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THE KHOKHOI POPULATION
A REVIEW OF EVIDENCE AND TWO NEW ESTIMATES

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**The Khoikhoi Population, 1652-1780:
A Review of the Evidence and Two New Estimates**

Sumner La Croix

March 8, 2018

Abstract

Fourie and Green construct estimates of the Khoikhoi population over the 1652-1780 period using benchmarks for the initial and terminal Khoi populations and benchmarks for the punctuated population declines from smallpox epidemics in 1713 and 1755. I review the evidence underlying each of the four population benchmarks and argue for a revised 1780 benchmark. Qualitative evidence also points to a higher rate of population decline between 1652 and 1723 and a smaller rate of decline between 1723 and 1780. Using the Fourie-Green methodology and adopting 3 of their 4 population benchmarks, I develop two revised estimates of the Khoi population to supplement the original Fourie and Green estimates.

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In 1652 the Dutch East India Company (VOC) established an outpost in the Southwestern Cape where its passing East Indies fleet could stop to refresh supplies of food and water, ill sailors could recover, and ship repairs could be made. Over the next 70 years the VOC refreshment station transformed into a VOC colony, with settlers claiming lands extending hundreds of miles from Cape Town to graze cattle and sheep and to grow crops. Nomadic herding groups, known collectively as the Khoikhoi, Khoe, Khoi or the derogatory term, Hottentots, had previously grazed their own herds of cattle on these lands which were also used by hunter-gather groups, known collectively as the San or Bushmen. Competition among the Khoikhoi, the San, and Dutch settlers for access to land, water and livestock led to 150 years of violent conflict and population decline. After losing access to grazing lands, many Khoikhoi also lost their livestock and became attached to Dutch farm households, working as laborers, shepherds, and herders. Some Khoikhoi and San groups were pushed beyond the expanding boundaries of the Dutch settlement, where they faced competition with other Khoi and San groups and Bantu peoples who were already occupying and using these lands. Many Khoikhoi perished from diseases introduced into South Africa by colonists and crews and soldiers from ships stopping in Cape Town.

How big was the decline in the Khoi and San populations during the period of Dutch expansion at the Cape? A precise answer to this question is impossible because no official censuses of these two populations were made prior to 1805 and there are widely varying estimates of the Khoi and San populations in 1652, when the Dutch refreshment station was established. The first recent attempt to estimate

the decline in the Khoi and San populations was made by Johan Fourie and Erik Green (2015), who specified population benchmarks for 1652 and 1780 and used them to calculate a 54 percent decline in the two combined populations over the 128-year period. For their 1652 population benchmark, they used Richard Elphick and V.C. Malherbe's (1989:3) estimate of 50,000 Khoikhoi in 1652 in the "whole of the southwestern Cape." For the 1780 population, they used Leonard Guelke's (1974:248) estimate of 20,000 Khoikhoi and 3,000 San in the entire Cape Colony in 1780.

Fourie and Green then construct annual population estimates for the 1652-1780 period by assuming that the Khoi population declined at a constant rate between 1652 and 1780, while punctuated by two much larger annual declines in 1713 and 1755 due to smallpox epidemics in the Colony. They use Robert Ross's estimates of a 20 percent decline in the Khoi population during the 1713 epidemic and a 5 percent decline during the 1755 epidemic. Under the assumption that the annual rate of population decline was constant in all other years between the population benchmarks, they calculate an annual rate of population decline for the entire period of -0.61 percent and for the non-smallpox years of -0.42 percent.

Fourie and Green's estimate is based on four population benchmarks—the 1652 and 1780 population estimates and the 1713 and 1755 estimates of population decline during the two smallpox epidemics—and the assumption that population declined at a constant rate between each population benchmark. My objective in this article is to review the evidence supporting each of the population benchmarks and to examine the assumption of constant population decline between

each benchmark. I begin with a brief survey and evaluation of alternative estimates of the Khoi population in 1652 and consider how use of an alternative 1652 population benchmark would affect the pattern and extent of decline in the Khoi population. Next I review the literature on smallpox epidemics in a variety of different populations and find that Fourie and Green's estimates of population decline during the 1713 and 1755 epidemics are consistent with recent research on mortality of first peoples from smallpox epidemics. My review of the 1780 population benchmark indicates that it should be revised downward, from 23,000 San and Khoikhoi to 20,000 Khoikhoi in order to be consistent with the 1652 benchmark which only includes Khoikhoi. In addition, several factors point to a higher rate of population decline between 1652 and 1723 and a smaller rate of decline between 1723 and 1780 than specified by Fourie and Green. I conclude by providing two alternative estimates of Khoi population decline over the full period, both of which correspond closely to the estimate of population decline over the 1652-1780 period offered by Fourie and Green.

I. Estimates of the Initial Population of the Southwestern Cape

Population estimates for the Khoi population of the Southwestern Cape in 1652 vary by a factor of 19, ranging from 11,000 to 200,000.¹ Some of the variation in estimates could be due to observers using different definitions of the area encompassed by the Southwestern Cape; employing different techniques to extrapolate from an observed sample to a population; or specifying different time

¹ A wide range of estimates is also typically found for populations of first peoples in the Americas.

periods for their estimates. Consider these estimates of the overall Khoi population and specific Khoi groups made by travelers, government officials, social scientists, and historians between 1660 and 1992.

1660 and 1662 Estimates of Commander Jan van Riebeeck. On 26 August 1660 Commander Jan van Riebeeck wrote in his journal that just two of the many Khoi groups in the vicinity of the Cape—the Chainaqua and the Cochoqua—amounted to more than 34,000 people” (Moodie 1960:213-214).² On 5 May 1662 van Riebeeck wrote to his successor regarding how many fighting men various Khoi groups could muster.³ His estimate of Chainaqua numbers was now much smaller, as he concluded that they could muster only 600-700 fighting men.⁴ Using a conservative extrapolation of 1.5 women and children per fighting man, this would amount to an overall population of 1,500 - 1,750 for the Chainaqua in 1662.

In the same memorandum, van Riebeeck also provided estimates of men for three other Khoi groups (the “Peninsular Khoi”) who lived near the settlement: the Goringhaiconas “who are, exclusive of women and children, not above 18 men in number”; the Goringhaiquas, who “exclusive of women and children [have] about 300 men capable of bearing arms”; and the Gorochoquas who “have, besides

² Jan van Riebeeck, Journal, 26 August 1660 as translated in Moodie (1960:213-214). van Riebeeck wrote that the Chainaquas “far exceed the Cochoquas in numbers of men and cattle, and yet the latter are supposed to be fully 17,000 or 18,000 in number ...”

³ Jan van Riebeeck, Memorandum left by Commander J. van Riebeeck, for the information and guidance of his successor Z. Wagenaar, 5 May 1662, as translated in Moodie (1960:246-248).

women and children, about 6 or 700 hundred men capable of bearing arms.”⁵ Using, once again, an extrapolation of 1.5 women and children per fighting man, this would amount to an overall population of 2,295 – 2,545 for these three groups in 1662. Combining this population range with the 1662 estimates for the Chainaqua population (1,500-1,750) and the 1660 estimate of the Cochoqua population (17,000-18,000) yields a total population for the five groups ranging from 20,795 to 22,295. Using the 1660 estimates for both the Chainaqua and Cochoqua populations yields a much higher range of 36,295 to 36,545. Many other Khoi groups who grazed cattle on lands outside the vicinity of the Cape, including the Great and Little Namaqua (discussed below), the Inqua, the Hessequa, the Attaqua, the Ubiqua, the Gouriqua and other groups living farther to the east, are not included in van Riebeeck’s estimates.

