Unravelling Mortality in Enslavement. Patterns and Determinants of Mortality Among the Enslaved Population of Curaçao, 1839–1863

By Wieke Elien Metzlar and Nadeche Diepgrond

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Unravelling Mortality in Enslavement

Patterns and Determinants of Mortality Among the Enslaved Population of Curaçao, 1839–1863

Wieke Elien Metzlar
Radboud University Nijmegen

Nadeche Diepgrond
Radboud University Nijmegen

ABSTRACT

This paper examines the demographic patterns of an enslaved population. During the 19th century, enslaved populations in Latin America and the Caribbean were characterized by an excess of deaths, indicating the harsh conditions they were forced to endure. However, the island of Curaçao — at that time a Dutch colony — formed an exception to this trend, as the enslaved population experienced a natural increase. Today, newly crowdsourced data of the slave registers of Curaçao enable the examination of the entire enslaved population and facilitate the study of demographic developments on the island. This paper aims to gain insight into patterns of mortality between 1839 and 1863 to shed light on the determinants of the exceptional demographic development of the enslaved population of Curaçao. This research examines the mortality rates of the population and explores possible determinants — seasonality, sex, and age — of this unique mortality pattern (n = 12,793). Earlier research emphasized the importance of the fertility pattern of Curaçao as the determinant of the natural population increase. However, the results of this paper suggest that mortality might have played a more decisive role. The relatively low mortality rates allowed fertility rates to exceed them, resulting in a positive difference between births and deaths and leading to a unique pattern of natural increase of an enslaved population in the Caribbean.

Keywords: Mortality, Enslaved populations, Demography, 19th Century, Curaçao

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1 INTRODUCTION

Demographical developments in the context of modern slavery have always been an object of interest, although the motivations of studying the population size, mortality, fertility, and life expectancy have differed. For example, owners of enslaved persons were particularly interested in the development of the population in terms of the increase or decline of their labour force. In contrast, abolitionists were interested in life expectancy and patterns of mortality among enslaved people to demonstrate the cruelty of slavery and to support their anti-slavery arguments (Steckel, 1979, p. 86). Nowadays, demographic patterns of enslaved populations are examined in order to shed light on the materialistic living circumstances — regarding both working and living conditions — of people in slavery, as well as the life courses of enslaved people and the factors influencing these circumstances (van Stipriaan, 1993, p. 330).

An important theme in demographic research in the Western Hemisphere is the different courses of development of enslaved populations. Enslaved populations in the United States were characterized by a natural increase — more births than deaths — whereas enslaved populations in the Caribbean experienced a natural decrease: an excess of deaths. Curaçao, however, occupied a unique position in the Caribbean, as the enslaved population was characterized by a natural increase. Although several studies have examined this population on aggregated level, no comprehensive study on the patterns of death has been undertaken until now. Recent crowdsourcing projects have provided a new dataset, which consists of all enslaved individuals who lived on Curaçao between 1839 and 1863. This study will use this new data to shed light on the mortality patterns among enslaved people on Curaçao to examine the unique demographic development of this Caribbean population.

In this paper the demographic development and patterns of mortality (both on the individual and societal level) of the enslaved population of Curaçao from 1839 to 1863 will be studied. Previous studies relied on aggregated data, but because of the newly crowdsourced data of the Curaçao Slave Register Dataset, it is now possible to study the mortality patterns of the entire enslaved population of the island. The analysis will include the life courses of approximately 13,000 enslaved individuals, aiming to gain insight into how the mortality of enslaved people of Curaçao between 1839 and 1863 can be characterized. As mortality among the enslaved people of Curaçao has not yet been examined in depth, this explorative research seeks to shed light on several aspects of death rates and mortality patterns.

The first aim of our study is to examine which structural characteristics and developments can be discerned in the mortality rates among the enslaved population of Curaçao, as well as to determine the underlying explanations for these characteristics and developments. The second aim of our study is to examine which variables (including age, sex, season and time) influenced the mortality risks of individuals and how these risks relate to the observed trends in the entire enslaved population. In short, while building on previous research focussing on the demography of the enslaved population, this paper also draws attention to questions regarding the relation between individual mortality risks and developments of mortality rates on a societal level.

In the following section, a historiographical overview of studies focussing on the demography of enslaved populations will be discussed. Thereafter, the historical context of slavery of Curaçao will be described. Then the sources, data and methods used in this study will be discussed, followed by the presentation of the results and findings. The paper concludes with a discussion on how the case of Curaçao provides new insights into our understanding of the demography of enslaved populations, followed by suggestions for further research.

2 HISTORIOGRAPHY

One of the main topics and central themes of research on slave demography within the Western Hemisphere is the different development of population growth. In general, two patterns can be distinguished. On the one hand the development of the enslaved populations in the United States, which were characterized by a natural increase (an excess of births) (Dunn, 1972, p. 314; Hacker, 2020, p. 840). On the other hand the substantial decline — as a result of an excess of deaths — of enslaved populations living in the Caribbean and Latin America (Everaert, 2011, p. 235; Lamur, 1981, pp. 87–88). Among enslaved societies in the Caribbean, rates of natural decrease varied widely over time and

place. For instance, Humphrey Lamur estimated an annual natural decline of 0.5% in Jamaica between 1817 and 1832, compared to the annual decline of 7% in Cuba between 1816 and 1860 (Lamur, 1981, pp. 87–89). Moreover, Barry Higman distinguished two patterns in declining populations: those with heavy yet lessening natural decreases (e.g., in Trinidad, Berbice and Grenada) and those with light, yet increasing natural decreases (e.g., in Jamaica and Dominica) (Higman, 1991, pp. 221–227).

Some enslaved populations formed an exception to this general trend of natural decrease in the Caribbean and Latin America. Certain enslaved populations in the British Caribbean, such as Barbados, the Bahamas, and Barbuda experienced a constant natural growth between 1807 and 1834 (Higman, 1995, pp. 307–310). Klein and Luna also mentioned the Brazil provinces of Minas Gerais, Panará, and Piauí where the birth rates of the enslaved populations exceeded the death rates during the 19th century (Klein & Luna, 2012, p. 163). The demographic pattern of the enslaved population in the Dutch Antilles — including the island of Curaçao — also formed an exception to the Caribbean pattern. From 1840 until 1863 the enslaved population of Curaçao was characterized by a positive rate of natural population growth of circa 1.8% each year, according to Lamur.

Developments and changes in patterns of fertility and mortality have been explained by numerous factors, which Higman distinguished in three groups of exemplary aspects. The first group regards structural, demographical differences in populations (Higman, 1991, pp. 221–227). These studies primarily focused on differences in age structures and sex ratios among enslaved populations. Normalization of age structure (an increase in the share of the youngest and oldest age categories) resulted in a decline of natural decrease (Klein & Luna, 2012, p. 163; Lamur, 1997, p. 164). However, these age categories were characterized by the highest death rates. For instance, Gert Oostindie estimated that two-thirds of live born children died before the age of four (Oostindie, 1989, p. 135). In addition to age structures, sex differences and sex ratios also effected mortality, fertility, and birth rates. Overall, mortality rates were higher among men, as they are biologically disadvantaged and were often assigned to physically heavier work (Oostindie, 1989, p. 135). However, women of reproductive age had relatively high probabilities of death due to risks regarding pregnancy and childbirth (Everaert, 2013, p. 9). The ratio of women compared to men furthermore influenced demographic patterns. Normalization of sex ratios resulted in an increase of births (Craton, 1971, pp. 15–16; Steckel, 2010). However, an increase in the birth rate would also result in an increase in the death rate, due to high mortality rates among infants and young children.

The second group of factors aims to explain the diversity in demographic patterns as a result of differences in economic structures. The slave exploitation regimes have often been divided between "plantation economies", which aimed for the maximization of production of goods for the world market, versus more "domestic slavery" as a relatively more "mild" form of slavery compared to the plantations. On Curaçao, no "true" plantation economy existed, as production at the island was aimed at provision for the inhabitants, instead of export to other markets. Hermannus Hoetink therefore linked the lower mortality rates on Curaçao to the relatively "milder" type of work compared to the "true" plantation economies (Hoetink, 1958, pp. 108–117). The British islands of Barbuda and the Bahamas contained in the 19th century also more diversified slavery economies, which included activities as fishing, salt-raking, cattle breeding and agricultural work aimed for the food provisions on the islands. Like Curaçao, the enslaved populations of Barbuda and the Bahamas naturally increased (Higman, 1995, pp. 65–66, 307–310). However, Higman's study showed that also in "true" plantation economies natural increase of the enslaved population could occur. The population of Barbados, for instance, had a positive natural development, despite the vast sugar plantation economy on the island (Higman, 1995, pp. 50–52, 307–310). Others emphasized differences in types of crops produced — and the associated nature of work — on mortality rates (Higman, 1995, pp. 335–336; Lamur, 1977, pp. 161–162; Steckel, 1979, p. 92; van Stipriaan, 1993, pp. 326–327). In Suriname, for example, sugar plantations (compared to coffee and cotton) exhibited the highest death rates among enslaved persons (Oostindie, 1989, pp. 251–253; van Stipriaan, 1993, pp. 326–327). Connected to the type of crop produced was the geographical context of plantations. Plantations located on wet soils, for example, resulted in higher mortality rates, as these wetlands fostered the spread of contagious diseases (Craton, 1971, p. 21). Furthermore, studies have stressed the influence of plantation size on demographic patterns. Death rates rose in correlation with the size of the slaveholding (Fogel, 1989, p. 123; Higman, 1984, pp. 331–332; Steckel, 1979, p. 106–107). As Richard Steckel argued that enslaved people in larger groups often lived in more cramped villages with unsanitary living conditions, Higman argued that a maximization of labour productivity (a quantitative scale-up of the enslaved workforce) can be seen in the maximization of mortality (Higman, 1984, pp. 331–332).

