VARIOUS CAUSES OF THE 1994 GENOCIDE IN RWANDA WITH EMPHASIS ON THE ROLE OF POPULATION PRESSURE

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1. Objectives

First, we will present trends in demographic rates in Rwanda in 1960-2000. In the next three sections we will review the various analyses that have been carried out aiming to explain why the 1994 genocide took place as well as earlier episodes of violence. Use is hereby made of views of economists, demographers and other social scientists (incl. historians). In the next three sections, we focus on population pressure. We favor a broad definition of the concept and propose to measure it with two indicators. We then apply it to Rwanda in 1970-2000 using data from FAO. We also report on results of a comparative analysis of population pressure in 91 countries. Conclusions are drawn in the final section.

2. Demographic rates in 1960-2000

FIGURE NO 1 (Map of Rwanda)
Figure 1 shows that Rwanda is located in Central Africa. It is surrounded by Burundi, Democratic Republic of Congo (formerly Zaire), Tanzania and Uganda. It is a small country (26,338 sq km) and with a population of about 8 million (in 2002) it has high population density.

It is a country consisting of hills and mountains, very fertile and with fairly abundant rainfall. It is, therefore, very suitable for intensive agriculture and keeping of livestock. The average size of farms is very small (about 1 ha per farm) and fragmentation of land holdings is a serious problem (each farm is on average composed of 5 plots on average)(May, 1995).
Rwanda was for a number of years a colony of Belgium and it maintains close ties with France. It is part of Francophone Africa.

There are two major ethnic groups: the Hutu and Tutsi. The Hutu are by far the largest (85% of the population in 1991) while the Tutsi are much smaller (estimated at 12%). Both groups speak the same language, share the same religion, live in the same areas and, due to frequent intermarriage, have by and large the same physical appearance.

Data on trends in population size, fertility, mortality and migration in Rwanda are available from three sources: UN Pop. Division, World Bank and US Bureau of

the Census. More refined figures than these can be presented, because use was made of sources of data that were not fully available by these agencies. We made use in particular of the following sources: three censuses in 1977, 1991 and 2002 (National Census Service, Gov. of Rwanda); two DHS surveys in 1992 and 2000 (esp. on fertility and below 5 mortality); UNHCR figures (streams of refugees from and to Rwanda in 1993-2002); Prunier 1995 (streams of refugees and estimates of mortality due to violence in 1959-1994); and Steering Committee of Joint Evaluation of Emergency Assistance to Rwanda 1996 (several volumes) (streams of refugees). Wherever possible annual figures are shown and use was made of the balancing equation of population change in 1992-2002. Although the figures we present here are more precise than the existing figures, further refinements are needed.

We now present three graphs with data on changes in population size, vital rates and growth rates in 1960-2002.

FIGURE NO 2 (Pop size 1960-2002)
Figure 2 shows the growth in the population in Rwanda in 1960-2002. The sharp decrease in 1994 is the result of both the genocide and the exodus of refugees to neighboring countries that took place in April – June of that year. Several estimates exist on the number of people killed in the 1994 genocide with figures varying from 500,000 to 1,000,000. The best estimate according to us is made by Prunier; he concludes that from 800,000 to 850,000 people were killed or 11% of the population in 1994 (Prunier, 1995). The large majority of those who were killed were Tutsi, but this was also the case for a group of moderate Hutu.

FIGURE NO 3 (Crude birth and death rates 1960-2002)
Figure 3 shows vital rates in 1960-2002. In addition to the peak in the crude death rate in 1994, there were much smaller peaks in the early 1960s, early 1970s and early 1990s. These much smaller peaks were due to several other episodes of violence that took place in Rwanda in particular in 1959-1964, 1972-1973 and 1990-1993 leading to elevated mortality.
Fertility, measured with the crude birth rate, has been high in Rwanda throughout the past 40 years although there has been a gradual decline from 52 per 1,000 in 1960 to 42 per 1,000 in 2002 (with exception in 1994). Rwanda can be characterized by a pattern of high fertility and high mortality that can also be found in a number of other African countries that are in the second phase of the demographic transition.

FIGURE NO 4 (Rate of natural increase + net migration rates)
Figure 4 shows rates of natural increase and net-migration in the past 40 years. The rate of natural increase was 3.0 to 3.2% per year in the 1960s and gradually decreased to about 2.1% in the early 2000s (with exception in 1994). There were several fluctuations in the net migration rate in the past 40 years with the largest episode of emigration in 1994 (refugees who fled the country) and the largest episode of immigration in 1995-1997 (returning refugees). According to UNHCR and Prunier the number of refugees that fled in 1994 was from 2,000,000 –

2,300,000. However, in the same year a total of 700,000 refugees returned. These were the group of refugees – and their descendants – who had fled in 1959-1964 and returned in the second half of 1994.

Figure 4 also shows that several other periods of emigration took place especially in1959-1964 and 1972-1973. There corresponded with several episodes of violence took place during these periods leading to various refugee streams to neighboring countries.