1707 Estimate by Peter Kolb. Peter Kolb, who lived at the Cape from 1705 to 1713 and served as the Colony’s first official astronomer, provided descriptions of 16 different Khoi groups in his book, *The Present State of the Cape of Good-Hope: or, A Particular Account of the Several Nations of the Hottentots*. While he does not venture an explicit estimate of the overall Khoi population, Kolb observed that the Great and Little Namaqua, two Khoi groups located to the north of the Olifants River were “able on Occasion, to take the Field with 20,000 fighting Men” (Kolb 1731:67).

⁵ Jan van Riebeeck, Memorandum left by Commander J. van Riebeeck, for the information and guidance of his successor Z. Wagenaar, 5 May 1662, in Moodie (1960:246-248).

Using an extrapolation of 1.5 women and children per fighting man would imply an overall population for these two Khoi groups exceeding 50,000 in 1707.

1811 Estimate by Hinrich Lichtenstein. Hinrich Lichtenstein was a European visitor to the Cape Colony in the first decade of the nineteenth century. In his 1811 book he provided the lowest estimates of the 1652 population, just 11,000 Khoikhoi. Lichtenstein started from a base population of 30,000 in the 1805 census and extrapolated backwards to 1652, using the assumption that the Khoi population had increased over the preceding 153 years.⁶ His rationale for this assumption was that the Khoi population had stabilized and prospered as they began to work for Dutch settlers as laborers, shepherds, and herders from the early eighteenth century.

1837 Estimate from Report of the Parliamentary Select Committee on Aboriginal Tribes. A Select Committee of the British Parliament was convened in February 1837 to consider the state of aboriginal groups in all British colonies. A group of experts assisted the Committee in preparing its June 1837 *Report* and it provided one of the highest estimates of the 1652 Khoi population, concluding that “[f]rom all the accounts we have seen of the Hottentot population, it could not have been less than 200,000” (British Parliament, House of Commons 1837:25-26).

⁶ “An exact estimate was not possible here. However, if one took the accounts of the oldest authors and if one allowed for what one knew about the simple means of their subsistence, the number of all Hottentots [Khoikhoi] within the boundaries of the colony in my days hardly exceeded 10,000 a hundred and fifty years ago. The census of 1805 revealed 30,000 of them.” See Lichtenstein (1811:37, note 3).

1897 Estimate by George Theal. George McCall Theal, the leading South African historian during the late nineteenth century, estimated a population in 1652 of 45,000 - 50,000 Khoikhoi. Theal (1897:126) wrote that he constructed his estimate from van Riebeeck's estimates of the population of Khoi groups, which are "scattered throughout his writings. Where he [van Riebeeck] has given only the number of fighting men in a clan, I have multiplied that number by five to represent the total of men, women, and children. In two instances he has given no information further than saying the clans were about as strong as some others which he had previously named." Theal's count included the Cochoqua, the Namaqua, the Chainaqua, the three Peninsular Khoi groups, and the Chariguriqua, but left out the Hessequa, Inqua and other Khoi groups farther to the east that may have had substantial populations.

1905 Estimate by George Stow. Stow was an amateur historian who worked with knowledgeable ethnologists in the late nineteenth century. His estimate of 35,000-40,000 Khoikhoi inhabiting "the southern angle of the African continent" in 1652 was derived from van Riebeeck's 1662 estimates of the number of fighting men (2,268) that five Khoi groups (Goringhaikona, Goringhaiqua, Gorachouqua, Chariguriqua, and Cochoqua) living relatively close to the Cape were able to muster (Stow 1905:246-248).⁷ Stow used an extrapolation of 4.73-5.17 additional people in the group per fighting man to estimate a population range of

⁷ Stow noted that Khoi groups "were certainly congregated more densely from the Cape to the northward, along the western coast, than to the eastward of that promontory; but even here [to the northward] there does not appear to have been a single tribe or clan capable of bringing two or three thousand men into the field."

13,000 - 14,000 people for the five Khoi groups. In order to account for the population of the remaining Khoi groups, Stow increased the lower bound of the range by a factor of 1.69 to 35,000 people and the upper bound of the range by a factor of 1.86 to 40,000 people.

1969 Estimate by Monica Wilson. In an influential chapter in the *Oxford History of South Africa*, the anthropologist Monica Wilson (1969:68) provided an “informed guess” that “it is likely that the total Khoikhoi population south of the Orange [River] was somewhere about 200,000.” She noted that “[t]his was the minimum figure given the Select Committee on Aborigines in 1837, [fn deleted] and is much closer to the reports of eye-witnesses than Theal’s estimate of forty-five to fifty thousand” (Wilson 1969:68).

1974 Estimate by Leonard Guelke. In his dissertation, the historian Leonard Guelke (1974:28) stated that it “appears likely that there were as many as 200,000 Khoikhoi in South Africa midway through the seventeenth century” and noted that his estimate “is in substantial agreement” with the 200,000 estimate made by Monica Wilson. Guelke’s estimate was based on his conclusion that the Khoikhoi “made effective use of the available resources” and that “[t]he number of persons that could be accommodated per unit area of land on the basis of the Khoikhoi’s system of resource use was of the order of three persons per square mile” (Guelke 1974:28).

1977 and 1989 Estimates by Richard Elphick. In his classic book, *Kraal and Castle*, Richard Elphick (1977:23) estimated that “in 1660 there were no more than 100,000 Khoikhoi in the southwestern Cape.” Twelve years later, Elphick and

Malherbe (1989:3) offered a much lower estimate, just “50,000 in the whole of the Southwestern Cape.”

1992 Estimate by Leonard Guelke and Robert Shell. In their study of settler displacement of Khoikhoi from their traditional Cape grazing lands, Leonard Guelke and historian Robert Shell (1992:804-805) adopted an estimate of 50,000 Khoi “inhabiting the area south of the Orange River” in 1652. They cited Elphick (1977:23) as their source, but his 1977 book provided a population estimate of 100,000 people for the Southwestern Cape. Guelke and Shell (1992:805) noted that 50,000 people spread over the 130,000 square miles of the Southwestern Cape meant that the “overall population density was well under one person per square mile” or, more precisely, 0.38 per square mile. This was a substantial change from Guelke’s earlier conclusion that Southwestern Cape lands could support 3 people per square mile.

II. Evaluation of 1652 Population Estimates

The lower bound (11,000) estimate of the 1652 Khoi population made by Lichtenstein seems implausible. Lichtenstein made the lower bound estimate in the early nineteenth century under the assumption that the Khoi population had thrived in the presence of the Dutch settlers. His comments mirror those of Fourie and Green (2015) and Guelke and Shell (1992) regarding how some of the Khoi population was absorbed into settler farms from 1685 but he completely fails to

take into account effects of disease, violent conflict,⁸ and deprivation of habitat on the overall Khoi population from 1652 to 1713.