The last group of influential factors on the demographic structures of enslaved populations that Higman distinguished was the developmental phase of the plantation. Work on newly created plantations was harder, resulting in higher death rates (Craton, 1971, p. 26; Higman, 1991, pp. 221–223). Oostindie suggested that a decrease of workload resulted in improvement of living conditions, which could contribute to a positive development in the demography of a population (Oostindie, 1989, pp. 137–140). It is important to note here that the various aforementioned "groups" of factors do not necessarily exclude each other and sometimes even correlate with each other. It is likely that multiple interrelated factors determined the demographic development of a population.

Developments in the area of policies, geographical and political contexts can influence the aforementioned factors. In 1820, international slave trade was abolished. As a result, young African-born men could no longer be imported, leading to the normalization of age structures and sex ratios among enslaved populations (Klein & Luna, 2012, p. 163; Lamur, 1977, p. 164; Oostindie, 1989, pp. 97–98). Furthermore, Huub Everaert compared fertility and mortality rates of populations before and after the abolishment of slavery in Suriname. The author argued that as a result of *Emancipation* (freedom from slavery), birth rates increased. At the same time, as a result of poverty, many newly-born children died, resulting in particularly high overall death rates. The demographic experience of Emancipation thus was not immediately an undisputed success. Other policy improvements could have positively influenced demographic patterns. For example, during the 19th century, the "miasma" theory was gradually replaced by new scientific insights on the spread of infectious diseases. Oostindie argued that improved medical knowledge, healthcare, and vaccination campaigns resulted in an overall improvement of living conditions (Oostindie, 1989, pp.140–148).

An interplay of numerous factors can result in specific demographic patterns. The demographic development of the enslaved population of Curaçao has been examined by Lamur in 1981. Lamur argued that the different developments of enslaved populations of Curaçao — characterized by a surplus of births — and Suriname — marked by an excess of deaths — mainly derived from differences in fertility rates. Lamur argued that birth intervals on Curaçao were shorter, which resulted in a greater proportion of births compared to deaths and therefore resulting in a natural population growth (Lamur, 1981). However, trends in natural increase are always the sum of both birth and death rates. Mortality patterns on Curaçao have not been studied hitherto, which renders the analysis of demographic patterns of the enslaved population on the island incomplete. Moreover, Steckel argued that differences in demographic trends between the United States (to which the pattern of Curaçao compares) and other enslaved societies primarily derived from differences in mortality. This study will therefore examine death rates of enslaved people on Curaçao in depth to enhance our understanding of the unique demographic characteristics of the island.

This study will predominantly focus on demographic characteristics (the first group of factors Higman distinguished) in the examination of mortality rates. The first reason — as will be discussed in the next section — is that the plantation context of Curaçao differed from other enslaved societies in the region, such as Suriname. The production of crops and breeding of cattle on Curaçao was not conducted for export but primarily for local consumption. Curaçao therefore had more small-sized gardens which contained both crops and cattle. Labour in these gardens was more diverse and the focus was less on maximizing production (Renkema, 1981, p. 254). Since the slave registers started in 1839, the developmental phase of plantations or other estates was also of less importance, as most of the estates were already established at that time. Moreover, Everaert and Oostindie have emphasized the importance of structural, demographic differences on mortality patterns (Everaert, 2013; Oostindie, 1989, p. 137).

3 HISTORICAL CONTEXT

In 1634, the Dutch West India Company (WIC) annexed Curaçao, the largest island of the Dutch Antilles. Although the island was initially occupied for military purposes, as the natural harbour functioned as a strategic base in the war against the Spanish in the Caribbean, the island later also fulfilled an economic purpose. From 1660 onwards, the Company set up plantations on Curaçao, which were either under their own administration or that of private owners. Simultaneously, the WIC gained a prominent trading position on the island, particularly with the onset of the international

slave trade in the Trans-Atlantic from 1665 onward. Enslaved individuals were transported from Africa to Curaçao and then shipped to various destinations from there. Eventually, Curaçao secured a key position in international trade networks and thrived as one of the most prosperous islands in the Caribbean in the 17th century. In 1791, however, the WIC declared bankruptcy, leading to the sale of all its estates ("plantations") to private investors. At this moment, Curaçao officially became a colony under Dutch rule. Yet, in the following years a continuous conflict with the British took place. In 1816 the Dutch reclaimed the island, restoring Curaçao as a Dutch colony (Renkema, 1981). Following the examples of England and France, the Dutch government abolished slavery in 1863.

In the 19th century, enslaved people, similar to other Caribbean colonies, were forced to conduct labour on plantations, in other production areas (e.g., shipbuilding) or within households. However, certain aspects of Curaçao's context differed from other colonies in the Caribbean. Firstly, plantations in for instance Suriname produced for export and thus aimed for maximization of production, whereas the production of Curaçao plantations — mostly larger *tuinen* (gardens) — was predominantly intended for the food supply of inhabitants of Curaçao and provisioning of ships (Renkema, 1981, p. 254). Therefore, Curaçao's plantations were not focused solely on the production of a single crop for export, but engaged in a diverse range of activities, with cattle and food for local consumption being the most significant. Typically, a plantation comprised three main areas: an orchard for vegetable production, a crop field, and an uncultivated area for cattle (Lamur, 1981, p. 91; Renkema, 1981, pp. 11–12, 25–53, 254). On the plantations enslaved people were predominantly occupied with the production of crop in the fields from October until March. During the remaining months they were assigned to prepare the grounds for new production (*ploegen*), domestic work or tasks in town (Renkema, 1981, p. 115). Whereas in most colonies planters continuously sought to increase production through advancements in production techniques and knowledge, Curaçao's planters were often content if food production met the local demanded for food. Hence, no drastic changes in the type of labour of enslaved people of Curaçao occurred. Furthermore, in contrast to Suriname and other plantation colonies, the owners were generally present on their estates. Some actually lived there, while others lived in the city but periodically visited their plantation. Finally, the cost of purchasing and maintaining plantations and their "property" were comparatively low, mainly due to minimal expenditures to sustain the workforce, as the enslaved population on Curaçao experienced natural growth, with births almost always outnumbering deaths (Renkema, 1981, pp. 25, 96–97, 255).

The extent of slavery and the size of the enslaved population of Curaçao are widely discussed, as in many other regions. An inventory in the *Encyclopedie van de Nederlandse Antillen* [Encyclopaedia of the Dutch Antilles] listed 362 plantations, gardens, and privately owned grounds in 1828, 260 in 1853 and 100 in 1865. Other official government documents report 105–141 plantations and 52–129 gardens in the period from 1816 until 1851 (Renkema, 1981, pp. 19–20). More information is known about the number of slaves on the island in the 19th century. However, it is important to state here that various sources also result in wide-ranging estimates, which will be discussed more extensively in this paper in one of the upcoming sections.

The slavery context of Curaçao has often been characterized as relatively mild compared to other — "more cruel" — slavery societies. According to Hoetink, this was a result of the fact that Curaçao was not a true "plantation economy" focussed on export and a maximalisation of profit. Additionally, due to the small size of the enslaved workforce, owners did not have to resort to cruelty as extensively as in other plantation regimes. Furthermore, the geographically small size of the island facilitated more convenient and extensive social control of the slaveowners, which would expose abuse and other malpractices (Hoetink, 1958, pp. 108–117). The plantation context of Curaçao presumably resulted in a lower workload compared to other production colonies. However, it is important to note that enslaved people on Curaçao were still being forced to live under these circumstances. These harsh living and working conditions, in no way, resembled those of their free counterparts. Moreover, the enslaved population were most affected in the event of a crop failure. Because the island was largely self-sufficient and responsible for its own food supply, a crop failure directly impacted the food supply and living conditions of the enslaved population (Renkema, 1981, p. 119).

