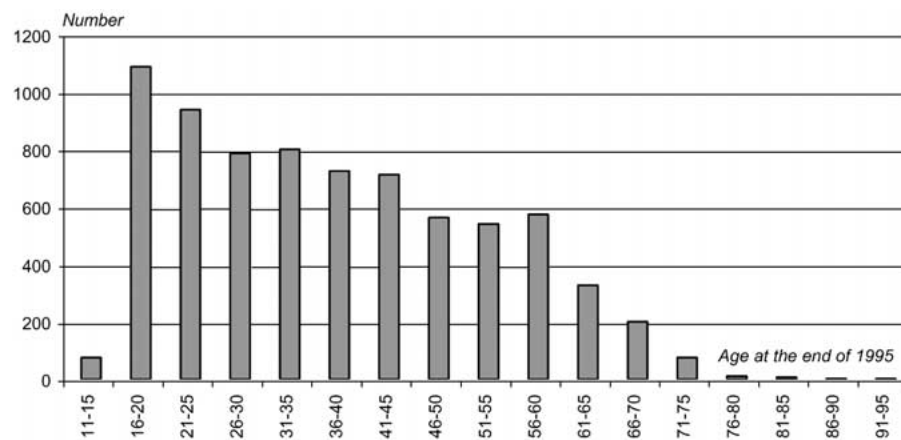
Only 48 of the missing persons are women, and a total of 753 persons (10.1%) are either women and children or elderly, i.e. not men of 'military age' (Table 2). The youngest are two girls, who were aged 8 and 9 when they disappeared. The age distribution of the missing men is shown in Figure 1.

Ideally we would have liked to know the proportion of people killed of all who resided in the enclave at the time it fell. This could show that the atrocities were of a

Table 2. People missing from Srebrenica by sex and age group

Age group	Number	Percent
Men <16	76	1.0
Men 16–60	6,727	89.9
Men >60	629	8.4
Men, age unknown	1	0.0
Women <16	2	0.0
Women 16–60	20	0.3
Women >60	26	0.3
Total	7,481	100.0

The table includes six missing persons known to have survived according to ICRC, but with ages and identities unknown to us.

*Figure 1.* Number of missing men from Srebrenica by age at disappearance.

genocidal character. But such an operation proved difficult. The people who stayed in the town of Srebrenica in July 1995 came from the Srebrenica municipality itself as well as from surrounding municipalities. There were large flows of displaced people in and out of Srebrenica between the outbreak of the war in April 1992 and the fall of Srebrenica in July 1995, due to the war going on in the surrounding areas. Local authorities and international humanitarian organizations are said to have compiled lists of the people who were present in the enclave prior to its fall, but the authors have not been able to locate such lists and we doubt their existence. It is assumed that about 40,000 people were in the town of Srebrenica before it fell, but the exact size of this population and its distribution is not known. The lack of data on the population at risk made it difficult to calculate proper fatality rates, so we had to opt for another approach.

The second-best solution to this problem was to use information on place of residence in 1991, according to the census, i.e., before the armed conflict started.

Table 3. Missing men by municipality of residence in 1991

Municipality	Absolute number	Percent
Srebrenica	4,146	55.8
Bratunac	1,775	23.9
Vlasenica	911	12.3
Zvornik	393	5.3
Han Pijesak	103	1.4
Other	105	1.4
Total	7,433	100

The numbers have been adjusted for 1,002 records of missing men (13 percent) that were not matched with the 1991 census records, assuming that the distribution of municipality of residence in 1991 is similar to the distribution of the matched records.

We obtained such information from the matching of the missing persons with the 1991 census records. A total of 6,431 (or 87 percent) of the missing men were matched with records in the census.¹⁸ This provided us with census information for these persons, including municipality of residence and ethnicity. It seems reasonable to assume that the matched persons constitute a fairly representative sample of the total population of missing persons.¹⁹ Consequently, the aggregate numbers presented below have been adjusted on the assumption that the residency and age distribution is the same for the records that were not matched as for those that were.