The upper-bound estimate of 200,000 for 1652 was originally put forth in 1837 in a report commissioned by the British Parliament on the status of aborigines in Britain's colonies. The 1652 population estimate in the *Report of the Parliamentary Select Committee on Aboriginal Tribes* is extrapolated from van Riebeeck's estimates for particular Khoi groups. In testimony to Parliament, an author of the *Report*, Dr. Thomas Hodgkin, attributed Khoi population decline to their alcohol use, their loss of land and cattle and to the VOC's incitement of violent conflicts between Khoi groups.⁹ Notably, the last two reasons are the ones cited by modern historians for the Khoi's political, economic and demographic decline. Wilson (1969:68) revived the *Report's* estimate of 200,000 Khoi in 1652 and criticized Theal's estimate of 45,000-50,000 Khoikhoi, saying that the 200,000 estimate "was much closer to the reports of eyewitnesses."¹⁰ Guelke's (1974:28)

⁸ The indirect effects of conflict may be more important than direct losses. Khoikhoi who lost their livestock or their access to the lands and water needed to support their herds became increasingly attached to settler farmers (Guelke and Shell 1992; Fourie and van Zanden 2013; Fourie and Green 2015). The defeat of the Khoikhoi in the Second Dutch-Khoi War (1673-1676) and the expansion of settlers onto lands and sources of water previously used by Khoi herders were two forces underlying Khoi decisions to work with settlers. Recent estimates of the number of Khoikhoi attached to settler farmers by Fourie and van Zanden (2013) and Fourie and Green (2015) show sharp increases in these numbers after 1682.

⁹ Testimony of Dr. Thomas Hodgkin, House of Commons (1836:455-457), 9 May 1836. See Marks (1972) for discussion of Khoi-settler interactions.

¹⁰ Testimony of Dr. Thomas Hodgkin, House of Commons (1836:455-456), 9 May 1836. Hodgkin's testimony to the Select Committee indicated that the Committee staff emphasized eye witness reports from travelers "who have visited the extremity of Africa at a remote period, and speak of it as highly populous ..."

adoption of a 200,000 initial estimate has different roots, as it stems from his hypothesis that the carrying capacity of lands in the Southwestern Cape was three people per square mile. Later, he reduced his estimate of the carrying capacity of Cape land to just 0.38 people per square mile, and this led to a revision of his initial population estimate to 50,000 people.¹¹

Stow's initial estimate of 35,000-40,000 Khoikhoi is based on extrapolations of the number of fighting men mustered by various Khoi groups as reported in Governor van Riebeeck's journals and by European travelers. Stow qualified his estimate by noting that it might include some San people due to possible confusion by travelers regarding which groups they were observing.¹² Richard Elphick (1977:23) used a similar methodology in his 1977 book. He estimated the initial populations of several different Khoi groups and aggregated them into an estimate of 1652 population of 100,000. Elphick (1977:23, fn 1) then qualified his estimate, noting that "[t]he highest possible figures for the total Peninsular population are 8,000 and, for the Cochoqua, 16,000. It is conceivable that the Chainouqua and the Hessequa were more numerous—say 25,000 each. But the Guriqua and Little Namaqua populations were both smaller. Thus a total of 100,000 is almost certainly

¹¹ The extent of the Cape covered by each estimate could be different, as the estimate of 50,000 people is for 130,000 square miles, whereas the estimate of 200,000 people at 3 people per square mile is consistent with an area of 66,667 square miles. For context, note that the Western Cape Province of South Africa encompasses 49,981 square miles.

¹² Stow (1905:248) also noted that "these Cape tribes were neither all annihilated, nor reduced to serfdom, but that a considerable number fled from the danger which threatened them and migrated to the north and north-east, and that their descendants are now to be found amongst the present Koranas and Griquas."

on the far side of the truth.” The geographic extent of the Southwestern Cape was not explicitly defined in the book but from the discussion of the groups included in the estimate, it clearly encompassed area to the east of the Breede River inhabited by the Hessequa and area to the north of the Oliphants River inhabited by the Little Namaqua (Little Namaqualand).

Elphick’s praise of George McCall Theal’s estimate of 45,000-50,000 Khoikhoi foreshadowed a new estimate offered by Elphick and Malherbe in a 1989 article of 50,000 Khoi in the Southwestern Cape. They (1989:3) defined the extent of the Southwestern Cape, relatively narrowly, encompassing “lands south and west of a line running from the Oliphants River mouth to modern Tulbaugh and thence to the mouth of the Breede River.” This geographic area would exclude the Little Namaqua, the Great Namaqua and the Hessequa from their population estimate. Given Kolb’s estimate of 20,000 Namaqua fighting men and Elphick’s own earlier estimate that the Hessequa might have 25,000 people, the exclusion of these two groups might account for the differences in Elphick’s two estimates.¹³

Does the evidence support the 1652 population benchmark of 50,000 Khoikhoi? Given the quality of the evidence, yes. It is, however, important for the geographic scope of the 1652 and 1780 benchmarks to be comparable. The 1780 benchmark encompassed the entire Cape Colony but excludes Namaqualand and

¹³ No geographic definition of the Southwestern Cape goes beyond the Orange River. Because the Great Namaqua used grazing grounds on both sides of the Orange River, they may or may not be included in estimates of the Khoi population in the Southwestern Cape. It would, however, be hard to reach the 200,000 estimate of the 1652 Khoi population without including them.

therefore should exclude both the relatively small population of the Little Namaqua and the relatively large population of the Great Namaqua from the estimates. If we add together Elphick's upper-bound population estimates for the Hessequa (25,000), Chainaqua (25,000), Peninular Groups (8,000), and Cochoqua (16,000), this yields an upper bound estimate of 74,000. Given the speculative nature of Elphick's population estimates for the Hessequa and Chainaqua, perhaps the best estimate of the 1652 population remains 50,000, with this estimate, to paraphrase Elphick (1977:23, fn 1), "almost certainly on the low side of the truth."

None of the initial estimates intentionally include the San population. Guelke (1974:246) concluded that the San population in 1652 was 15,000 people and that it remained relatively constant over the first century of contact. Other historians have concluded that the San were much less affected than the Khoikhoi by Dutch settler expansion until the 1720s, when Dutch settlement began to expand to the Northeast into mountainous areas and into the drier plains to the east in the Graff-Reinert region. Penn (2005:117) concluded that "... after 1740, the great brunt of commando activity [raiding parties conducted by settlers] fell primarily on hunter-gatherer societies." Attempts by the Dutch to exterminate the San expanded dramatically during the 1760s and 1770s, with thousands of San deaths documented (Penn 2005; Adhikari 2011).¹⁴

¹⁴ San and Khoi populations were somewhat fluid during the first 100 years of Dutch settlement, with Khoi families who lost their livestock to settler raids, disease, or drought sometimes absorbed into the San population. The San were in a very different situation vis-à-vis the settlers than the Khoi, as they hunted wild game and poached both Khoi and settler livestock. Dutch settlers and Khoi groups reacted by organizing commando raids to kill San

IV. The Decline in Khoikhoi Population, 1652 to 1713

Researchers differ regarding the extent of the decline in the Khoi population over the Colony's first 60 years. Fourie and Green's population estimate assumes a constant -0.4 percent annual decline in the Khoi population during the years without smallpox epidemics: 1652 to 1712, 1714 to 1754, and 1756 to 1780. There is, however, some evidence that population decline may have been larger and more punctuated in the 1652-1712 period than in the other two periods. The archaeologist Andrew Smith (1989:25) noted that the Khoikhoi experienced eight other documented bouts with infectious disease other than smallpox over a 30-year period, 1658-1687.¹⁵ Consider, for example, this entry from Commander van Riebeeck's journal on 29 October 1658:¹⁶

She [Eva] was told that Doman was daily putting us upon our guard against the Cochoquas, saying that they were much incensed against us, and would burn our houses, kill our people, &c. and that he had therefore asked us to lend 20 soldiers to fight the Cochoquas, and take their cattle, because they were now almost all sick, and at their weakest, &c.

males and take San women and children prisoner. See Adhikari (2008) for a summary of the academic literature on the San and the Dutch campaigns to exterminate them.