4 SOURCES, DATA AND METHODS

The primary source of this research is the Curaçao Slave Register Dataset, composed of the slave registers of Curaçao, that were drawn up by the colonial government. This register was introduced at the beginning of 1839 and persisted until the abolition of slavery on Curaçao on 1 July 1863. All slave owners were obliged to register people in their property, as well as changes in property — such as birth, death, sale, release, import, and export — in order to keep track of the enslaved persons. Apart from these "events", the registers also contain information on the name, sex, year of birth, mother's name of the enslaved persons, and the name of the owner. Due to a recent crowdsourcing project, the slave registers have been digitized and made available for academic research and the general public (van Galen, 2019, pp. 178–194). This resulted in a database consisting of around 21,500 events, which comprises approximately 13,000 persons living in slavery. Because the government demanded that the registers were to be kept up-to-date continuously, it provides a comprehensive insight into the composition of the entirety of the enslaved population on Curaçao in the years between 1839 and 1863.

The dataset consists of the complete slave registers of the island Curaçao, not the colony of Curaçao which consisted of Aruba, Bonaire, St. Maarten, St. Eustatius and Saba. The registers only contain information of privately owned people or enslaved persons in ownership of organizations. Enslaved people owned by the government were not included in the registers. Emancipation registers list 67 *gouvernementsslaven* (enslaved persons by the government), estimates of earlier years differed from several dozens to a few hundreds (Renkema, 1981, p. 118). Events were registered periodically. Specific events (e.g., birth or death) were often noted on the date the event was registered, not the specific date of the actual event. Dates in the registration could thus differ a few days, weeks or months, yet not years. Registration of infants and people aged older than 60 years is more likely to be incomplete. Infants that died shortly after birth, within the so-called registration interval, were often not registered in the slave registers by their owner (van Galen & Hassankhan, 2018, p. 510). Furthermore, owners did not have to pay *hoofdenbelasting* (taxes) for enslaved people older than 60 years from 1844 onwards. Registration of these enslaved persons was therefore often conducted less precise. However, owners did receive 200 gulden per enslaved person they had in their property at the Emancipation. Registration of older and elderly enslaved persons in the slave registers is therefore likely to be more reliable at the end of the research period compared to the earliest years (Renkema, 1981, p. 117).

Linkage of events of individuals was done automatically by connecting observations with matching (letter combinations of) name, mothers name, and year of birth. Remaining cases were linked manually. Individuals who had been moved away from Curaçao and possibly returned afterwards were not linked, as it could not be checked if the event concerned the exact same person (Quanjer, 2022).

This study has only examined people with defined beginning and ending dates in the registers. Moreover, on the 1st of July in 1857, a correction on the administration was made, and all 138 individuals that were missing were registered as deceased on that date. We decided to remove these individuals from the sample, as it is unknown when and how these people went missing from the enslaved population. After this selection, we ended up with a sample of 12,793 individuals living in slavery between 1839 and 1863, comprising in total 179,534 observation years. As the registers started in 1839 and ended with the abolishment of slavery in July 1863, data on life courses contain left and right censoring. There is no information on life events of those born before 1839, except for their year of birth. The registers also contain no information on life courses after Emancipation. Further life events of those who were emancipated are therefore also unknown. Mortality in this study therefore pertains to people at risk of mortality between 1839 and 1863, focusing on those who died in slavery during this period. It does not address the patterns of death for those who lived in slavery during these years but died *after* the abolition of slavery.

This study will partially be conducted through Event History Analysis. Next to descriptive analyses, this study will fit a Kaplan-Meier estimator on the data, using age as the dependent factor and a dummy variable that distinguishes between "death" or "no death". Kaplan-Meier is a univariate analysis, using only one factor (sex) in estimating survival. In this research, the model will used to examine the relation between death, age and sex. This study used IMB SPSS Statistics Version 26 to conduct statistical analyses. As data on life courses of people aged above 60 is less reliable, the model has been censored at 60 years.

5 ANALYSIS

This section presents the results of the analysis of the slave registers regarding the enslaved population of Curaçao between 1839 and 1863. The first section examines the (natural) development of the enslaved population and compares these results with previous estimations of the Curaçao population development. To provide more context for the mortality level of the studied population, the total mortality rates of the free and enslaved population will be compared in the next section. Moreover, this section examines the age-specific mortality risks of men and women to create insights in any particularities in the death rates across ages. Thereafter, we will examine possible determinants — seasonality, sex and age — of the mortality pattern through descriptive statistics, as this topic has remained understudied hitherto. Lastly, the interplay of various determinants of mortality will be examined by using the Kaplan-Meier estimator.

5.1 A CONSTANT RATE OF NATURAL INCREASE

As previously observed, much has remained uncertain about the exact size and development of the enslaved population of Curaçao. Table 1 compares estimates of the size and development of the enslaved population of our own analysis and previous research. Despite of the slight downward trend in the years prior to the abolishment of slavery, the enslaved population of Curaçao was generally characterized by a positive development in population size from 1839 until 1862, as shown in Table 1. The estimates by Wim Renkema, based on the same source (slave registers), and the estimates of Lamur, based on the *Rapport der Staatscommissie van de Gouverneur en Gezaghebbers* [State Committee Report of the Governor and Authorities], show a similar development: a gradual increase in the population. However, the other estimates by Renkema and Lamur show a different pattern. This led Lamur to conclude that in the last decades before the abolishment of slavery, the enslaved population of Curaçao experienced a decline in population size with a 4.3% decrease from 1840 to 1863. Lamur argued that this negative trend in population growth was the result of a substantial amount of manumissions (Lamur, 1981, p. 88). Although there were a considerable number of manumissions — in certain years (1850, 1856, 1857, and 1862) the number of manumissions exceeded a hundred — there was still an almost constant population growth, as shown in Tables 1 and 2.[1]

Although opinions differ on the overall course of the enslaved population of Curaçao, there seems to be a consensus regarding its natural population growth: the enslaved population was characterized by a birth surplus and a natural increase. As stated before, one of the main research topics on slave demography in the Western Hemisphere is the difference in the natural increase of enslaved populations in the United States compared to a natural decline of enslaved societies in the Caribbean and Latin America. However, as concluded by Lamur and Renkema, Curaçao was an exception to this pattern, because the enslaved population of the island was characterized by an excess of births and a natural increase (Lamur, 1981; Renkema, 1981, pp. 117–119). In determining the natural population growth or decline, only births and deaths within the population are considered, excluding changes due to manumission, escapes, import, and export. Table 2 shows the overall and natural development of the enslaved population of Curaçao between 1839 and 1862, including birth and mortality rates.

In contrast to the overall development of the enslaved population, where yearly declines are frequent, the natural course of the population was characterized by a positive rate of increase during the entire period, which is consistent with Lamur's earlier findings. In short, we found an average annual rate of increase of 1.5%, composed of a birth rate of 3.5% and a death rate of 2.0% for the period from 1840 to 1862 (Table 2). The calculated birth and death rates are considered minimum values, as both might be underestimated due to under-registration of infants that died shortly after birth (Everaert, 2008, p. 25; Higman, 1984, p. 314; Lamur, 1981, p. 88). Lamur and Renkema attributed the exceptional natural population growth of the enslaved population of Curaçao to several factors: less cruel treatment of enslaved persons compared to other enslaved populations, the favourable geographical location and climate, the comparatively less physically challenging nature of work and the advantages of the small size of plantations of Curaçao (Lamur, 1981, pp. 91–93; Renkema, 1981, p. 118).

1 See Appendix 2 for an overview of yearly manumissions on Curaçao.

Table 1 *Estimated size of the enslaved population on Curaçao, 1839–1862*

Year	Population slave registers	Renkema – Population overviews	Renkema – Slave registers	Lamur – Annual reports of the district and neighborhood supervisors & Colonial Reports	Lamur – State Committee Report of the Governor and Authorities
1839	6,596	5,449	?	5,750	?
1840	6,703	5,671	6,601	6,023	?
1841	6,771	5,896	6,699	5,979	?
1842	6,789	5,843	?	5,772	?
1843	6,820	5,630	?	5,793	6,869
1844	6,809	5,643	6,869	5,569	6,555
1845	6,897	5,372	6,555 (or 6,890)	5,619	6,931
1846	6,853	5,423	6,931	5,436	6,923
1847	6,713	5,428	6,923	5,479	6,809
1848	6,830	5,289	6,809	5,585	6,703
1849	6,948	5,406	6,703	5,638	6,854
1850	6,863	5,524	6,854	5,573	6,893
1851	6,954	5,453	6,993	5,542	6,891
1852	6,926	5,423	6,891	5,503	6,981
1853	6,973	5,429	6,981	5,418	?
1854	7,059	5,418	7,120	5,615	?
1855	7,152	?	?	5,585	?
1856	7,132	5,501	?	6,986	?
1857	7,152			6,309	?
1858	7,267			5,855	?
1859	7,265			5,962	?
1860	7,103			5,398	?
1861	7,168			5,524	?
1862	7,004			5,498	?