As expected, we found that in 1991 more than 90% of the persons who later went missing lived in Srebrenica municipality or in one of the two municipalities of Bratunac and Vlasenica that were captured by Serb forces early in the war (Table 3). The shares of the victims originating from non-neighbouring municipalities decline with their geographic distance from Srebrenica. Bratunac, the municipality with the second highest proportion of missing persons, has a long border with Srebrenica, whereas Zvornik and Han Pijesak are farther away. Muslim refugees from Zvornik in particular were more likely to flee to other Muslim-held areas in Bosnia.

To get a better picture of the scale of the atrocities, we have computed the 'missing probability', i.e., the proportion of men that went missing in relation to the fall of Srebrenica relative to the number of Muslim men enumerated in the 1991 Census, broken down by age and pre-war municipality. We assume that all missing persons were Muslims, since there is only one non-Muslim (a Serb) among the 5,556 persons on the PHR list with data on ethnicity. Information from the 1991 Census corroborates this. Table 4 shows the proportions of missing Muslim men enumerated in these four municipalities in 1991 by birth cohort and municipality. As expected, Srebrenica has the highest missing rate. More than a third of all Muslim men born in Srebrenica between 1905–1984 as enumerated in the 1991

Table 4. Proportion of Muslim men enumerated in 1991 who went missing from Srebrenica in 1995, by birth cohort and municipality of residence in 1991 (percent)

Birth cohort	Approximate age in 1995	Municipality of residence in 1991				
		Srebrenica	Bratunac	Vlasenica	Han Pijesak	Zvornik
1905–1909	86–90	5.1	0.0	0.0	0.0	0.0
1910–1914	81–85	15.7	0.0	0.0	0.0	2.1
1915–1919	76–80	14.9	8.9	7.3	11.3	0.9
1920–1924	71–75	25.3	7.7	12.9	4.5	2.3
1925–1929	66–70	29.3	19.1	14.3	1.8	3.2
1930–1934	61–65	37.8	25.9	15.8	9.9	2.6
1935–1939	56–60	46.3	23.5	22.0	12.1	3.4
1940–1944	51–55	46.8	31.4	16.6	6.1	2.8
1945–1949	46–50	50.4	27.0	21.0	12.5	2.8
1950–1954	41–45	44.9	24.8	15.5	10.7	3.3
1955–1959	36–40	38.5	22.2	11.9	12.1	1.7
1960–1964	31–35	38.1	21.2	9.4	4.2	1.6
1965–1969	26–30	31.2	17.5	8.4	7.6	1.7
1970–1974	21–25	33.4	19.9	9.7	6.8	1.5
1975–1979	16–20	37.0	21.0	12.8	15.5	1.5
1980–1984	11–15	2.6	1.4	1.0	0.0	0.1
1905–1984	11–90	33.7	18.9	11.2	8.0	1.8

The numbers have been adjusted for the missing men that were not matched with the 1991 census records and for 2.5 percent of men without data on the year of birth in the census, assuming a similar distribution on age and municipality of residence in 1991 as for the matched records.

Census, disappeared in connection with the fall of the enclave in July 1995. The missing rates for men enumerated in neighbouring municipalities are also very high (Table 4).

The missing proportions should be considered as low estimates because of demographic changes between the census on 31 March 1991 and the fall of the enclave on 11 July 1995, which reduced the population at risk of disappearing. These factors include deaths from natural causes, especially among the elderly; deaths from war-related causes, especially among young men; people migrating or fleeing from Srebrenica; and the likelihood that men of military age were engaged in fighting elsewhere in the country. On the other hand, there is hardly any upwards bias in the rates, as people who came to Srebrenica from other municipalities are included in the population at risk for the municipalities from which they originated.

Only a few young children from the five municipalities reported in Table 4 went missing, but the rates are very high for young men, fully 37 percent for Srebrenica men aged 16–20 in 1995 (those born in 1975–1979). The rate is highest for middle-aged men 46–60 years, with about 50 percent missing. This may seem surprising, since middle-aged men should be less likely to be suspected of being soldiers and singled out for execution. A main explanation may be that the middle-aged

men were less likely to leave Srebrenica because they had families in the enclave. Also, younger men are generally healthier, which increased the likelihood that they would attempt to trek the approximately 70 kilometres through the woods to Tuzla, and succeed in doing this. Consequently, younger cohorts probably experienced a lower risk of being victims. However, the population at risk in the enclave was probably significantly lower for cohorts of younger men, especially those in their 20s, than what we have suggested here, potentially causing a bias in the fatality rates. Younger men from Srebrenica were more likely than older men to be engaged in fighting elsewhere in the country and to have been killed or captured earlier in the war. The youngest boys, aged 16–20 in 1995, were less likely to be in the army, which may explain their elevated risk of disappearance compared to the preceding cohorts.