The next issue we will deal with is what were in general the causes of the 1994 genocide and what was the role of population factors in particular. We will now summarize the views first of economists and demographers to be followed by the views of historians and knowledgeable observers.

3. Causes of 1994 genocide as viewed by some economists, specialists in public health and demographers

Several economists, specialists in public health and others have focused on the negative consequences of rapid population growth for agricultural production, use of non-renewable resources, conflicts, violence and mortality. Important concepts in this approach are overpopulation, demographic pressure or population pressure and similar terms, but no efforts are made to define them accurately. Many of these authors make use of a Neo-Malthusian perspective; some do not.

King and Elliott mention several factors that played a role in the 1994 genocide, but state that rapid demographic growth (which they call demographic entrapment) was by far the single most important cause: “It is the concurrence of all these and other factors that made population pressure critical. It was inevitable that the pressure would express itself by reopening the tribal fault line” (King and Elliott, 1996).

A more or less similar view was expressed in a UNHCR presentation at the UN Conference on Population and Development in Cairo in 1994: “The recent strife in Rwanda is a striking example of ethnic conflict *ignited* by population pressure and diminishing land resources” (UNHCR 1994 cited in Berry and Pott-Berry, 1999) (italics added).

May (1995, 1996) reported on the demographic situation in Rwanda in the 1980s and early 1990s (before the 1994 genocide) and described the negative consequences of rapid population growth for agriculture, land use and the environment. He notes, for instance, that more and more marginal land was brought under cultivation (e.g., steep hills), fallow periods were shortened and pasture and forest land was converted to cropland. In addition, he referred to the inadequacy of existing agricultural policies and the lack of success in implementation of the national family planning programme.

A sophisticated Neo-Malthusian analysis of the crisis in Rwanda was carried out by André and Platteau. They conducted a population-based study in a small densely-populated area of Rwanda and studied economic and other changes that took place between 1988 and 1993. They provide evidence of an increase in landlessness in the households they studied and an increase in inequality of land ownership. The poor were forced to sell land to those with more capital and this happened in spite of the fact that in many cases this was in violation of existing law. In addition, a fall in the size of owned farms was observed (e.g., the median size of a farm declined from 0.36 to 0.30 ha) and an increase in household size (from 4.9 persons per household to 5.3). This increase in household size is the result of a tendency for children to stay longer with their parents and to delay marriage due to lack of land on which to start and independent household. They also show that land disputes increased as well as disputes within families about transfer of land to sons. André and Platteau conclude as follows: "…..the story told….. [dealing with an area within Rwanda] documents how the "Malthusian trap" can result in bitter tensions within families, intra-community hatreds and violence……" (André and Platteau, 1998, 2).

Magnarella employed what he calls a human materialist theoretical framework and concluded that the ultimate cause of the genocide was: "….the country's economic plight, caused in large part by the world economy and Rwanda's growing imbalance in land, food and people that led to malnutrition, hunger, periodic famine, and fierce competition for land to farm". He adds that the main proximate cause was: "…the political indoctrination that demonized the Tutsi and convinced many Hutu that Tutsi elimination was the country's economic and political remedy". (Magnarella, 2002).

4. Causes of 1994 genocide as viewed by historians, experts and knowledgeable observers

Another approach was followed by historians, experts and knowledgeable and observers (journalists). Their point of departure is different. The main questions they pose are: what were in general the main and most important causes of the genocide. We are especially interested to find out what, according to them, was the contribution of demographic factors. We used the following sources: Prunier 1995, Steering Committee of the Joint Evaluation of Emergency Assistance to Rwanda 1996, Kapuscinski 2002 and OAU Expert Panel, 2000.

FIGURE NO 5 (Main and contributory causes of genocide)
The conclusions of these analyses are to a large extent similar and can be summarized as follows. The single most important cause of the genocide is existence and/or creation of a conflict between two ethnic groups (Hutu and Tutsi) about access to scarce resources in general and land in particular. It needs to be stressed that the ethnic conflict was to a considerable extent created since, in the period 1990-1993, the majority group (which was in charge of the government) manipulated public opinion and falsely accused the minority group of offences it had not committed. All historians and observers (with exception of

report of OAU Expert Panel) mentioned the role of rapid population growth or population pressure, but it is clearly viewed as a factor that contributed to the seriousness and intensity of the conflict. It was not the main or underlying cause. Representative is the following statement: “The decision to kill was of course made, for political reasons. But at least part of the reason why it was carried out so thoroughly by the ordinary rank-and-file farmers……was [the] feeling that there were too many people on too little land, and that with a reduction in numbers, there would be more for the survivors” (Prunier, 1995).