Sources: Estimate size of the enslaved population (on December 31 of the respective year), based on the slave registers (van Galen et al., 2023). Estimate size of the enslaved population according to Renkema, based on the bevolkingsstaten *(population overviews) (Renkema, 1981, p. 118). Estimate size of the enslaved population according to Renkema, based on the slave registers (Renkema, 1981, p. 118). Estimate size of the enslaved population according to Lamur, based on the annual reports of the* district-en wijkmeesters *(the district and neighborhood supervisors) and* Koloniale Verslagen *(Colonial Reports). Estimates were given for January of the respective year, but are interpreted in this table as December 31 of the previous year (Lamur, 1981, p. 95). Estimate size of the enslaved population according to Lamur, based on the* Rapport der Staatscommissie van de Gouverneur en Gezaghebbers *(State Committee Report of the Governor and Authorities). Estimates were given for January of the respective year, but are interpreted in this table as December 31 of the previous year (Lamur, 1981, p. 95).*

There is, however, a noticeable disruption in the positive rate of natural increase during the year 1862 (–0.6%), which is the result of a relatively high mortality rate and a remarkably low birth rate. The underlying causes can only be speculated upon, as little is known about the factors that possibly influenced these rates, such as outbreaks of infectious diseases or crop failures. The factors that affected the birth rate are also unclear. Although Everaert's consideration that "at the end of 1862, the plantations were awash with rumours that the abolition of slavery was imminent […]" might have contributed to a lower birth rate in the year prior to the abolishment of slavery, as mothers could have postponed pregnancies with freedom in prospect (Everaert, 2011, pp. 243–246).

Overall, significant differences can be found in the yearly rate of natural increase (which ranged from –0.6% to 2.5%) as well as the annual mortality and birth rates. Since the focus of this study is on mortality, it is important highlight some observations regarding the development of the mortality rate based on our analysis. Firstly, the mortality rate fluctuated from year to year, ranging between 1.4% and 3.3%. Secondly, mortality seemed to increase over time, as shown in Table 2. While the average mortality rate was 1.9% from 1840 to 1845, the period from 1858 to 1862 was characterized by a relatively higher mortality rate of 2.5%. In the upcoming sections, mortality and patterns of death among the enslaved population of Curaçao will be investigated further.

Table 2 *Course of the population of enslaved persons on Curaçao (N = 12,793)*

Year	Population (December 31)	Increase or decrease	Birth	Death	Birth	Death	Natural increase or decrease
	Number	Number (%)	Number	Number	%	%	Number (%)
1839	6,596		249	117			
1840	6,703	107 (1.6)	209	93	3.1	1.4	116 (1.7)
1841	6,771	68 (1.0)	267	164	4.0	2.4	103 (1.5)
1842	6,789	18 (0.3)	197	130	2.9	1.9	67 (1.0)
1843	6,820	31 (0.5)	226	132	3.3	1.9	94 (1.4)
1844	6,809	–11 (–0.2)	237	154	3.5	2.3	83 (1.2)
1845	6,897	88 (1.3)	237	95	3.5	1.4	142 (2.1)
1846	6,853	–44 (–0.6)	229	135	3.3	2.0	94 (1.4)
1847	6,713	–140 (–2.1)	209	96	3.1	1.4	113 (1.7)
1848	6,830	117 (1.7)	248	92	3.7	1.4	156 (2.3)
1849	6,948	118 (1.7)	249	104	3.6	1.5	145 (2.1)
1850	6,863	–85 (–1.2)	272	137	3.9	2.0	135 (2.0)
1851	6,954	91 (1.3)	258	120	3.7	1.7	138 (2.0)
1852	6,926	–28 (–0.4)	192	163	2.8	2.3	29 (0.4)
1853	6,973	47 (0.7)	250	137	3.6	2.0	113 (1.6)
1854	7,059	86 (1.2)	287	139	4.1	2.0	148 (2.1)
1855	7,152	93 (1.3)	286	127	4.0	1.8	159 (2.2)
1856	7,132	–20 (–0.3)	250	151	3.5	2.1	99 (1.4)
1857	7,152	20 (0.3)	262	129	3.7	1.8	133 (1.9)
1858	7,267	115 (1.6)	302	125	4.2	1.7	177 (2.5)
1859	7,265	–2 (0.0)	236	168	3.2	2.3	68 (0.9)
1860	7,103	–162 (–2.3)	267	236	3.7	3.3	31 (0.4)
1861	7,168	65 (0.9)	283	134	4.0	1.9	149 (2.1)
1862	7,004	–164 (–2.3)	184	229	2.6	3.2	–45 (–0.6)
1840–1845					3.4	1.9	1.5
1846–1851					3.6	1.7	1.9
1852–1857					3.6	2.0	1.6
1858–1862					3.5	2.5	1.1
Average					3.5	2.0	1.5

Notes: Individuals whose year of entry and/or exit (Appendix 1: IN_year / OUT_year) is unknown are not included in this table. Relative birth and death rates have been calculated based on the average population on December 31 of the concerned year and December 31 of the previous year.

Source: van Galen et al., 2023.

5.2 MORTALITY

The results of the previous section showed that the death rates of the enslaved population were lower than the birth rates, resulting in a natural increase. Lamur argued that birth intervals on Curaçao were shorter, leading to a larger proportion of births compared to deaths, and therefore resulting in a natural population growth (Lamur, 1981). However, this natural growth could also be attributed to relatively low mortality rates, which can be examined by comparing the death rates of Curaçao to those of other populations.

Data on other enslaved populations in the region, such as those in Suriname or the islands of the British Caribbean, is available. However, these comparisons present challenges. Suriname, for instance, was also under Dutch rule, but the plantation and climate context differed from the Curaçao circumstances. The islands under British rule differed in terms of political context and weather conditions, as Curaçao is located leeward, whereas the British Caribbean islands are located windward. Therefore, we decided not to compare Curaçao's enslaved population with other enslaved societies, but with Curaçao's free population, as both populations lived in the same environmental context but under very different circumstances. Figure 1 shows the death rates (mortality) and the rate of natural in/decrease (population growth) of the enslaved and free population of Curaçao between 1839 and 1863. The rates of the enslaved population have been computed based on the aforementioned slave registers and the rates of the free population have been calculated based on population counts and numbers of births and deaths that Renkema retrieved from the annual reports drawn up by the colonial government (Renkema, 1981, pp. 336–338).

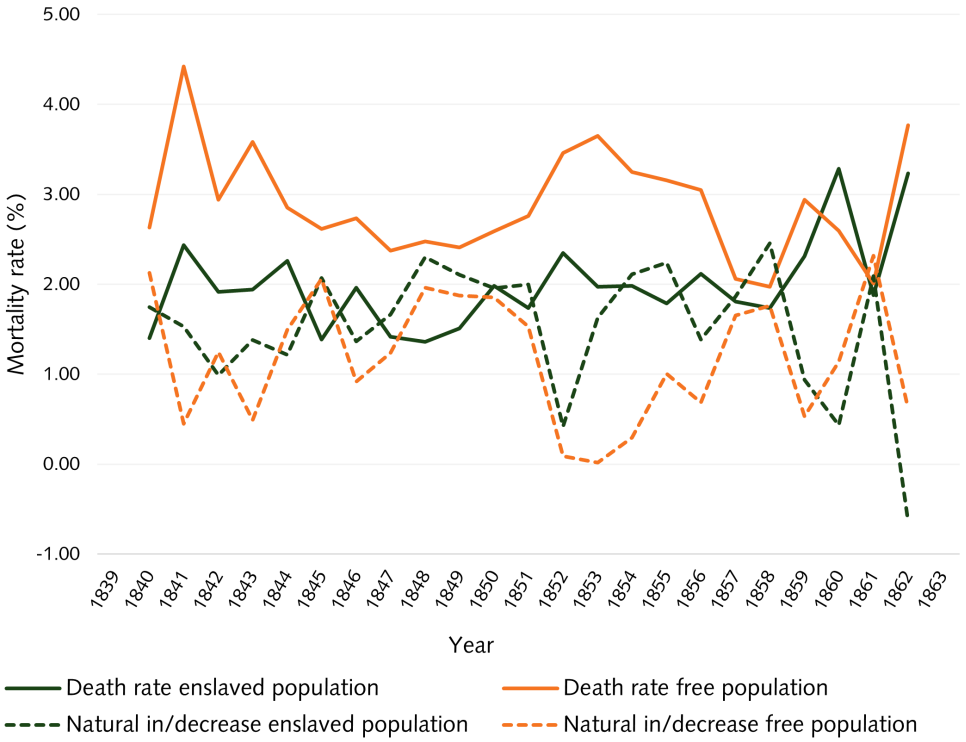
Figure 1 shows that mortality was generally higher among the free population than among the enslaved population of Curaçao. Yet, both experienced an almost similar natural population growth. The natural growth of the enslaved population was slightly higher than that of the free population, which was the result of the aforementioned lower mortality among the enslaved individuals, as birth rates were more or less comparable. Although initially it may seem unexpected that death rates were higher among the free population, there are several explanations for this observation. A plausible explanation is that the free population at that time lived primarily in the cities and more densely populated areas, where hygienic and disease conditions were often unfavourable. Furthermore, enslaved populations might have had more consistent access to food, healthcare and other resources provided by their owners, as it was in the owner's interest to keep his/her workforce healthy. Disparities in death rates will also derive from the differences in the composition of the enslaved and free population. For example, it is possible that the free population had a larger proportion of elderly individuals, who naturally have higher mortality rates. Due to a lack of further information on the composition of the free population (e.g., with regard to gender and age), it is not possible to draw further conclusions based on the population structure.