Ideally, we would have liked to control for factors such as normal mortality and migration when calculating the missing probabilities. We have no information about migration flows but we have attempted to adjust for normal mortality. To do this we projected the male Muslim Srebrenica population from 31 March 1991 (census day) to 1 July 1995 (immediately before the fall of Srebrenica), assuming the pre-war mortality level for Bosnia and Herzegovina 1985–1990, i.e. a life expectancy at birth of 69.2 years (UN, 2001).

As it is more convenient to use single years of age, and since one-year death rates are not easily available, we used the period life table for Norway 1948 (Mamelund and Borgan, 1996), with a life expectancy of 69.4 years, very close to the pre-war life expectancy for Bosnian males. The difference in the age structure of mortality between Srebrenica Muslim men before the war and Norwegian men in 1948 is not likely to be as large as to cause very different results. This is a modest approach as the mortality of Srebrenica Muslim men during the period April 1991–July 1995 was probably much higher than that corresponding to a life expectancy of 69.2 years, due to considerable hardship in the isolated enclave caused by lack of food, proper medical treatment and firewood, in addition to people being killed directly and indirectly in war-related activities.

Figure 2 shows that the adjustment of the population at risk for ‘normal’ mortality does not affect the estimates of the missing probabilities very much, only increasing the total estimate by about 0.5 percentage point. For old men the adjustment is striking, however. For the very oldest, born 1905–1914, the missing rate increased by almost one half, from 10.4 to 14.9 percent. The real fatality probability for very old men may be even higher since the excess mortality is likely to have been most severe for the elderly.

7. Are the missing persons really dead?

As stated initially, a major task for the project was to present evidence of the likelihood that the persons listed as missing actually had died. While this is the assumption made by most observers,²⁰ the project engaged in several activities to

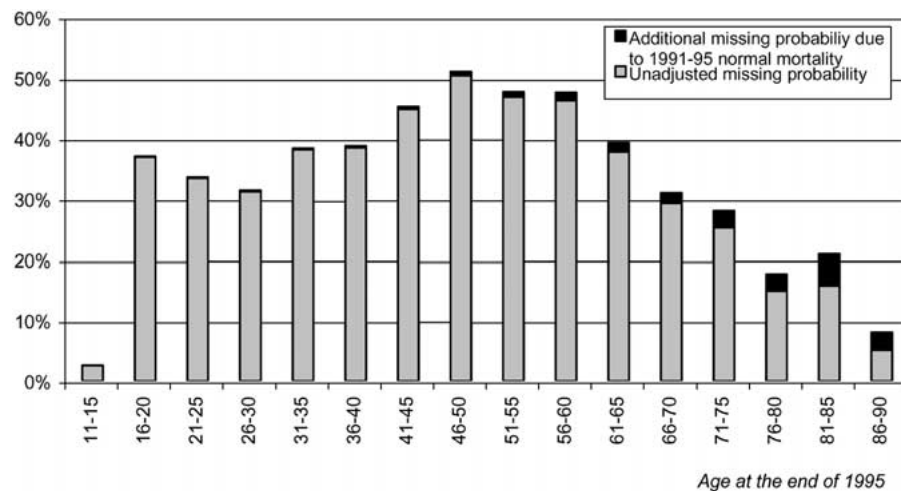


Figure 2. Probability of going missing in 1995 for Muslim men enumerated in Srebrenica in 1991, by age in 1995.

support such a conclusion. Major evidence for this view is our finding that only nine Srebrenica-related missing persons were found on the Voters' Register for the 1997 and 1998 elections. Also, only 22 Srebrenica-relevant persons of a total of 7,421 persons have been found to be alive by ICRC since they started registering Srebrenica victims in July 1995. Only six persons missing from Srebrenica have been found alive since January 1997, in spite of strong efforts by ICRC to find survivors.