¹⁵ Moodie (1960:241, 272, 291, 336, 363, 370, 386, 420).

¹⁶ Moodie (1960:146).

Or this “Public Warning” from Commander van Riebeeck on 24 November 1661:¹⁷

Whereas the natives of this country, the Saldanhars and Caepmans, have at present their houses and cattle close by, ... and whereas there is now among them, but particularly among their livestock, a great sickness ...

Or this excerpt from a letter from Commander Wagenaar and the Policy Council, to the Herren XVII on May 16, 1666:¹⁸

The Cochoquas ... were formerly, with the kraals under their authority, so strong, that both together might have mustered three thousand men capable of bearing arms ; but they were, some time ago, very much diminished and melted away by a sickness which prevailed among them.

Or this passage from the Company’s Journal for 8 December 1673:¹⁹

Captain Class and some of his grandees came to state, that for a few days back, there had been an infectious disease among his people, of whom 9 or 10 males or females had already died very suddenly; this they regard as a bad omen, for no particularly severe sicknesses are known among them; and Death usually contents himself with old worn out people.

¹⁷ Moodie (1960:241).

¹⁸ Moodie (1960:291).

¹⁹ Moodie (1960:336)

Elphick's discussion of the 1713 smallpox epidemic ("The Final Catastrophe") is prefaced by a discussion of a "third Khoi-Dutch war" in 1701-1703, in which the Dutch rebuff attacks from both San and Khoi groups and react by fortifying the frontier. He emphasized reports from an expedition in 1705 through the region to the north of the Cape by Johannes Starrenburgh, a *landrost* (local official). Starrenburgh's tour "revealed a bleak panorama of desolation" among two major Khoi groups, "the Guriqua and the Gonnema Cochoqua." There were few kraals to be found, and even fewer which had much stock."²⁰ Elphick paints a picture circa 1705 in which "all strata of colonial society saw easy and attractive pickings in the livestock of a crumbling native society."²¹ In this context, the 1713 smallpox epidemic hit Khoi groups that were already reeling from the effects of past disease outbreaks, war with the Dutch and other Khoi groups, loss of territory, and forced trades with European settlers.

V. The 1713 Smallpox Epidemic

Elphick (1977) and Elphick and Malherbe (1989) have followed Theal and other prominent South African historians in identifying the 1713 smallpox epidemic in the Cape Colony as a signal event in the Cape's population history, and historians have generally quarreled only about the extent of the population decline rather than its importance.²² Introduced via a fleet of visiting ships in April 1713 that slipped

²⁰ Elphick (1977:226).

²¹ Elphick (1977:229).

²² Guelke and Shell (1992:804, fn 1) noted that "Theal's [G.M. Theal, *History of South Africa* (London, 1922), III, pp. 475-77] emphasis on the disastrous impact of the smallpox

through the Cape's quarantine procedures, the epidemic led to large declines in the Colony's populations.²³ Theal (1909:432) concluded that "nearly one fourth of the European inhabitants" of Cape Town lost their lives from the epidemic. Population estimates by Peiter van Duin and Robert Ross compiled from the *Opgaff* (tax) rolls show that the European population of the entire Colony (excluding company employees) declined by 20.2 percent between 1712 and 1713 (van Duin and Ross 1987; Ross 1977). The slave population in Cape Town fell by a similar amount (20.8 percent), while the slave population in rural areas actually rose by 5.8 percent, perhaps in response to slave purchases (Ross 1977).

What do we know about the impact of the epidemic on the Khoi population?

Elphick and Malherbe's (1989) and Penn's (2005) accounts of the 1713 epidemic

epidemic of 1713 has found support among later historians such as W.M. MacMillan, J.S. Marais, P.J. Van der Merwe and Monica Wilson." For example, In the *Oxford History*, Monica Wilson wrote that "the smallpox epidemics of 1713, 1755 and 1767 so decimated the Khoikhoi that the very names of some hordes were forgotten." Wilson references Schapera (1930) for this quote.

²³ The standard story of the origins of the 1713 epidemic is that the virus was introduced by clothing sent ashore for laundering. Carlos and Lewis (2012) note that "[a]lthough droplets or scabs that fall on bedding or clothing remain infectious in principle, laboratory tests using vaccinia virus indicate that infection is unlikely because of how the material is handled by the respiratory tract. Also, in experiments on the persistence of infectivity, it has been found that the virus is rapidly inactivated, even on heavily contaminated objects. There are instances of laundry workers contracting smallpox, but the documented cases of smallpox transmission via fomites are very rare." See Fenner et al. (1988:194). Other sources surveying historical epidemics, e.g., Hopkins (1995), note contaminated clothing and bedding are documented but rare sources of virus transmission. The U.S. Centers for Disease Control and Prevention in its discussion of smallpox transmission states that smallpox "scabs and the fluid found in the patient's sores also contained the variola virus. The virus can spread through these materials or through the objects contaminated by them, such as bedding or clothing. People who cared for smallpox patients and washed their bedding or clothing had to wear gloves and take care to not get infected." Available at <http://www.cdc.gov/smallpox/transmission/index.html> (Last access on 20 September 2016).

are partly based on a VOC journal entry (13 Feb. 1714) about several surviving Khoikhoi in the Piketberg area—more than 100 kilometers north of Cape Town—who visited the Castle and painted a horrific picture of population losses of 90 percent, including all four of the group’s leaders. Elphick and Malherbe (1989:22) contended that the epidemic was not confined to April-November 1713 but rather “continued its destructive course after 1713. From the southwestern Cape, it spread north to the Tswana and then back to the Little Nama (around 1722-24), among whom it caused great disruption of social and economic life.” Penn wrote that a VOC company soldier reported in November 1714 that “the Khoikhoi were now scattered in an ‘unorganized’ manner and very poorly supplied with cattle.”²⁴ Elphick and Malherbe (1989:21) concluded that it may have resulted in an up to 90 percent decline in the Khoi population over the following decade, a period of drought and cattle disease that ravaged both Khoi and settler herds.²⁵ Their major argument supporting the large decline is that “the Khoikhoi virtually disappeared from the [VOC] records of subsequent years” (Elphick and Malherbe 1989:21).