The relatively high mortality rates among the free population should, however, be interpreted with caution. The free population of Curaçao was not a homogeneous group. The free population was composed of Europeans, indigenous people and manumitted individuals, all with very different living and working conditions. The death rates of these different groups within the free population cannot be examined. Until 1840, the reports distinguished between "white" and "other" free persons, but ceased this distinction afterwards. However, the 1840 report did show that about one-third of the free population was registered as "white", while the majority of the free population (70.1%) was registered as "other" (e.g., the native population of Curaçao, manumitted persons and groups of people with non-European backgrounds). Most of these free "others" most likely lived in poverty, which is detrimental to health, hence the relatively high mortality rate among the free population. For example, the subgroup of manumitted persons. Everaert argued, for instance, that the freedom of slavery — Emancipation — did not immediately result in an improved standard of living. He observed an increase in mortality rates directly after the Emancipation and attributed this to the fact that formerly enslaved people were now fully dependent on themselves. After a life of dependence on their owners their access to resources was limited and caused poverty, which eventually led to higher mortality rates (Everaert, 2008).

A final explanation is that the mortality rates of the enslaved population were underestimated due to the imprecise registrations of deaths in two specific age categories that generally have higher mortality risks: infants and elderly people. This could result in a distorted overall death rate, making the mortality rate of the enslaved population appear lower than that of the free population of Curaçao. To explore any remarkable patterns in these mortality and survival risks, unadjusted life tables for males and females have been constructed.[2]

2 See Appendix 3 and 4.

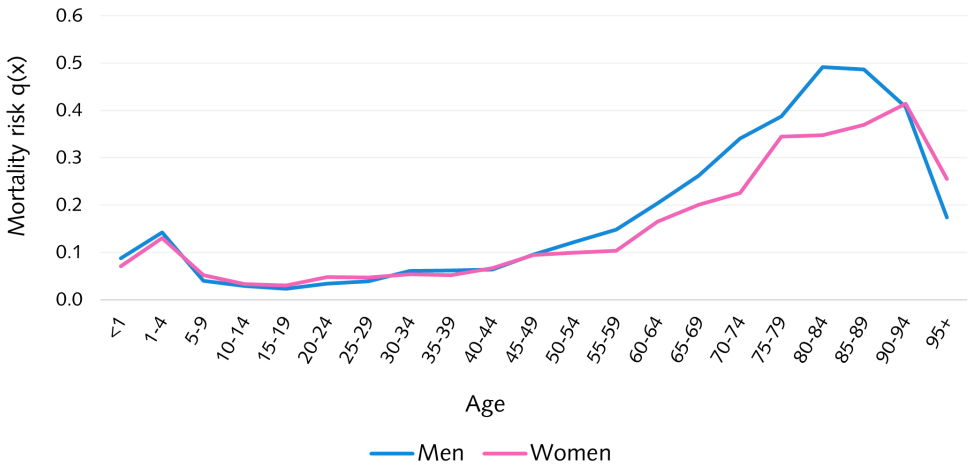
Figure 1 *Mortality and (natural) population growth among the enslaved and free population of Curaçao, 1839–1863*



Sources: Renkema, 1981, pp. 336–338; van Galen et al., 2023.

To construct the life tables, we used the years in which enslaved individuals were under observation to account for censoring in the data. For example, if a person was 20 years old in 1840 and died in 1845 at the age of 25, that person would have been at risk of death every year between the ages of 20 and 24 but experienced no death during that time. In 1845, this person was also at risk of death and did experience it. If this person left the observation in another way in this year, for instance because of manumission, the person was at risk of dying for five years between the ages of 20 and 25, but did not experience death. The mortality risks have been computed based on the annual chance of death at a certain age. Figure 2 shows these mortality risks (q(x)) for enslaved males and females on Curaçao between 1840 and 1862.

Figure 2 *Mortality risks enslaved males and females, Curaçao 1840–1862*



Source: van Galen et al., 2023.

Figure 2 indicates that mortality among infants and older people is underestimated. A high infant mortality rate would be expected, however, the mortality among infants is even lower than that of children aged between one and four years old. As mentioned before, deaths of infants that were born and passed away within a registration interval were often not recorded in the slave registers. The low mortality rate among infants is caused by this under-registration. Furthermore, the death rates of older people also seem distorted. Whereas an exponential increase of mortality risks with age would be expected, a decrease can be observed among the older age groups. This downward trend could indicate that registration of people above 60 years old — and even more clearly of people above the age of 70 — was conducted less precise. This is because owners were not obliged to pay *hoofdenbelasting* (taxes) for these individuals. However, it is also possible that unhealthy enslaved people had died in earlier ages, causing the healthiest people to survive to old ages and resulting in an abnormal development of the mortality risks.

The under-registration of infant and elderly deaths leads to underestimated mortality rates for the entire enslaved population. This could also explain the relatively low rates of mortality among the enslaved population compared to the higher mortality rates among the free population. Since the registration of free persons was more accurate, the death rates of the enslaved population were arguably closer to those of the free population, reflecting historical reality more accurately. Given these observations regarding the underestimation of infant and elderly deaths, the following sections of this analysis will focus on the patterns of death of individuals aged between 1 and 59 years old, as this data is the most reliable.[3]

5.3 SEASONALITY

Seasonal patterns of death have been linked to the working and living conditions of enslaved people. Among the enslaved population in the south of the United States for example, mortality peaked in specific months characterized by intense labour related to the seasonal work routine in agriculture (Steckel, 1979, p. 107). Higman (1984) argued that, in addition to these seasonal work regimes, nutritional and climatic factors also contributed to differences in mortality throughout the year:

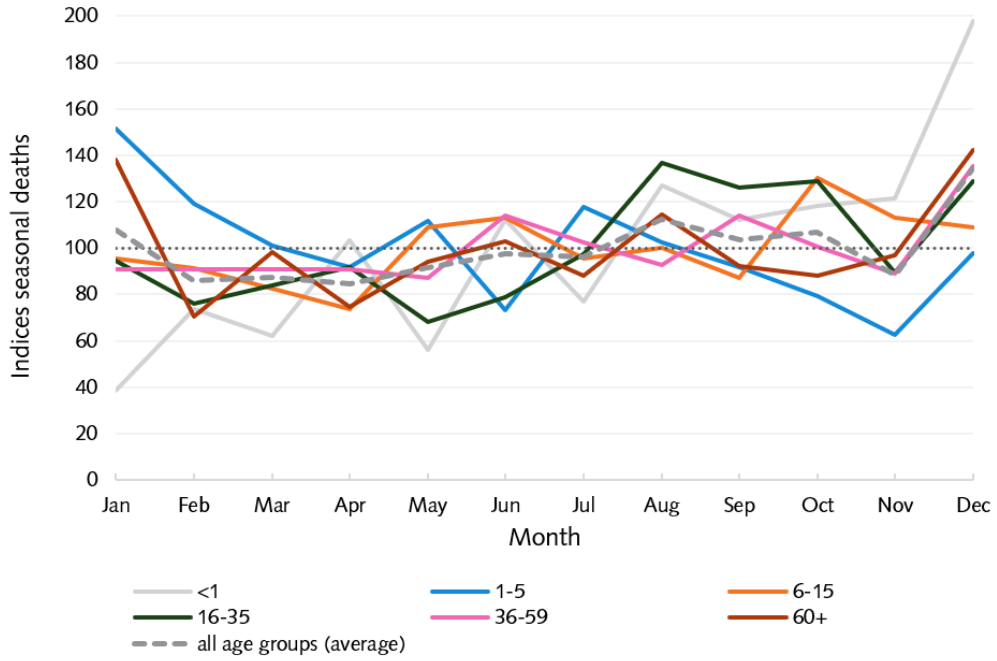
> In general, mortality was at near minimum levels at the commencement of the sugar crop around January and declined further in the early stages of the harvest. It rose fairly sharply at the end of the crop season in June, reached a maximum around the middle of the out-of-crop season, and then declined in the last months of the year. (p. 337)

Higman suggested that enslaved people were generally healthiest during the crop season, as they had access to better nutrition, such as sugar cane juice and molasses. Conversely, he described the out-of-crop period as "hungry-time" which caused mortality to peak (Higman, 1995, pp. 301–302, 337). Seasonal variations caused by changes in weather also affected mortality. For instance, Steckel stated that diseases as yellow fever, malaria, typhoid, and hookworm were much more common during the warm summer months in the United States, which resulted in a higher incidence of death (Steckel, 1979, p. 107). Higman, however, identified July to September as the healthier months in the Caribbean, compared to the months around December, which he referred to as the "sickly season" (Higman, 1995, p. 302).