In addition, we have compared our findings with results from ICTY exhumations. The age distributions of the Srebrenica-related missing persons and the exhumed bodies are very similar (Figure 3), indicating that the exhumed bodies are a random sample of the persons assumed to be killed after the fall of the enclave. It is not surprising that there are some differences between the distributions, however, considering the uncertainties involved in estimating the age of an exhumed body, especially since the estimates are often based on fragments of bodies, in addition to the sample variance. The bias towards older age groups for the exhumed bodies may also reflect the likelihood that more middle-aged and older men were taken to Potočari and later executed, while younger men to a larger degree attempted to flee through the forests towards Tuzla. Most mass graves consist of victims that were taken away for execution in groups. In sum, these findings support a conclusion that the persons missing in connection with the fall of Srebrenica are actually dead.

8. Conclusions

The aim of this article has been to present the results and the methods used by the authors to establish a minimum estimate of the victims of the genocide in

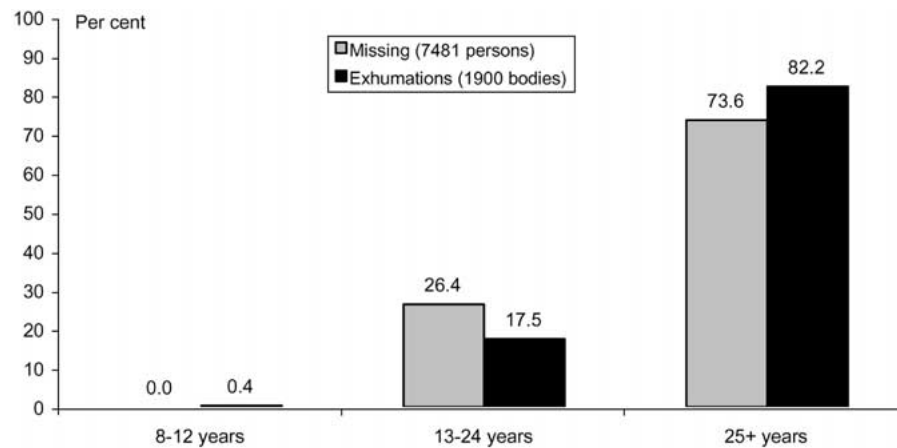


Figure 3. Age distribution of Srebrenica-related missing persons and of bodies exhumed by ICTY (percent).

Srebrenica based on individual-level data. It also provides descriptive statistics that elaborate on the magnitude of the genocide of Muslim men in this former UN 'safe area'. The methods used here, if appropriate, may be applicable to other cases of genocide. In many conflict areas, humanitarian organizations like the ICRC collect information on people who have disappeared in order to establish their fate. This may enable researchers to conduct further studies of genocide and war crimes at the individual level.

In this study we compiled a list of missing persons from two lists that were collected independently, and compared a consolidated list of missing persons with the 1991 Census and the OSCE Voters' register for the 1997 and 1998 elections. The comparison with pre- and post-conflict registers was primarily conducted in order to (a) establish that persons registered as missing were existing and alive in 1991 and (b) investigate whether people registered as missing could be found to be alive after the end of the war. The comparison with these data also provided us with information that enabled us to say more about who the missing persons were, and of the magnitude of the genocide.

The study concludes that at least 7,475 persons have been reported as missing and are presumed dead after the fall of the Srebrenica enclave on 11 July 1995, according to our conservative criteria. Also, an unknown number of persons were probably not reported as missing, for various reasons. Our estimate is lower than the commonly referred to range of 8–10,000 killed persons. As previously stated, ours is a conservative estimate based on highly reliable data. The actual number of genocide victims is likely to be higher than 7,475 and thus, this figure should be considered a *minimum estimate*. By using multiple systems estimation we found the likely estimate for the total number of victims to be only slightly higher, 7,536.