Using Elphick and Malherbe’s initial population estimate of 50,000 Khoi in the Southwest Cape, the 90 percent loss in Khoi population would have left just 5,000 Khoikhoi. In light of Guelke’s population estimate for 1780 of 20,000 Khoikhoi, the 90 percent decline in their population seems implausible. The Khoi population would have had to grow at a very robust annual rate of roughly 2.1

²⁴ Cape Archives, Leibbrandt Manuscripts 18, Letters Received by Council of Policy, 9 Nov. 1714, as quoted in Penn (2005:43, 298).

²⁵ In his classic study of settler interaction with Khoi groups, Elphick (1977:233) concluded that the 1713 smallpox epidemic led to the loss of a majority of the Khoi population.

percent in order to increase from 5,000 people in 1723 to the 1780 population benchmark of 20,000 people

In spite of the anecdotal evidence for a Khoi mortality rate in 1713 exceeding 50 percent, Fourie and Green (2015) follow Robert Ross (1977) and Andrew Smith (1989; 1990) in specifying a much lower Khoi mortality rate, 20 percent, from the 1713 smallpox epidemic than earlier writers. This is because a 50 percent mortality rate from a specific smallpox epidemic lies far outside the range of documented smallpox epidemics, even in populations of first peoples who ultimately experienced overall population declines exceeding 80 percent after exposure to western diseases.²⁶

In their studies of smallpox epidemics in the Americas, Masimo Livi Bacci (2011) and Ann Carlos and Frank Lewis (2012) have echoed the skepticism of Ross and Smith regarding mortality rates in the two Cape smallpox epidemics. Livi Bacci (2011:164) found that some American populations, such as indigenous populations in the missions of Paraguay, were hit by a series of major epidemics, including smallpox, yet suffered only temporary population declines. Carlos and Lewis re-examined the Hudson Bay smallpox epidemic of 1781-1782 and lowered previous estimates of population decline from 50-90 percent to a maximum of 20 percent. They surveyed case fatality rates in other smallpox epidemics with verifiable

²⁶ Hawai'i provides a good example of an indigenous population that declined by 85-95 percent after contact with Europeans in 1778. An initial population of 400,000-500,000 people in 1778 declined to just over 44,000 native Hawaiians in the 1884 Census. A smallpox epidemic in 1853 accounted for 5,000-6,000 deaths, which was less than ten percent of the native Hawaiian population in the 1853 Census (Bushnell 1993).

population losses, and concluded that the range of case fatality rates is limited to 5-40 percent. This reduces dramatically the potential mortality of an epidemic, even if 50-60 percent of a population become infected (Fenner et al. 1988).²⁷ If incidence were to be limited to 50 percent of households, this would limit population losses from a single epidemic to roughly 20 percent of the population.²⁸ Carlos and Lewis do not consider the 1713 Cape Colony epidemic in their analysis, but their 20 percent cap for population loss from a single epidemic corresponds to upper-bound estimates by Ross (1977) and Smith (1989, 1990) for the effect of the 1713 smallpox epidemic on the Khoi population.²⁹

Did case fatality rates among the Khoi in the 1713 epidemic fall into the Carlos-Lewis range of 5 to 40 percent? Theal (1897:428; 1909:433) wrote that Khoi case fatality rates approached 100 percent while European rates were less than 50 percent.³⁰

²⁷ For a contrary view, see Riley (2010).

²⁸ Steffenson (1977:49) estimated that the mortality rate in Iceland's 1707-1709 smallpox epidemic was 26.4 percent, well above mortality rates in other post-1700 western epidemics. Steffensen's estimate is based on specific counts of smallpox deaths from 6 of 10 Iceland communes. Steffensen argued that mortality rates were high partly because the number of people who were ill simultaneously reduced the ability of people to care for each other.

²⁹ Ross (1977:422) concluded that the Khoi population "suffered as badly as the whites and slaves alongside them, perhaps worse," from the 1713 epidemic. Ross (1977:421) estimated white and slave losses at "around 20 percent" and later in the same article found that Khoi population losses must have been less than 30 percent. This is because white and slave mortality rates were smaller in rural areas where almost all Khoi lived. See Ross (1977:422-23).

³⁰ E.H. Burrows (1958:64) provided some information on the case fatality rate of European settlers in the 1767 smallpox epidemic. Although confined to Cape Town, roughly 2,000 European settlers contracted smallpox. Only 179 died, a case fatality rate of just 9 percent.

Among the Hottentots [Khoikhoi] the disease created the greatest havoc. Of the Europeans who were smitten, more recovered than died; but with the Hottentots, to be ill and to die were synonymous.

Two entries in the VOC's *Dagregister* provide conflicting evidence on the incidence of smallpox among the Khoikhoi. On 6 May 1713, an entry read:³¹

Even the poor Hottentots [Khoikhoi] are not free, but disastrously do not know the disease and, have never seen it and, in consequence of this medical ignorance are thus very disastrously smitten.

Another *Dagregister* entry from 19 May 1713 stated that some Khoi with smallpox who fled inland were killed by Khoi groups they encountered who were wary of being infected:³²

Today the news was received that some of the surviving Cape Hottentots [Khoikhoi], who wished to escape the sickness by fleeing over the mountains to another tribe have been mostly killed by the latter - with the exception of a few who escaped - for fear that the pox should break out among them: a rigorous policy.

³¹ As quoted in and translated by Ross (1977:417).

³² As quoted in and translated by Ross (1977:417). See also Theal (1909:433).

Such harsh prevention measures could have reduced the spread of smallpox among rural Khoi populations and, thus, the overall mortality rate beyond Cape Town.

On its surface, a *Dagregister* entry for 28 November 1713 provides some support for a high case mortality rate for the Khoi population.³³

... was heard more to bewail about the smallpox which recently reigned here (although it has not totally ceased; in Drakenstein Colony people are still afflicted). Corn reaping is at hand and the majority of the Hottentots [Khoikhoi] who used to serve the farmers have been carried off, so that some of them [the farmers] are helping with the scything, something here outside normal usage.

A visitor to the Cape, François Valentijn, stated that “the Hottentots, they died as if by hundreds, so that they lay everywhere along the roads as they fled inland with kraals, huts, and cattle, all cursing the Dutch who they said had bewitched them.” Valentijn then noted that “[a]fterwards as a result (as I found in 1714) very few Hottentots were to be seen here compared with previously, this causing very great inconvenience to the Burghers and other inhabitants who now lacked their service ... especially in the cutting and gathering of corn and grapes” (Valentijn 1971:217, 219). Smith (1989:25) concluded that the shortage of workers for the harvest was not solely due to Khoi population losses but also to a reluctance of survivors to come back to the area after the epidemic had ended exactly because they believed the Dutch had bewitched them.

³³ As quoted in and translated by Ross (1977:417).

After the 1713 epidemic, the Colony suffered from two years of drought (1715-1716) and then seven years of cattle disease (1716-1723). In their discussions of Khoi population decline, Elphick (1977) and Elphick and Malherbe (1989) argued that declines in the size of Khoi herds due to drought, cattle disease, and the loss of grazing lands contributed to a breakdown in the Khoi's social fabric, governance structure, and population. Elphick (1977) stressed that the Khoi population depended on the stock of cattle available to feed them. While there is no quantitative information regarding changes in Khoi cattle in the decade following 1713, there is somewhat reliable information regarding changes settler cattle and sheep stocks (Figure 1). These reveal a sharp downturn between 1711 and 1717, with the number of cattle falling from 20,743 to 15,298 and sheep from 116,256 to 62,220. Five years later in 1722 neither stock had recovered, with cattle counts at 15,336 and sheep counts at 66,593. Since the decline in the settlers' stock of sheep and cattle has been widely attributed to drought and disease, a substantial decline in Khoi animal stocks is a plausible inference. And that should also have been associated with a smaller Khoi population.