Figure 3 shows the indexed seasonal mortality among different age groups within the enslaved population of Curaçao. We can see that the seasonal pattern of death differed throughout the age groups, especially for infants (age < 1) and young children (age 1–5). This observation aligns with Steckel's findings among the enslaved population in the south of the United States (Steckel, 1979, p. 107). On Curaçao, infant mortality peaked in the last months of the year — September, October, and December — as approximately 37% of all deaths occurred in these months. Infant mortality at the beginning of the year appears to be improbably low. The peak in mortality at the end of the year reflects the administrative practices rather than reality. As administration was completed at the end of the year, the registered number of deaths at the beginning of the year was dubiously low. Infant mortality is thus not only underestimated — as established in the previous section — but also not correctly estimated with regard to seasonality (timing). We think that a further exploration of seasonal fertility in future research could provide a deeper understanding of this seasonality, as infant deaths could have also been linked to seasonal patterns in fertility.

3 The sections on seasonality and age do include infants and older people, but as a separate age group (< 1 and 60+).

Figure 3 *Seasonality indices per age group, Curaçao 1840–1862*



Source: van Galen et al., 2023.

In the age group of young children (1–5) most deaths occurred in the first months — January, February, and March — making up about 31% of all deaths. Another more vulnerable group, those older than 60, follows a similar path with higher mortality at the beginning of the year. Compared to other age groups, the influence of forced labour might have played a smaller role in these vulnerable groups, as their workload was lower. Since working conditions played no or a minor role, it is likely that one of the main determinants for the seasonal pattern among these age groups was the influence and spread of diseases. Higman, for example, did find a higher incidence of deaths attributed to "old age" between January and March in Berbice, which he attributed to minor variations in the temperature in those months (Higman, 1995, pp. 346–347). Unfortunately, there is no further information available on the types of diseases that existed on Curaçao or in which months they were most prevalent. And, as the slave registers of Curaçao did not contain information on the cause of death, the underlying causes in cannot be studied.

Interestingly, the other age groups did not show clear seasonal patterns in the mortality rates. As mentioned before, Steckel linked seasonal mortality peaks to intense labour phases in the production of crop, while Higman stressed the importance of seasonal differences in nutrition, observing a peak in mortality in the middle of the out-of-crop season. The absence of a clear seasonal pattern among the majority of the enslaved people on Curaçao implies a lower importance of crop production on living circumstances. Instead of large plantations aimed at export, on Curaçao, production in the *tuinen* was aimed at self-sufficiency and work of the enslaved included a wider range of activities all year round. Enslaved people were employed in crop production, preparing grounds for new production, caring for livestock, and even repairing roads in outlying districts (Renkema, 1981, pp. 113–114). The absence of a clear crop season and the inclusion of other types of work could have caused the mortality pattern on Curaçao to be more evenly spread throughout the year. In addition, unlike in the United States, there was less variation in weather throughout the year and compared to the Windward Islands, Curaçao in the Leeward was not affected by extreme weather conditions, such as hurricanes (Caviedes, 1991, p. 310). Although there was a rainy season from October through January and a dry period from February through September, this does not appear to have had a major effect on mortality, and weather thus did not play a significant role as a determinant of mortality (Renkema, 1981, p. 163). The only clear seasonal peak occurred in December, but given the large discrepancies between December and January, and the absence of a correlation with crop season or weather conditions, we believe this peak is caused by an administrative registration peak at the end of the year rather than a true peak in mortality.

5.4 SEX

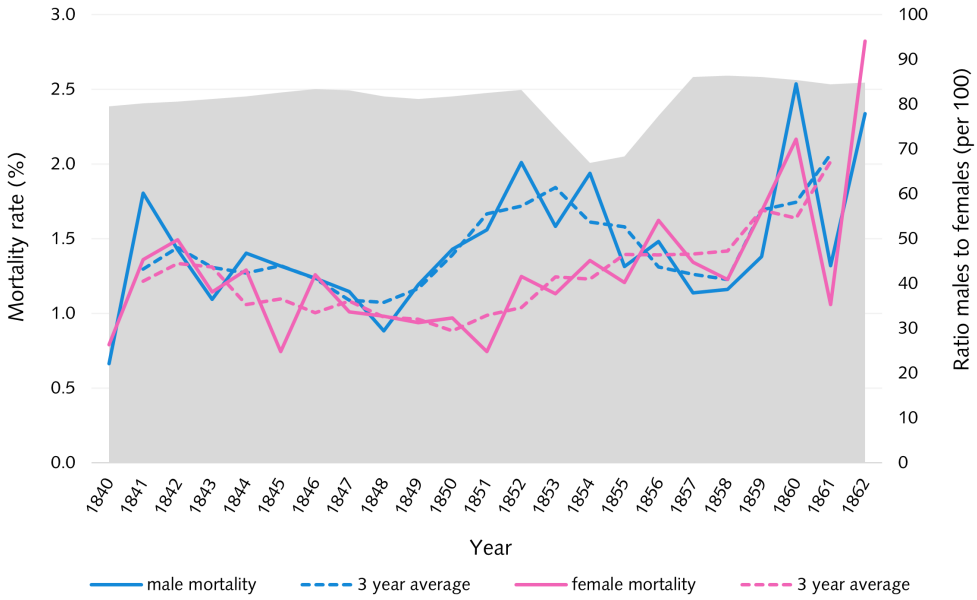
Figure 4 shows relative mortality rates of both enslaved men and women aged between 1 and 59 years. Our data shows that, in general, mortality rates of men were slightly higher at the beginning of the researched period. Between 1848 and 1855, an increase in mortality differences is observed, although it should be noted that these differences were still relatively small. After 1855, female mortality was slightly higher, and the last years show some yearly fluctuations, alternating between higher male and higher female mortality.

Several studies have shown the relation between mortality risks and sex. In general, enslaved men had higher chances of death compared to enslaved women. Since men on plantations were often assigned to physically heavier work, the gendered division of labour has been perceived as an explanatory factor in several studies (Oostindie, 1989, p. 135; Renkema, 1981, p. 117). Although a slightly higher mortality rate can be observed among enslaved men on Curaçao, the differences between the sexes in terms of mortality risks are minimal. This could possibly be due to the fact that plantations of Curaçao did not have a gendered division of labour, as was the case in other plantation economies (Renkema, 1981, pp. 115–116). Moreover, as determined above, male and female excess mortality alternated over the studied period. Throughout this time, no significant measures or developments in the type of work were taken, so no large differences in the type of work of enslaved people of Curaçao occurred between 1848 and 1859 (Renkema, 1981, p. 25). The shifts between higher male and higher female mortality therefore presumably did not derive from changes in the nature of work. For the case of Suriname, Everaert argued that differences in mortality among men and women did not derive from a gendered division of labour. The author calculated that after the introduction of steam machines in 1830 (which particularly lowered male workload) patterns of death among enslaved women and men in Suriname did not converge. Everaert therefore concluded that with the exception of the produced crop (thus the nature of work in general), biological factors (sex and age) above all determined mortality patterns, which also seems to be the case in this study (Everaert, 2013, p. 12).

One of those biological and demographic factors is the sex ratio. Before the abolition of international slave trade, plantations were often marked by a male surplus, as men were perceived as more productive and more suited for physically heavier work. This also meant that enslaved men were of higher economic value and therefore a preferable investment for slave owners. As a result of this male surplus and relatively high mortality risks for men, enslaved men represented the vast majority of deaths in absolute numbers (Craton, 1971, pp. 15–16; Higman, 1984, pp. 317–322). This excess in male mortality would eventually result in a surplus of women on plantations. However, a male surplus was artificially preserved by the import of enslaved persons, as human cargoes often contained a sex ratio of 60:40 (Steckel, 2010). The abolition of international slave trade changed the sex structures of enslaved societies. Lamur, for example, computed a sex ratio of 1.06 in 1830 for the case of *Catharina Sophia*, a sugar plantation in Suriname. This male surplus rapidly was replaced by a female surplus of 0.91 in 1850, and this gap increased further until the abolition of slavery in 1863 (Everaert, 2013, p. 11; Lamur, 1977, p. 164). Figure 4 shows that during the entire research period, the enslaved population of Curaçao was characterized by a female surplus. As the international slave trade was prohibited around 1820 and the registers started 19 years later in 1839, it remains unclear whether this female surplus had always existed on Curaçao or if the sex ratio of the enslaved population followed the same path as in Suriname (from male to female surplus).