In addition, several other contributory factors were mentioned which can be grouped in several categories: characteristics and actions of the government (e.g., its authoritarian rule and its “culture of impunity” or absence of actions by the government against perpetrators of crimes aimed at the minority group), characteristics and actions of the population (e.g., tradition of obedience to authorities), external events and conditions (e.g., land tenure arrangements, lack of non-agricultural employment opportunities and unfavorable economic conditions in 1985-1994) and, last but not least, the impact of the violence that occurred in neighboring Burundi in 1990-1993 on the government and public opinion in Rwanda.

An approach related to the one mentioned above is followed for Rwanda by Percival and Homer-Dixon. They make use of a political science perspective and focus on the consequences of increased competition for scarce resources for occurrence of conflicts and violence. Their conclusion is: “…..Many factors were operating in this conflict, and environmental and population pressure has at most a limited aggravating role”. (Percival and Homer-Dixon, 1998).

5. Conclusions on the role of population pressure compared to other factors

We made a distinction between two basic approaches to the issue of determining the various causes of the 1994 genocide.

Applications of Neo-Malthusian theory to Rwanda stress economic and demographic factors in general and demographic pressure or population pressure or overpopulation or imbalance in land, food, population in particular as the main (or ultimate) cause of the 1994 genocide and earlier episodes of violence. They tend to assign lesser importance to other factors that are mentioned under the heading of contributory or proximate causes.

Historians, experts, expert panels and journalists describe the main cause of the 1994 genocide in terms of existence and/or creation of a conflict between two ethnic groups on access to and use of scarce resources and power. Population pressure is mentioned as a contributory factor that exacerbated the seriousness and intensity of the conflict.

We wonder if the historians, experts and observers did not under-estimate the role of population pressure. We will see below that population pressure has been a continuing and chronic problem in Rwanda for a long time (50 to 100 years). The growth of the population has led to more competition for scarce resources such as land and in general it could have exacerbated the intensity of the ethnic conflict. On the other hand, it is also likely that the ethnic conflict had an impact on the population pressure. For instance, the ethnic conflict could have deviated attention on the part of the government to initiate agrarian reform policies and to implement a national family planning program.

Our view is that both perspectives have merit (at least with respect to understanding of the causes of the Rwanda genocide). The genocide was possible because of the cumulative effects of extreme stresses and strains due to population pressure and the ethnic conflict (which strictly speaking was also partly created). Both issues, i.e., population pressure and the ethnic conflict (real and/or created), have a long history in Rwanda going back 50 to 100 years. In addition, there were numerous contributory causes that altogether had a major impact especially on the time the genocide actually took place. The cumulative effects of the two main causes as well as of the contributory causes led to extreme tensions in the period 1990-1993 setting the stage of the 1994 genocide.

Our position can also be formulated in a different way. Using concepts derived from philosophy of science (e.g., Susser, 1973), population pressure and the existence (and/or creation) of an ethnic conflict were in the case of Rwanda the ultimate or predisposing or indirect causes of the genocide. In addition, there were a number of precipitating or proximate or direct or causes. One can also call the population pressure and ethnic conflict necessary but insufficient causes and all the other factors contributory causes.

We now turn to the topic if it is possible to determine in more detail what was the role of population pressure. First, we will describe and define the concept and we will make a proposal how it can be measured. Next, we will look at population pressure over time in Rwanda and report on a comparative analysis of a number of developing countries. It allows us to determine how high population pressure was in Rwanda compared to other countries.

6. Definition and measurement of population pressure

What actually is population pressure and how can it be measured?

FIGURE NO 6 (Concept and measures of pop pressure).
We define it as follows: the extent to which a population living in a certain area is able to meet the basic necessities of life (i.e., food, water, air, heating, housing) through use of natural and other resources. High population pressure in an area (or country) means existence of stresses and strains in various (sub)systems due to the presence of (too) many persons that are dependent on natural and other

(scarce) resources (in comparison with another area or country with low pressure).

What is nature of population pressure? How does express itself in a society? All economic, social and political systems in a society (e.g., armies, schools, industries, hospitals, farms, families) have to deal with the problem of regulation of optimal size. They aim at having the “right” number of members in relation to resources available. If they have too many members they face problems; if they have too few they there are also problems. Many economic, profit-making systems are quite capable to regulate their size, but others cannot do this so easily or not all (e.g., schools, hospitals). If a society has high population growth, it affects all systems (e.g., the family, the educational system, the health care system, etc.). Each of the various systems has to accommodate and absorb the increase. As a result each of these systems faces stresses and strains, because resources often do not increase at the same pace as the increase in numbers. The pressure on each of the various systems due to increase in numbers is usually gradual and manageable; the systems adapt to the increase as good as they can. One has to add up the pressure on each of the various systems in order to arrive at a total that represents the pressure experienced by all systems. In addition, it is often the case that the (too) high population size continues to exert pressure on the various systems for many years in a row. The total pressure can thus be very substantial.

A distinction needs to be made between population pressure as experienced at the national level (e.g., government at central level), as experienced by communities and as experienced in households. Population pressure can, for instance, affect households in a different manner than at the level of the central government.