VI. The Khoi Population from 1723 to 1780

The 1652-1722 period was marked by two frontier wars, eight identifiable outbreaks of infectious disease, drought, a major smallpox epidemic, and cattle disease outbreaks. By contrast, the 1723-1780 period has only one major event, the 1755 smallpox epidemic, that is sufficiently large, a 5 percent decline, to warrant a

special population benchmark.³⁴ The post-1723 absorption of more Khoikhoi as workers on settler farms is also notable. Fourie and Green (2015:201-207, Figure 2) and Fourie and van Zanden (2013) estimate that after 1727, the number of Khoi who were employed on settler farms increased more than eight-fold. The Khoi's shift from independent pastoral activities to working on settler farms surely reflects the shrinking land base available to the Khoi to graze cattle and may also be an indicator of improved social stability that could be consistent with a stabilization of overall Khoi population numbers. Compared with the 1652-1722 period, the 1723-1780 period probably had a lower rate of decline for the Khoi population.

How reliable is the 1780 benchmark for the Khoi population? Guelke's (1974:28) estimates of 20,000 Khoi and 3,000 San are derived from Khoi population data from the early 1800s. Most likely, he is referring to the count of the "Khoi, San, and Bastards" population (20,006) in the 1805 Cape Colony Census. Guelke (1974:247, note 61) noted that his estimate for 1780 "assumed that the figure for 1780 would not be very different from that of two decades later." Guelke's estimate for 1780—20,000 Khoikhoi and 3,000 San—is, however, inconsistent with the 1652 benchmark estimate of 50,000 Khoikhoi, as the 1652 estimate does not include the San.³⁵ To ensure that the benchmarks compare the same population groups, either the 1780 estimate of the Khoi population should be reduced to 20,000 or Guelke's

³⁴ It is generally agreed that the smallpox epidemic of 1767 was mostly confined to Cape Town and had little effect on the Khoikhoi living in rural areas.

³⁵ The 1805 Census did not count Khoi living in Nama lands north of the Orange River and did not count Khoi living in Little Namaqualand and Bushmanland as they were not officially part of the Cape Colony.

estimate of the 1652 San population, 15,000 people, should be added to the 1652 benchmark of 50,000 Khoikhoi. Because we know less about how the San population changed over the 1652-1713 period, a conservative approach is to compare Khoi populations at each benchmark date rather than the combined Khoi and San populations. Thus, the 1780 benchmark should be revised to 20,000 Khoikhoi to make it comparable with the 1652 benchmark.

VII. Comparing Simulations of Cape Colony Population

Figure 2 plots the Fourie-Green simulation of Khoi population that uses their initial and final population benchmarks, their two smallpox epidemic benchmarks, and assumption of constant rates of population decline between the population benchmarks. For comparison, I also plot three additional simulations that use all of the Fourie-Green assumptions and population benchmarks but for the initial population. Additional simulations are made using initial Khoi population estimates in 1652 of 200,000 (Select Committee of the British Parliament 1837), 100,000 (Elphick 1977), and 40,000 (Stow 1905).

I provide two additional simulations of the Khoi population that are constructed using the methodology set out in Fourie and Green (2015). In both simulations, I maintain Fourie and Green's assumptions regarding Khoi mortality rates in the 1713 smallpox epidemic (20 percent) and the 1755 epidemic (5 percent) as well as their initial population benchmark (50,000 people). In the first simulation, I adjust the 1780 Khoi population benchmark by removing the 3,000 San from the benchmark to make it consistent with the 1652 population benchmark that uses only the Khoi population. Using the new 1780 Khoi population benchmark of

20,000 people and all of the other assumptions made by Fourie and Green, I obtain a slightly higher rate of population decline over the 1652-1780 period (-0.7 v -0.6 percent) and a slightly higher rate of population decline during the non-smallpox years (-0.5 v. -0.4 percent). The new simulation, "Fourie-Green-Adj", is displayed in Figure 3 along with the original Fourie-Green simulation.

The second new simulation, "Revised", builds on the first, as it uses the adjusted Khoi population benchmark of 20,000 people for 1780 as well as the Fourie-Green assumptions regarding the initial population and losses from the two smallpox epidemics. It differs from earlier simulations of Khoi population by setting different population growth rates for four "non-smallpox" periods: 1652-1712, 1714-1723, 1723-1754, and 1756-1780. Particular events (human disease, animal disease, drought, and war) were identified above for the 1652-1712 and 1714-1723 periods that were likely to be associated with Khoi population decline. By contrast, there are no such events for the 1724-1754 and 1756-1780 periods that could have led to punctuated Khoi population declines and Fourie and van Zanden (2013) and Fourie and Green (2015) identify another factor, increased Khoi attachment to settler farming and grazing ventures, that surely contributed to Khoi population stabilization. The evidence points to a greater decline in the Khoi population during the 1652-1712 and 1714-1723 periods than in the 1724-1754 and 1756-1780 periods. Thus, in the second new simulation, I account for differences in population growth over the four non-smallpox periods by setting Khoi population growth rates equal to zero in the 1723-1754 and 1756-1780 periods. This forces the annual rate of Khoi population decline in the 1652-1712 and 1714-1723 periods to increase in

the second simulation from -0.42 in the original Fourie-Green simulation and -0.53 in the adjusted Fourie-Green simulation to -0.95.

It is useful to remember that all three annual population estimates are based on just four data points: Rough estimates of the Khoi population at two benchmark dates and rough estimates of the population declines during two smallpox epidemics. The simulations are useful because they help us understand the implications of changing benchmarks for benchmark Khoi populations and because taking qualitative evidence into account provides a glimpse into how small changes in assumptions can affect population over long periods. For example, in the Fourie-Green simulation, the Khoi population falls from 50,000 people in 1652 to 31,875 in 1713, a 36.3 percent decline. In this paper's second simulation, the Khoi population falls from 50,000 people in 1652 to 23,151 in 1713, a 53.7 percent decline. Such differences could be important for understanding long-standing debates in Cape history, as settlers migrating to the southeast and northern parts of the Cape in the 1720s, 1730s, and 1740s could have faced less resistance from a smaller number of Khoikhoi and, perhaps, more willingness by the much smaller and more disorganized Khoi populations to work for the settlers as laborers.