The sex ratio of Curaçao's enslaved population presumably contributed to the positive development of the overall population. During the researched period, the population consisted of 70–80 males to 100 females, which favours the overall mortality rate of the enslaved population as women had lower mortality rates than men. Others linked a normalized sex ratio to an increase of fertility rates. Although an influx of births will result in an absolute increase of deaths — due to high mortality rates among infants — it is in general likely to have a positive effect on the natural increase of the enslaved population (Craton, 1971, pp. 15–16; Lamur, 1977, p. 164). Table 2 showed a relatively constant birth rate, with a rate of 3.4% in 1840–1845 and 3.5% in 1858–1862. The constant female surplus in Curaçao's population could have contributed to the constant fertility pattern, which in turn contributed to the overall natural development of the total population. Instead, the annual fluctuations in the natural course of the population seemed to derive from changes in the mortality pattern, which in turn, mainly seemed to derive from external factors instead of demographic characteristics of the population.

Figure 4 *Sex ratio and sex-specific mortality risks (1–59 years), Curaçao 1839–1863*



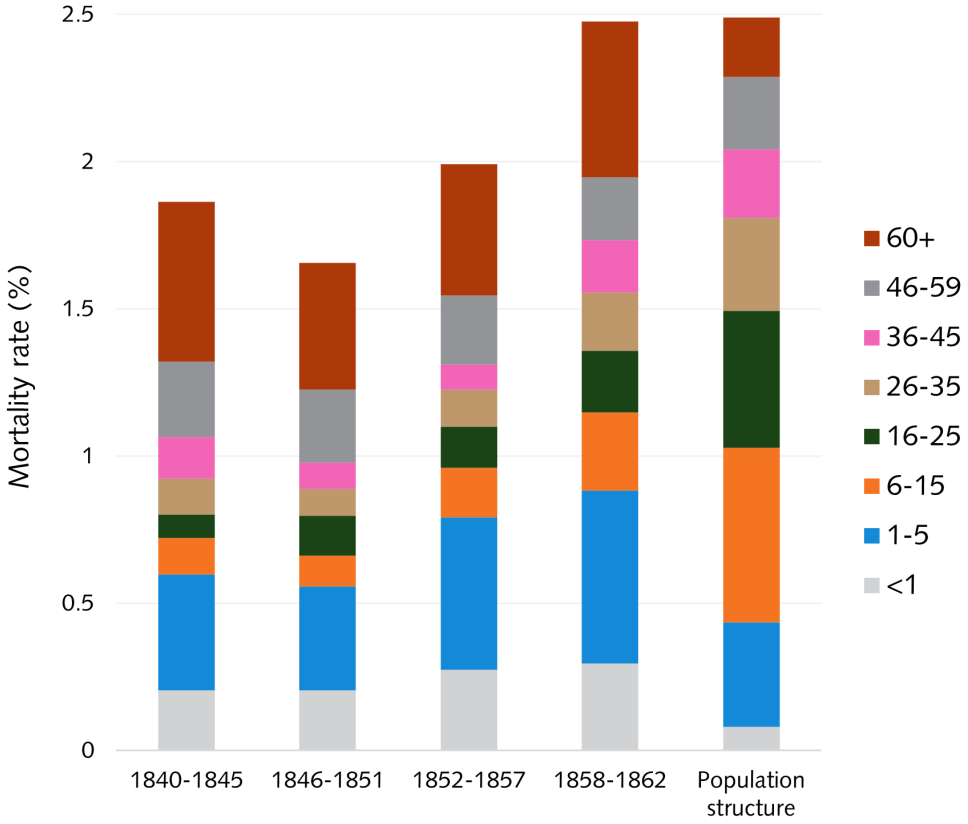
Source: van Galen et al., 2023.

5.5 AGE

An important factor influencing mortality is age. Therefore, this section will examine mortality in relation to age. To provide a clear analysis the enslaved population has been divided into several age groups. Following Lamur's classification, infants (up to 1 year old), young children (1 to 5 years old) and older children (6 to 15 years old), were taken as separate categories, as these age groups generally exhibited vastly different mortality patterns (Lamur, 1977). The remaining age groups were divided into proportional cohorts of ten years. Finally, the last age category starts at 60 years, as data reliability decreases beyond this age due to the exemption from *hoofdenbelasting* (taxes) for these enslaved individuals.

Figure 5 illustrates the age composition of mortality rates among the enslaved population of Curaçao. A significant proportion of deaths can be attributed to mortality among infants, young children, and the elderly. Moreover, based on previous observations using the constructed life tables, we know that infant and elderly mortality is also underestimated. Thus, these groups probably accounted for an even larger proportion of overall mortality. In contrast, mortality among the other age groups — primarily older children and (young) adults — covered only a small share of all deaths. To draw conclusions about the proportionality of the frequency of deaths per age group, the average size of the age groups within the enslaved population of Curaçao is also included in this figure (Figure 5, "Population structure"). Here, it is particularly striking that while the older age groups represent a relatively small part of the total population, they account for a large proportion of all deaths. In contrast, the "middle" age groups constitute a substantial part of the population but account for only a small proportion of the overall mortality. Furthermore, when examining the trend of mortality over time, it is notable that the decline in mortality from 1840–1845 (18.9 per 1,000) to 1846–1851 (16.6 per 1,000) took place despite an increase in mortality among young adults aged 16–25. Additionally, the increase in mortality over time can be attributed to increases among infants, children and adults, as mortality among the elderly remained consistent throughout the entire period.

Figure 5 *Mortality rate by age groups, Curaçao 1840–1862*



Source: van Galen et al., 2023.

As previously hypothesized by Lamur and Higman, there was a correlation between changes in the age structure of the enslaved population and developments in the mortality rate (Higman, 1984, pp. 317–322; Lamur, 1977, pp. 165–166). For example, populations with relatively large proportions of persons over the age of 40 years or under the age of 5 years are characterized by a high mortality rate due to the high mortality risks among these age groups, and vice versa. It would therefore be interesting to compare Curaçao's age structure and mortality rates with other enslaved populations in further research. Before conducting the analysis we checked the age structure of the enslaved population of Curaçao, which remained virtually unchanged over time, although the oldest age groups (46–59 and 60+) and the youngest age groups (< 1 and 1–5) decreased slightly in size relative to the other age groups over time. In the previous sections, an increase in the overall mortality rate over time was observed (see for example Table 2). One would then expect that the "vulnerable" age groups, characterized by high mortality risks, would actually increase in size. However, in the case of Curaçao, this does not hold true. There appears to be no clear correlation between the changing age structure of the enslaved population and mortality.

Table 3 includes the population at risk when calculating age-specific mortality risks. This table shows a similar pattern to Figure 5, with mortality risks being relatively high among the youngest and oldest age groups, and a smaller probability of death in the other age groups. Overall, these results are consistent with findings from previous studies. For example, Everaert (2011) concluded regarding the enslaved population of Suriname:

> [Both periods were characterized by] high rates of mortality among infants, which dropped relatively swiftly among older children, with the likelihood of mortality at its lowest just after the age of 10 years. It then rose gradually, appearing to accelerate somewhere around the age of 55 years. (p. 239)

Considering the case of Suriname, specifically the plantations *Mon Bijou* and *Roosenburg*, Oostindie noted that infant and child mortality was considerable, with less than two-thirds of all live-born children reaching the fourth year of life (Oostindie, 1989, p. 135). Moreover, it is probable that those who survived childhood had lower mortality risks, "because those who had weaker immune systems […] already had died as infants", according to Steckel (1979, p. 93).

Table 3 *Age-specific mortality rates, Curaçao 1840–1862*

	< 1	1–5	6–15	16–25	26–35	36–45	46–59	60+
1840–1845	6.4	2.6	0.5	0.5	1.1	1.4	2.5	5.3
1846–1851	6.2	2.6	0.4	0.7	0.8	1.0	2.2	5.9
1852–1857	8.4	3.8	0.7	0.7	1.0	0.9	2.4	6.1
1858–1862	9.0	4.2	1.2	1.0	1.4	2.0	2.4	7.1
Average	7.5	3.2	0.7	0.7	1.0	1.3	2.4	6.3

Source: van Galen et al., 2023.