In most cases the stresses and strains due to a change (e.g., increase) in numbers of (sub)systems remain within normal limits and manageable. Actions are taken by these systems to mitigate or solve the problems that have arisen. In such situations, the population increase is a contributory cause to the problems that occurred. In other words; it exacerbated the seriousness and intensity of these problems. Situations can, however, also arise in which there is an increase in numbers of societies or subsystems, but societies or systems are unable and/or unwilling to take adequate measures or actions to cope with the consequences. For instance, it is possible that these systems and their leaders are so preoccupied with very serious problems threatening the very survival of these systems that the “population problem” becomes relatively unimportant and cannot receive adequate attention. The consequences of the population pressure continue, however, unabated and what, therefore, can happen in such (extreme) situations is that the population pressure becomes a major or ultimate or underlying cause of societal problems. Using different terminology one can say that population pressure becomes a necessary but insufficient instead of a contributory cause.

This is according to us what has happened in Rwanda. Population pressure became a predisposing or main or ultimate cause of the genocide. However, it was not the only main cause and the genocide cannot be explained by the impact and consequences of this group of causes alone. The existence and creation of the ethnic conflict was another group of main or ultimate causes and, in addition, there were numerous contributory causes.

We stated above that it is in principle necessary to determine the stresses and strains for each of the various systems in order to arrive at a total. We will not attempt to do this here. Instead we will limit ourselves to determining the stresses and strains of population size (and increase) with respect to agricultural production and land availability at the national or macro level. We propose to provide an operational definition of population pressure with an index composed of two components.

The first is the weighted population/land-in-use ratio. It is a refined measure of land availability as well as population density. The second is the adjusted food supply expressed in calories, per capita and per day and represents agricultural production.

Both measures have been used by FAO (Alexandratos, 1995). However, we have determined them for different years and several refinements and adjustments have been made (or still need to be made). The first of the two components is weighted and the second component still needs to be adjusted; details of the procedures used (and to be used) will be explained below.

7. Population pressure, land availability and agricultural production in Rwanda and other countries

TABLE NO. 1 (Pop/land ratios in several countries)
Table 1 shows both unweighted and weighted population/land ratios. The unweighted ratio is the number of persons per ha land-in-use (arable land and land in use for permanent crops). The weighted pop/land ratio standardizes for the quality the soil and availability of water. For example, several Sahel countries have a small number of persons per ha, but have little rain. There is, e.g., only one harvest per year. Bangladesh, on the other hand, has a high population density, but a lot of rain and, in addition, river water that can be used for irrigation. Therefore, three harvests are possible.

We see that Rwanda has a very high number of persons per ha (the weighted pop/land ratio) and this is also the case for Bangladesh and Kenya.

FIGURE NO 7 (Pop/land ratio in Rwanda in 1961-2002)
Trends in the three components of the population/land ratio are shown in Figure 7. They are shown here in the form of indices with 1961 as the base or index year (=100).

The top line shows the population increase; these data were shown already in Figure 2.
The middle line is the number of ha used for agricultural purposes. Rwanda succeeded in the past 30 to 40 years in bringing more land under cultivation (and/or taking land away from forests and from land used for grazing of cattle).
The bottom line shows the number of persons per land-in-use over the years. We see that the pop/land ratio has increased in spite of the fact that more and more land was brought under cultivation. It is an indication that population pressure has increased in the past 40 years.

TABLE NO 2 (Food supply in several countries)
FAO considers 2200 calories, per capita, per day as the minimum that is needed to have adequate food consumption. If countries are below this value, there is malnutrition especially in the low-income groups of these countries. The measure we (and FAO) are using here is an expression of food availability in a country. Agricultural production figures are recalculated for each country to represent the food supply that is per capita available on an average day in a particular year.

Food supply figures for several countries in 1970-2000 are shown in Table 2. The food supply in all countries in the table (with the exception of South Africa) was below the minimum level most of the time between 1970 and 2000.

It is worth mentioning that in Table 2 food imports are included in the food supply figures of a country. There are countries that are able to buy food that they cannot produce themselves (e.g., Singapore or Saudi Arabia). These countries have, therefore, considerable non-agricultural sources of income.

One adjustment still needs to be made with respect to food supply. Food commodities (e.g., rice, wheat) that are given as donations or at a subsidized price to a particular country still need to be excluded.

The figures of Table 2 are another indication that in Rwanda in the past 30 years agricultural production has barely been able to meet the demands for food for its increasing population. The agricultural sector always was under stress, because the total food supply was inadequate (i.e., below the minimum 2200 cal/cap/day) in most years. It is another indication of existence of high population pressure in Rwanda as well as in several other countries.

FIGURE NO 8 (Food supply in Rwanda over time)
This can also be seen in Figure 8. It shows that the food supply that was available in Rwanda in the past 40 years was nearly always inadequate.