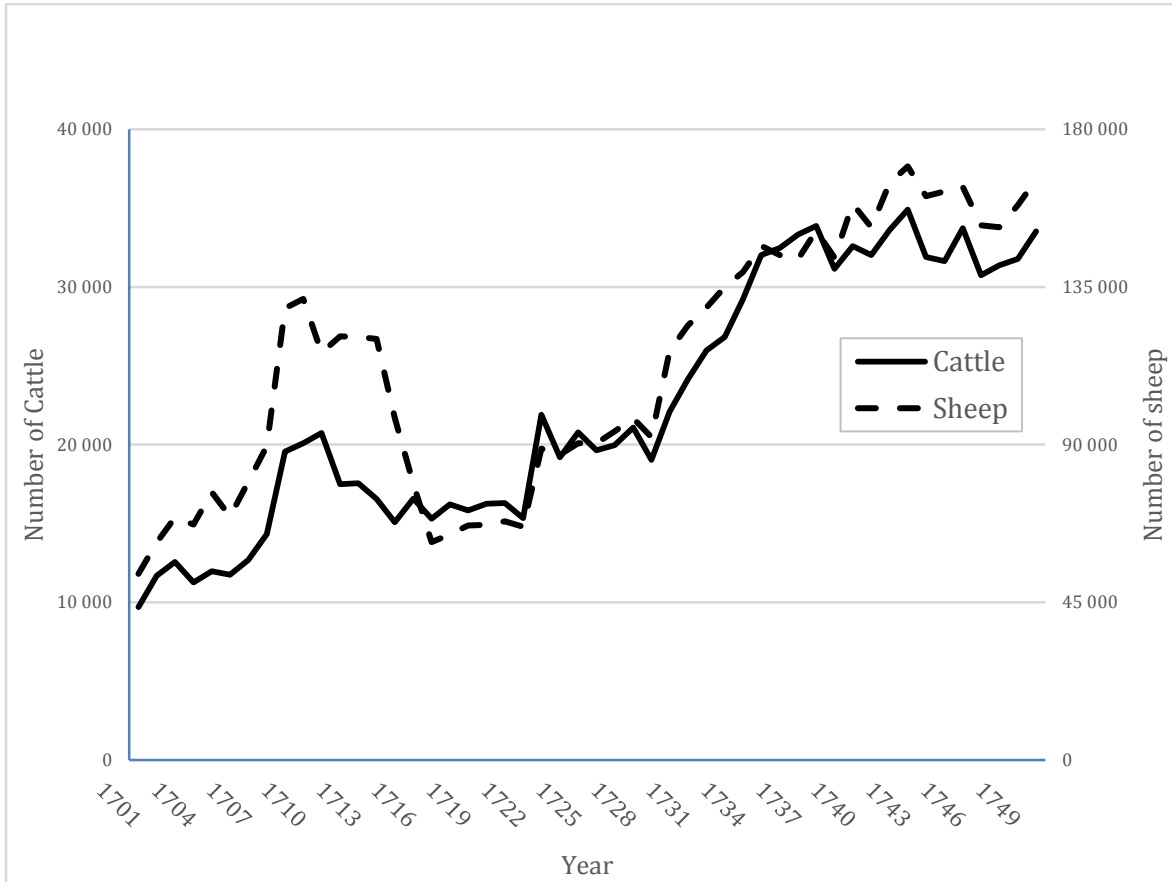
References

- Adhikari, Mohamed (2011). *Anatomy of a South African Genocide: The Extermination of the Cape San Peoples*. Athens: Ohio University Press,
- Burrows, E.H. (1958), *A History of Medicine in South Africa*. Capetown: A.A. Balkema.
- Bushnell, Andrew (1992), “‘The Horror’ Reconsidered: An Evaluation of the Historical Evidence for Population Decline in Hawai‘i, 1778-1803.” *Pacific Studies* 16(3): 115-161.
- Carlos, Ann M., and Frank Lewis (2012), “Smallpox and Native American mortality: The 1780s epidemic in the Hudson Bay region,” *Explorations in Economic History* 49: 277-290.
- Centers for Disease Control and Prevention (2016), Smallpox: Transmission. Available at <http://www.cdc.gov/smallpox/transmission/index.html> (Last access on 20 September 2016).
- Elphick, Richard (1977), *Kraal and Castle*. New Haven and London: Yale University Press.
- Elphick, Richard, and V.C. Malherbe (1989). “The Khoisan to 1828,” in Richard Elphick and Hermann Giliomee, eds, *The Shaping of South African Society, 1652-1840*. Middletown, Conn.: Wesleyan University Press.
- Fenner, F., D.A. Henderson, I. Arita, Z. Ježek, I.D. Ladny (1988), *Smallpox and its Eradication*. Geneva: World Health Organization.
- Fourie, Johan, and Erik Green (2015), “Missing People: Accounting for the Productivity of Indigenous Populations in Cape Colonial History,” *Journal of African History* 56(2): 195-215.
- Fourie, Johan, and Jan Luiten van Zanden (2013), “GDP in the Dutch Cape Colony: the national accounts of a slave-based society,” *South African Journal of Economics* 81(4): 467-490.
- Great Britain, Parliament, House of Commons (1836), *Minutes of Evidence before Select Committee on Aboriginal Tribes*. London.
- Great Britain, Parliament, House of Commons (1837), *Report of the Parliamentary Select Committee on Aboriginal Tribes*. London.
- Guelke, Leonard (1974), *The early European settlement of South Africa*. Unpublished Ph.D. dissertation, University of Toronto.