Estimates of the proportions of the 1991 population that disappeared in specific age groups show the great magnitude of the atrocities in Srebrenica. More than a

third of those born between 1920 and 1979 and who lived in Srebrenica municipality in 1991 went missing from the enclave after its fall. Almost all of the missing persons are men (99.4 percent). A substantial number are young boys under 16 (76 persons) or older men above 60 (629 persons). Women comprise only 48 of these missing persons, the youngest female being 8 years old at the time of her disappearance.

There is no evidence that any significant number of the Srebrenica-related missing persons have survived. On the contrary, all available information indicates that the overwhelming majority of those listed as missing are actually dead. Using comparison with the 1991 census, our study further undermines the argument presented by some that persons registered as missing were fictive individuals, registered solely for propaganda purposes.

The judgement on Radislav Krstić makes several references to the demographic evidence presented in our report to the court, including: “The correlation between the age and sex of the bodies exhumed from the Srebrenica graves and that of the missing persons support the proposition that the majority of missing people were, in fact, executed and buried in the mass graves” (para. 82). The Trial Chamber concluded that it had been established beyond a reasonable doubt that “In July 1995, following the take-over of Srebrenica, Bosnian Serb forces executed several thousand Bosnian Muslim men. The total number of victims is likely to be within the range of 7,000-8,000 men (para. 84)” (para. 427) (<http://www.un.org/icty/krstic/TrialC1/judgement/krs-tj010802e.pdf>).

We believe that the large scale of the tragedy, comprising more than a third of all Muslim men in Srebrenica before the war, including about 50 percent of all middle aged men (41–60 years of age), meets the ICTY genocide criteria: “. . . acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group . . .”. In the ICTY trial against General Radislav Krstić, the court ruled in accordance with this view.

Acknowledgements

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Notes

¹ In a study on Kosovo done after the Srebrenica report was written Ball et al. (2002) used a similar approach, i.e. merging several lists with individual-level data on victims, to estimate the total number of victims. They did not, however, have pre and post conflict individual-level data at their disposal.

² Several people have been sentenced to life imprisonment for genocide and other war crimes by ICTR, including the former Prime Minister Jean Kambanda (<http://www.ictor.org>).

³ Human Rights Watch World Report 1998 (http://www.hrw.org/worldreport/Helsinki-05.htm#P357_89852).

⁴ The Srebrenica massacre is still a very sensitive topic in the Netherlands. The NIOD report caused

Prime Minister Wim Kok and his cabinet to resign in April 2002, seven years after the events took place (*Time*, 29 April 2002: 33).

⁵ In the former Yugoslavia this commonly meant all men between the ages of 16 and 60.

⁶ The NIOD report suggests that of the total number of 7,500 missing persons, “[...] approximately 1,500 people died on the road to Tuzla, whether under gunfire, in combat, killed by mines, suicide or starvation” and 6,000 were taken by the Bosnian Serb Army (VRS) as prisoners of war and later executed (NIOD, 2002).

⁷ The evidence presented to court in this report and in the testimony appears to have formed an important basis for the judgement, see <http://www.un.org/icty/krstic/TrialC1/judgement/krs-tj010802e.pdf>. The judgment was appealed by the defendant and is still undergoing legal proceedings.

⁸ A more detailed description of the problems encountered in the matching process between the different lists is described in Brunborg and Urdal (2000).

⁹ The “total number of persons for whom a tracing request regarding Srebrenica’s fall was opened by the family” is 7421. Of these the fate has been clarified for 85, with 22 determined to be alive and 63 to be dead. Source: Tracing requests Missing in BiH (updated on 29/09/99), International Committee of the Red Cross, Sarajevo.

¹⁰ “Part 2 which is printed on different colour paper to facilitate usage, is the list of persons for whom ICRC has received information on death and whose relatives have been informed. The mortal remains of these persons have not yet been recovered by their families” (ICRC, 1998). These deaths have been established on the basis of eyewitness accounts and/or evidence provided by the family. Prior to the publication of version 4 of the ICRC list, families had the opportunity to register missing relatives that were not assumed to have survived, as dead.

¹¹ The date of disappearance could either be the date the informant her/himself last saw the person alive, or a date based on information provided by an eyewitness through the informant. The same applies to the place and date of disappearance.