The conclusion that already for a long time agricultural production could barely take care of the growing population is in accordance with the views of the Belgian government as expressed 50 years ago. A report by the Belgian government declared in 1951: "……A too dense and ever-increasing population has to live on very rugged land, which erosion, either agricultural or geological, is

impoverishing year by year. These basic facts……..cannot be too frequently recalled" (quoted in UN Pop Div, 1953, p.1). In addition, there is a report by Jaspar (quoted by King and Elliott) dating from 1929 dealing with Rwanda and Burundi in which the same point is made, but we have not yet been able to study it (Jaspar, 1929).
Population pressure has been a constant problem and threat for at least 50 years and maybe even much longer.

8. Results of a comparative study of population pressure in 91 countries

The seventh part of this paper deals with population pressure in 91 developing countries. We developed an index of population pressure which is a combination of two indicators mentioned above: the first is the weighted land-in-use ratio and the second is the adjusted food supply expressed in calories, per capita and per day. The data refer to 91 countries mostly LDCs.

Countries experience high population pressure when they have both a high pop./land ratio (>6.5 persons per ha land-in-use) (in 1988-1990) and a low food supply (<2200 cal/cap/day)(in 1970-1990). Countries have a low population pressure when they have a low pop./land ratio and high food availability.

FIGURE NO 9 (Index of pop. pressure in 91 countries)
Figure 9 shows the result of the calculations for 91 countries. One of the variables in the table is called Food Supply and is divided into 3 categories ranging from low to high. The second variable is called Pop/land ratio and is also divided into 3 categories ranging from high (> 6.5 persons per ha) to low (< 4.5 pers. per ha).

We see in Figure 9 that:
--- 7 countries have a high pop/land ratio AND low food supply. In other words these countries have high population pressure. Rwanda is one of them.
--- 11 countries have an average pop/land ration AND low food supply. These countries have fairly high pressure (e.g., Burundi).
--- 19 countries have a low pop/land ratio AND high food supply. They have low population pressure (e.g. Cote D'Ivoire).
--- 8 countries have a high pop/land ratio AND high food supply (e.g., Mauritius). The agricultural production of these countries is insufficient to meet food needs, but they have income from other sources and are able to buy food on the world market. For this reason they have medium population pressure.

There is an important implication of the findings presented in Figure 9. Population pressure as such cannot have been the only main cause of the 1994 genocide. Population pressure was about as high in Rwanda as in several countries such as Bangladesh and Kenya. There were no genocides in the last two countries in the recent past which means that other causes must have played a central role in explaining the 1994 genocide.

9. Conclusions

We believe that the revised figures on trends in demographic rates in Rwanda in 1960-2000 are an improvement in comparison with the existing ones. In particular trends in mortality, immigration and emigration are more precise reflecting the effects of various episodes of violence that occurred in particular between 1959 and 1994. It is realized, however, that these figures are still far from perfect or complete.

Applications of economic and demographic theories to the 1994 Rwanda genocide stress population pressure and overpopulation as the main cause of the 1994 genocide and earlier episodes of violence and attach less importance to political factors. Historians and journalists describe the main cause of the 1994 genocide in terms of existence of competition and conflicts between the two ethnic groups and mention population pressure as a factor contributing to the seriousness of the conflict. According to us both types of factors played a key role and can be considered as the ultimate or main or necessary but insufficient causes of the genocide. Both groups of causes have had a major impact on Rwandese society already for a long time (at least 50 to 100 years). These two causes also influence each other and, in addition, there are also a large number of contributory causes

We provided an operational definition of population pressure in terms of existence of (im)balance between population size, land and food availability and determined the extent of population pressure in Rwanda in the past 30 years and in comparison with 90 other countries. Using FAO and other data, we established that Rwanda experienced high population pressure during the past 30 years. We also found that in a comparative analysis of 91 countries Rwanda was in the category with the highest population pressure (together with 6 other countries that included Kenya and Bangladesh). This last finding supports our conclusion that population pressure, although it is a key factor, as a cause it is insufficient to explain the 1994 genocide, because there were no genocides in Kenya and Bangladesh in spite of the fact that these countries also experienced high population pressure.

Appendix: Estimate of number of persons who fled Rwanda in 1994, but are unaccounted for in subsequent years

According to UNHCR figures 2.3 million people fled the country in 1994 and 0.1 million in 1995-1997 which makes the total 2.4 million. In the period 1994-1997 a total of 3.1 million returned from abroad and very few in 1998-2002 (UNHCR, 2004). (This includes 600,000-700,000 Tutsi and their descendents who had left the country in 1959-1973). If we assume these figures to be correct and further assume a rate of natural increase of 2% per year and no net migration in 1998-2002 and we apply the demographic balancing equation for the period 1991-2002, the total midyear population in 2002 would have been 8.6 million.

However, the 2002 census arrived at a figure of 8.13 million which leaves a gap of 470,000 persons. UNHCR also estimates the number of Rwandese still in refugee camps outside Rwanda at about 90,000 in 1998-2002 which means that the actual number of persons unaccounted for is 380,000.