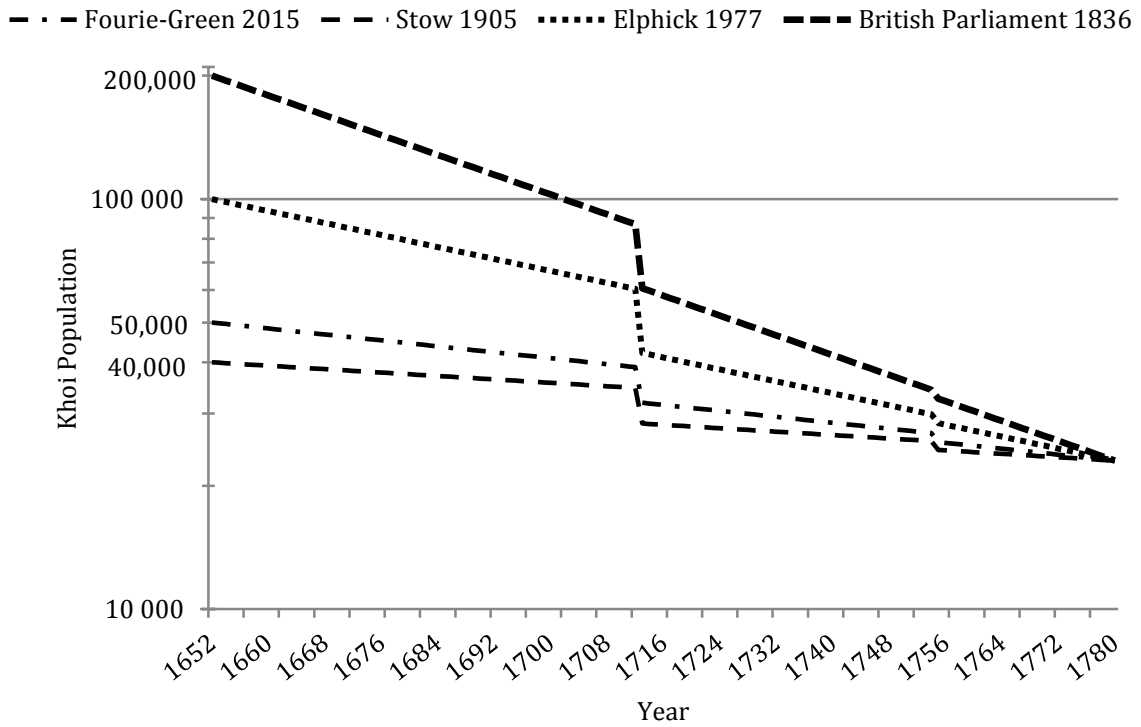
- Guelke, Leonard, and Robert Shell (1992), "Landscape of Conquest: Frontier Water Alienation and Khoikhoi Strategies of Survival, 1652-1780," *Journal of South African Studies* 18(4): 803-824.
- Hopkins, D.R. (2002), *The Greatest Killer: Smallpox in History*. Rev. ed. Chicago: University of Chicago Press.
- Kolb, Peter (1731), *The Present State of the Cape of Good-Hope: or, A Particular Account of the Several Nations of the Hottentots ... with a short account of the Dutch settlement at the Cape*. Translated by Guido Medley. London: W. Innys and R. Manby.
- Lichtenstein, M.H.C. (1973 [1811])). *Foundation of the Cape/About the Bechuanas*. Translated and edited by O.H. Spohr. Cape Town: A.A. Balkema.
- Livi Bacci, Masimo (2011), "The Demise of the American Indios," *Population and Development Review* 37(1): 161-165.
- Marks, Shula (1972), "Khoisan Resistance to the Dutch in the Seventeenth and Eighteenth Centuries," *The Journal of African History* 13(1): 55-80.
- Moodie, Donald (1960) [1838-1841]. *The Record: or, A Series of Official Papers Relative to the Condition and Treatment of the Native Tribes of South Africa*. Compiled, translated and edited by Donald Moodie. Amsterdam and Cape Town: A.A. Balkema.
- Penn, Nigel (2005), *The Forgotten Frontier: Colonist and Khoisan on the Cape's Northern Frontier in the Eighteenth Century*. Athens: Ohio University Press.
- Riley, James C. (2010), "Smallpox and American Indians Revisited," *Journal of the History of Medicine and Allied Sciences* 65: 445-477.
- Ross, Robert (1977). "Smallpox and the Cape of Good Hope in the eighteenth century," in C. Fyvie and D. McMasters (eds.), *Africa Historical Demography*, Vol. I. Edinburgh: Centre for African Studies, University of Edinburgh, pp. 416-428.
- Schapera, I. (1930), *Khoisan Peoples of South Africa: Bushmen and Hottentots*. London: George Routledge and Sons.
- Smith, Andrew B. (1989), "Khoikhoi susceptibility to virgin soil epidemics in the 18th century," *South Africa Medical Journal* 75(Jan.): 25-26.
- Smith, Andrew B. (1990), "The Origins and Demise of the Khoikhoi: the Debate," *South African Historical Journal* 23: 3-14.

- Steffensen, Jón (1977), "Smallpox in Iceland," *Nordisk Medicinhistorisk årsbok [Yearbook of the Museum of Medical History]* 1977: 41-56.
- Stow, George W. (1905), *The Native Races of South Africa*. London: S. Sonnenschein and Co.
- Theal, George McCall (1897), *History of South Africa Under the Administration of the Dutch East India Company, 1652-1795*. Vol. I. London: Swan Sonnenschein & Co.
- Theal, George McCall (1909), *History and Ethnography of Africa South of the Zambesi*. Vol. 2. London: Swan Sonnenschein & Co.
- Thom, H.B., ed., (1952-1958), *Journal of Jan van Riebeeck*. Three Vols. Cape Town: A.A. Balkema.
- Valentijn, François (1971), *Description of the Cape of Good Hope with Matters Concerning It*. Part I. [Beschryvinge van de Kaap der Goede Hoope, Deel I]. Second Series, No. 2. Trans. by E.H./ Raidt. Cape Town: Van Riebeck Society, pp. 216-219.
- van Duin, Pieter, and Robert Ross (1987), *The Economy of the Cape Colony in the Eighteenth Century*. Leiden: Centre for the History of European Expansion.
- Wilson, Monica (1969), "The Hunters and Herders," in Monica Wilson and Leonard Thompson, eds, *The Oxford History of South Africa*, Vol 1. London: Oxford University Press, pp. 40-74.

Figure 1: Sheep and Cattle on Settler Farms in Cape Colony, 1701-1750



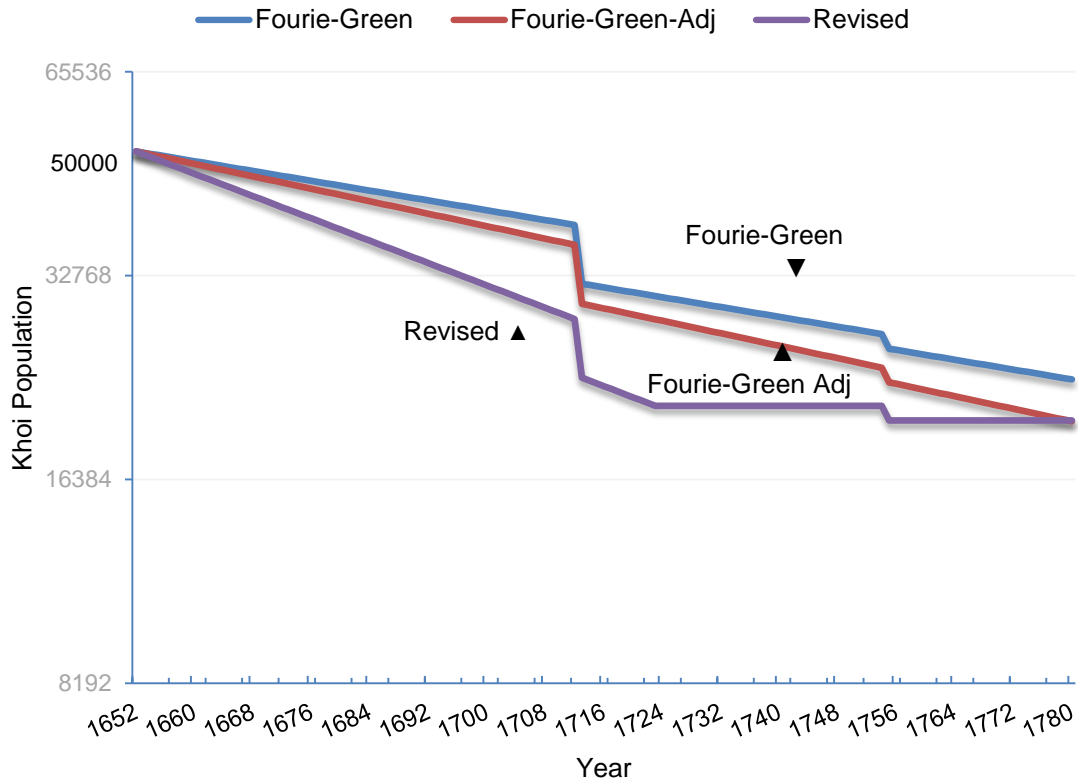
Source: van Duin and Ross (1987).

Figure 2: Khoi Population Simulations, 1652-1780

Sources: See text.

Note: The y-axis is in logarithmic scale. This means that a constant rate of population decline appears as a straight line.

Figure 3: Alternative Khoi Population Simulations, 1652-1780



Source: Fourie and Green (2015).

Note: The y-axis is in logarithmic scale. This means that a constant rate of population decline appears as a straight line.