¹² In the merging and matching process of the different lists we used the database utilities in Microsoft Access. The matching process was done electronically based on specified criteria, and then inspected manually.

¹³ The unique ID number, *matični broj*, was introduced in all of the former Yugoslavia in 1981.

¹⁴ The consolidated list includes 19,692 persons missing from all of Bosnia and Herzegovina, where 6,980 records are found on both lists, 12,423 on the ICRC list only, and 289 found on the PHR list only.

¹⁵ A registration in either the ICRC or the PHR list probably makes identification more likely. The main reason for not being identified, however, is that there are no personal characteristics on the bodies that make identification possible.

¹⁶ We are grateful to Patrick Ball and William Seltzer for advice on this.

¹⁷ Since we do not know whether the six survivors on the ICRC list are also on the PHR list, we use the total of 7,481 persons as the basis for this estimation.

¹⁸ Because of the relatively low number of female victims, we do not present further statistics on females broken down by municipality and age.

¹⁹ A counter-argument is that some of the missing persons we failed to match may have been enumerated in Yugoslav republics other than Bosnia and Herzegovina (or abroad), particularly in Serbia that is only a few kilometres away from Srebrenica. The number of such persons is not likely to have been very high, however.

²⁰ One example is the ICRC itself: “In February 1996, the ICRC’s conclusions were made public for the first time: that the vast majority of the missing men had been killed after capture and that many others had been killed in armed confrontations while fleeing the enclave or in lieu of arrest”. Source: ICRC Special Report, *The issue of missing persons in Bosnia and Herzegovina, Croatia and the Federal Republic of Yugoslavia*. The date of publication is not given but it is probably 1 February 1998.

Appendix

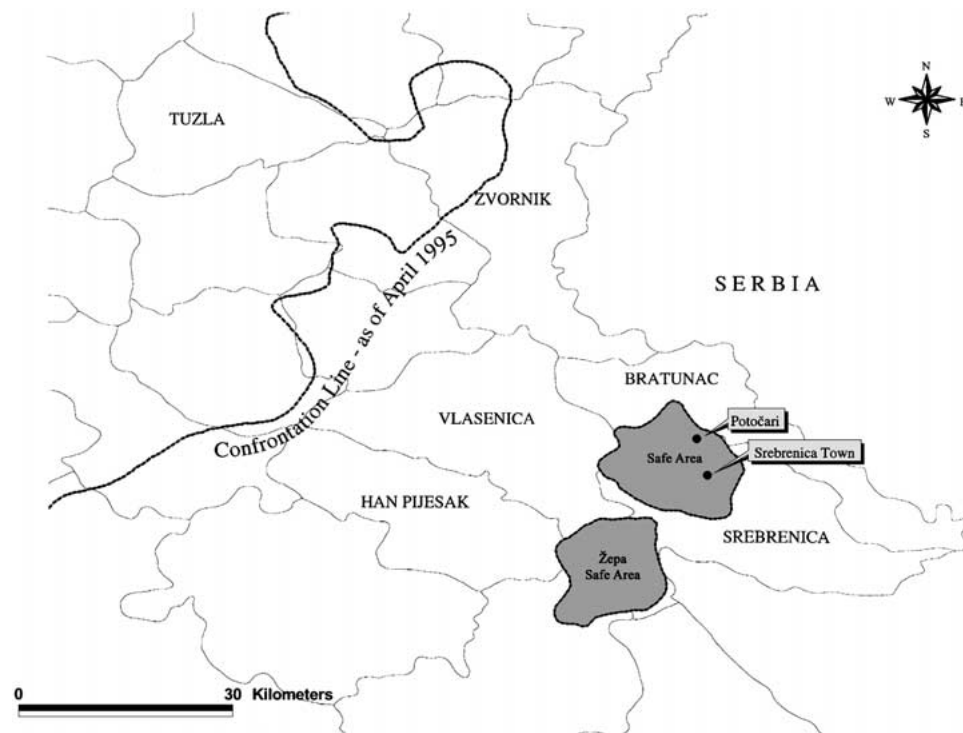


Figure Map.

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