There are various possibilities that could explain the deficit of 380,000 persons. The three most likely are: First, it could be that substantial under-enumeration took place in the 2002 census. Second, it could be that the UNHCR figure on the number of refugees who returned in 1994-1997 is too high and the figure of 90,000 refugees still living in refugee camps in 1998-2002 too low. Third, it could be that a number of refugees died or were killed while living abroad. Maybe it was a combination of all three factors (and there may have been others as well). More research needs to be done to determine if indeed there is a deficit of unaccounted persons and, if so, how many there were and what was their fate.

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Appendix: tables and figures

Figure 1

Figure 2

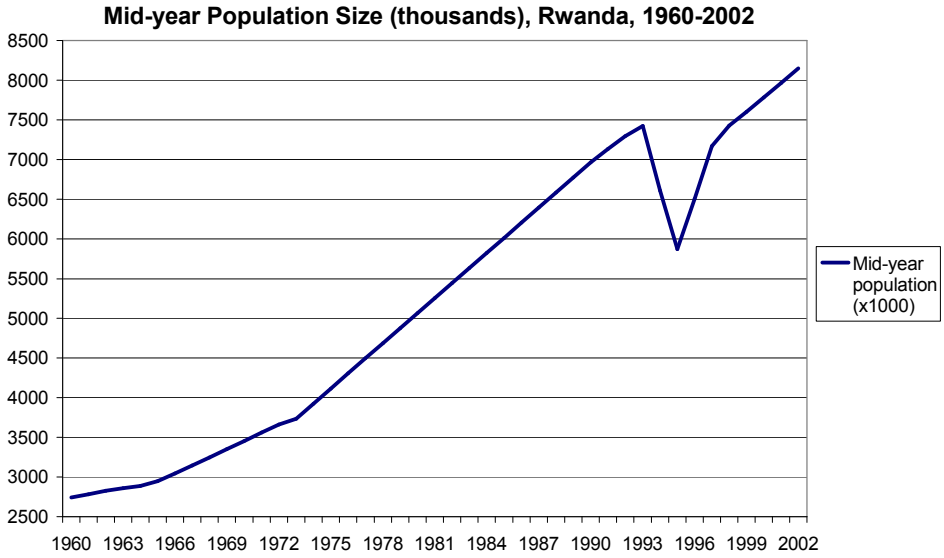

Figure 3

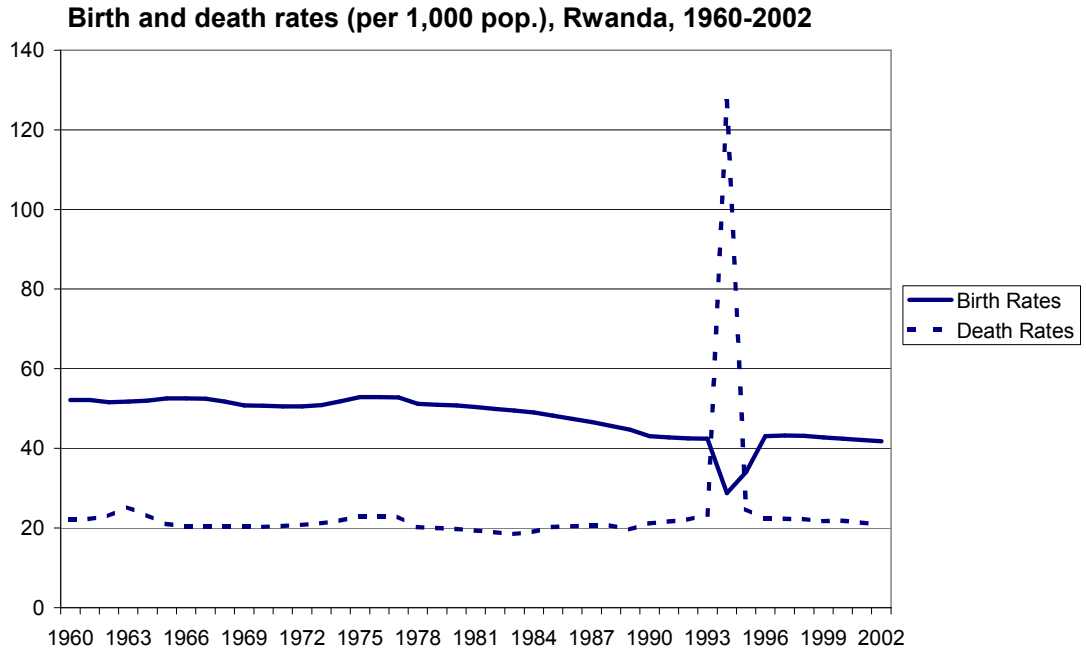

Figure 4

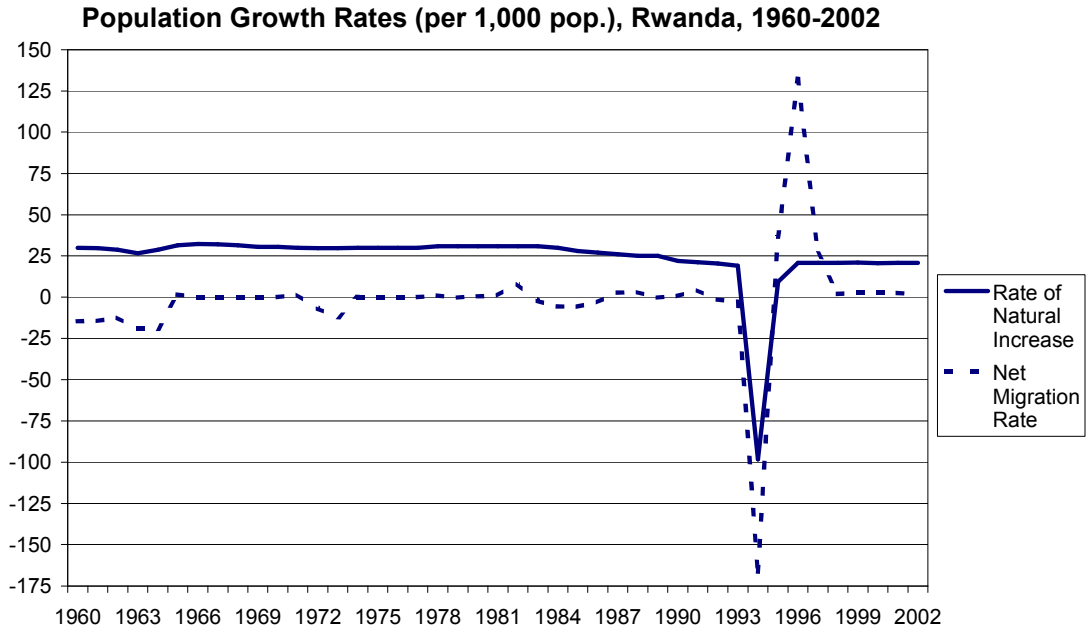

Figure 5

Main and Contributory Causes of Genocide

Main causes:
- Conflict (also created) between two ethnic groups
- Population pressure (imbalance pop.size., agric. prod., and land)

Contributory causes:
- Characteristics of government: e.g.,
  - Authoritarian rule
  - "Culture of Impunity"
- Characteristics of population: e.g.,
  - Obedience to authority
- Other features and events: e.g.,
  - Land tenure arrangements
  - Lack of development of non-agricultural sector
  - Unfavourable economic situation in 1985-1994

Figure 6

Concept and measures of population pressure

Definition: extent to which population living in an area is able to meet the basic necessities of life (food, water, air, housing etc.) through use of natural resources

High pop. pressure: imbalance due to (too) many persons that are dependent on scarce natural and other resources

Operational definition:

1. Weighted land-in-use ratio
2. Per capita agricultural production, or
   Adjusted food supply (Calories/per capita/per day)

Table 1

Population/land ratios, unweighted and weighted land, for several countries (1988/90 and 1998/00)

Years		Country					
		Rwanda	*South Africa*	*Burundi*	*Kenya*	*Africa South of Sahara*	*Bangladesh*
1988/ 90	*Unweighted*	7.2	4.6	5.0	20.2	2.3	12.2
	Weighted	11.4	6.0	7.9	9.2	3.1	10.4

Source: FAOStat, FAO, 2004.

Figure 7 (Population/land ratio, Rwanda, 1961-2002)

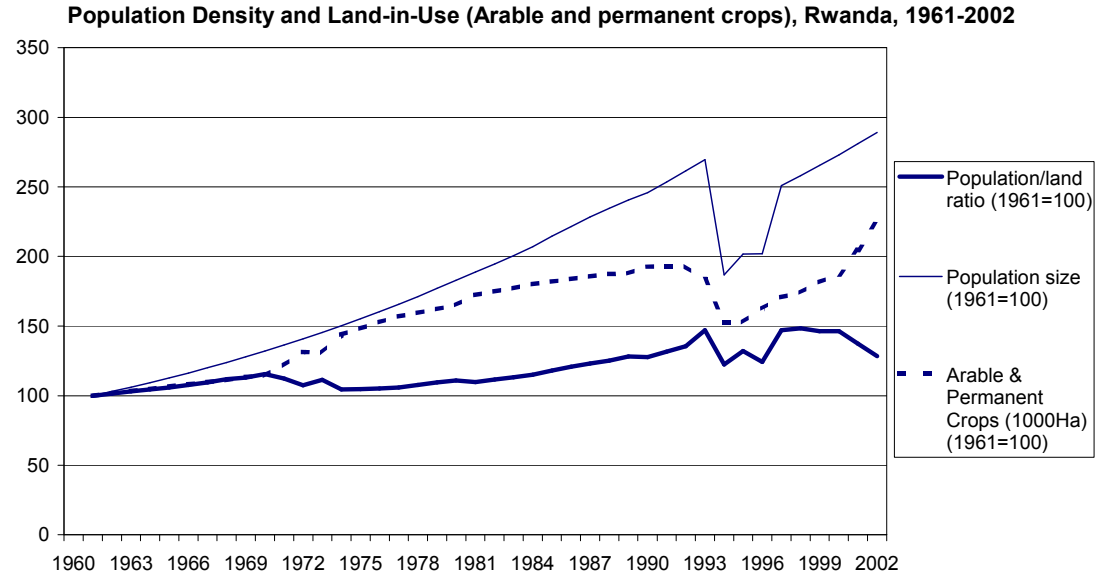

Table 2

Food Supply (Cal/Cap/Day) in Several Countries (1969/71 - 1999/01)

Years	Country					
	Rwanda	*South Africa*	*Burundi*	*Kenya*	*Africa South of Sahara*	*Bangladesh*
1969-1971	2210	2759	2107	2229	2109	2123
1979-1981	2287	2819	2029	2182	2088	1984
1989-1991	1961	2874	1850	1962	2119	2065
1999-2001	1992	2894	1609	2044	2211	2156

Source: FAOStat, FAO, 2004.

Figure 8

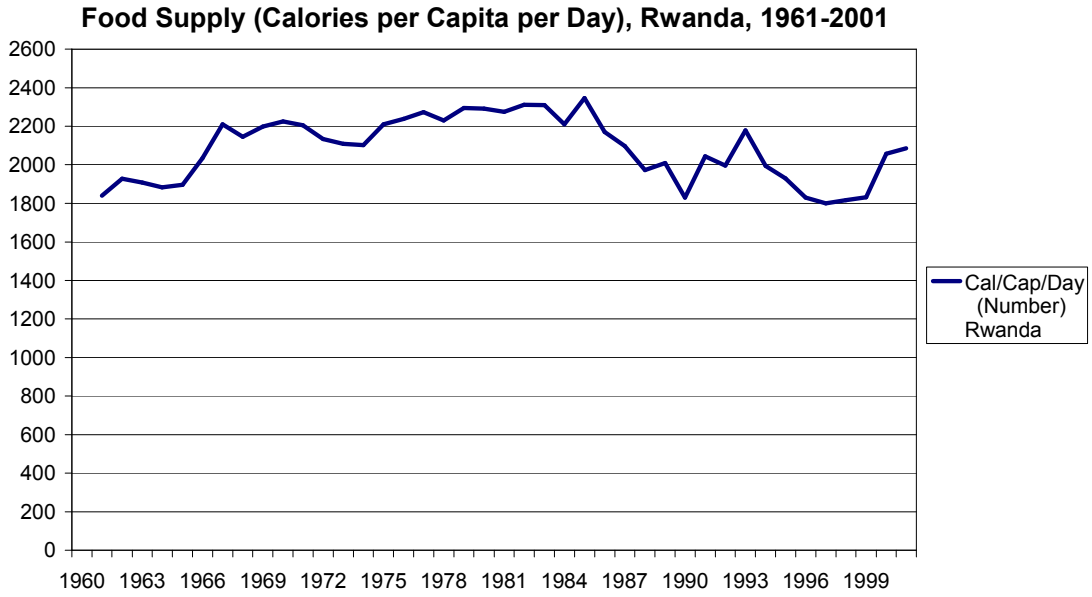

Figure 9

Food Supply (Cal/Cap/Day) and Population/land Ratio in 91 Countries

Population/ land ratio	Food Supply (Calories/Capita/Day)		
	<2,200	*2,200-2,400*	*>2,400*
>6.5	Kenya **Rwanda** Somalia Yemen Bangladesh Haiti Vietnam		Mauritius Egypt Jordan Lebanon Saudi Arabia Korea Rep Jamaica Trinidad and Tobago
Nr of countries	7	0	8
4.5-6.5	Burundi Congo Ethiopia Lesotho India Korea DPR Laos Philippines El Salvador Honduras Peru	Indonesia Sri Lanka Colombia Dominican Republic Guatemala Panama	Liberia Libya Costa Rica Venezuela
Nr of countries	11	6	4
<4.5	Angola Benin Botswana Burkina Faso Cen. Af. Rep. Chad Gambia Ghana Guinea Mali Mozambique Niger Nigeria Sierra Leone Sudan Tanzania Togo Zambia Afghanistan Cambodia Nepal Bolivia	Cameroon Congo/Zaire Madagascar Malawi Mauritania Senegal Uganda Zimbabwe Myanmar Thailand Pakistan Ecuador Nicaragua Suriname	Cote D'Ivoire Gabon Swaziland Algeria Iran Morocco Syria Tunisia Turkey Malaysia Argentina Brazil Chile Cuba Guyana Mexico Paraguay Uruguay Iraq
Nr of countries	22	14	19