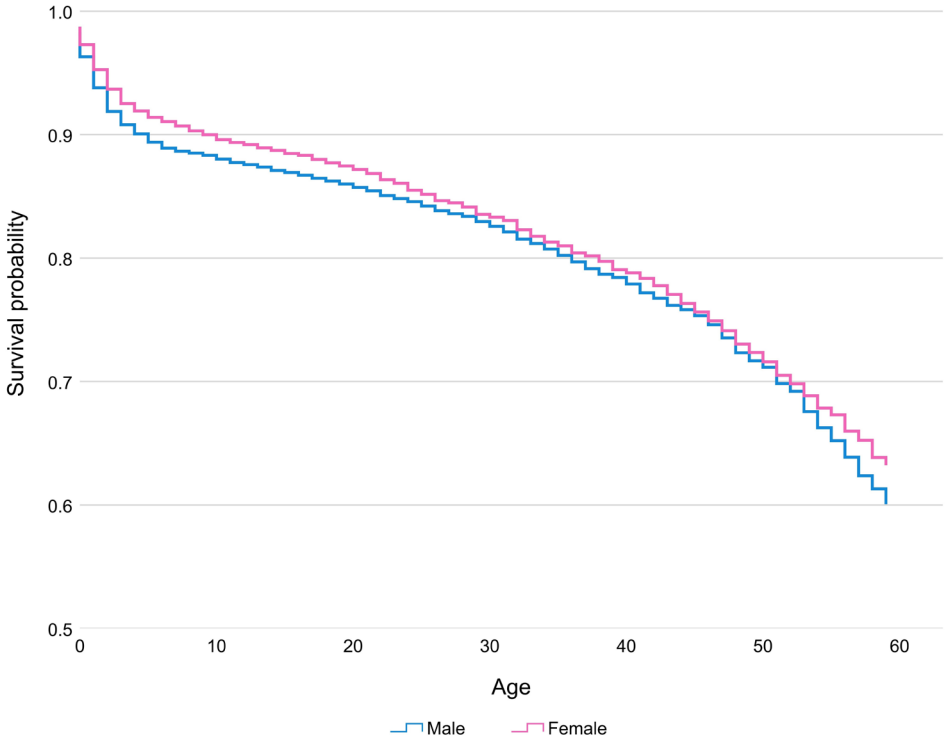
5.6 KAPLAN-MEIER MODEL

Death patterns can result from an interplay of numerous factors. The factors from the previous analysis, moreover, indicate correlations (e.g., seasonality and age or sex and age). Further statistical analysis can provide better insight into this interplay of factors and their relationship with mortality risks. As concluded from the descriptive analysis, mortality risks differed between males and females and across age cohorts. However, several studies have also emphasized a correlation between sex and age in mortality risks. Therefore, a Kaplan-Meier model has been created which estimates the survival probability of men and women across different ages. The model uses age as the dependent variable and the dummy variable "death" or "no death" as the independent variable. The first model created includes people that entered the data at an age older than 0 (for instance at the beginning of the registration or after a transport). As mentioned before, we censored the model above the age of 60 due to unreliability of the data. People that left the registration in other ways, for instance because of transport or manumission, have been registered with their last age at observation (as we know that this person at least reached this age) and with "no death". The model shows that at $t = 0$, 100% of the population at risk is present in the data. However, as age increases (and thus $t > 0$), the survival probability declines.

As concluded from descriptive analysis and emphasized by previous studies, infant death rates were especially high (Everaert, 2008, p. 25; Higman, 1984, p. 314). The Kaplan-Meier model also shows a sharp decline at the beginning of the curve. Previous studies also argued that infant mortality among enslaved people was characterized by higher rates among males compared to females (Everaert, 2013, p. 14). The curve of males indeed declined further than the female curve, yet this difference is not large. In reality, this difference might have been even larger. If male infants indeed had higher mortality risks, the under-registration of infants might have disguised an even larger difference in mortality among male and female infants. Furthermore, Everaert argued that compared to younger men, young women had higher risks of mortality due to risks related to pregnancy and childbirth (Everaert, 2013, p. 9). Indeed, around 25 years, the lines in the Kaplan-Meier curve converge, until the age of 55, suggesting that mortality risks among men and women of these ages were comparable. However, the differences between the sexes are still not as large as in other enslaved populations, such as for instance in Suriname where large discrepancies between males and females were found. The differences between men and women do increase after the age of 55, with a sharper decline among men.

However, including late entries in the analysis in Figure 6 might cause a bias in the estimation of the age-specific survival probabilities. To estimate the age-specific mortality risks more precisely, a second Kaplan-Meier model has been created, using only data on persons that have been under observation from birth onwards. As the slave registers started in 1839 and stopped in 1863, the age-specific mortality risks could only be computed until the age of 24. Like the previous model, this model uses a dummy variable that distinguishes between "death" and "no death". People that left the observation due to other causes than death — such as manumission, escape or transport — have been registered with their last age at observation and with the event "no death". Figure 7 shows the Kaplan-Meier model for enslaved males and females that have been under observation from birth onwards.

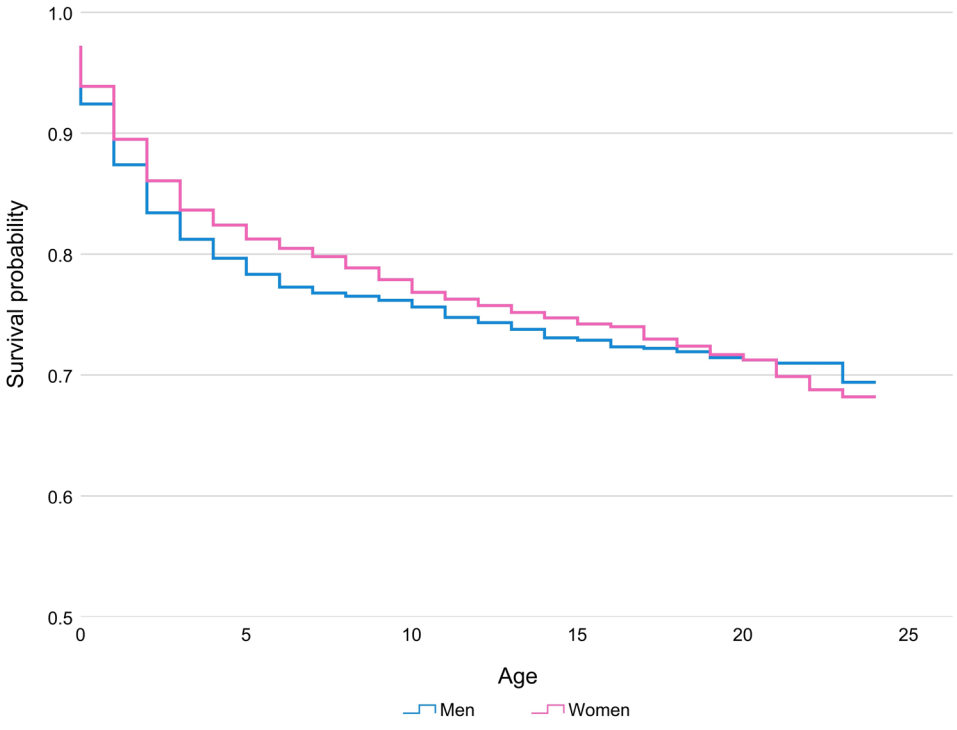
Figure 6 *Kaplan-Meier curve (sex and age), 1839–1863 (N = 12,727)*



Note: N: Death = 2,542; Male = 6,122, Female = 6,605. Population over the age of 60 years has been excluded from this model.

Source: van Galen et al., 2023.

Figure 7 *Kaplan-Meier curve excluding late entries (sex and age), 1839–1863 (N = 5,874)*



Note: N: Death = 1,367; Male = 2,954, Female = 2,920. This model only includes persons under observation from birth onwards.

Source: van Galen et al., 2023.

The results from Figure 7 show lower survival probabilities compared to the results from Figure 6. For example, Figure 6 showed a survival probability of around 0.9 at the age of 10 years, versus 0.75 at the age of 10 in Figure 7. At the ages of 20, Figure 6 shows a survival probability of 0.85, versus 0.7 in Figure 7. The lower survival probabilities in Figure 7 could indicate differences in mortality risks between cohorts. People born prior to 1839 (before the start of the registration) might have had lower mortality risks which could have caused the higher survival probabilities in Figure 6. However, it is also likely that the results of Figure 6 contain a bias. The people that entered in the slave registers at older ages formed a "survivor population". For example, if a person was first registered at the age of 50, the person was at risk of dying every year between the ages of 0 and 50 and experienced no death. The late entries in our research data therefore compose a survivor population, as they had outlived their more vulnerable peers that had higher mortality risks and died prior to the start of registration. Including this survivor population with higher survival chances could therefore distort the estimation of mortality risks. The differences between the two Kaplan-Meier models indicate that age-specific survival probabilities are overestimated when late entries are included in the analysis. Unfortunately, the observation period of the data used in this research was relatively short (24 years). Therefore, the age-specific survival probabilities of enslaved people on Curaçao at older ages remain unknown. Future research could link the slave registers to the civil registers that started in 1863, to complete the life courses and research age-specific mortality risks at older ages, however, it should be considered that life conditions differed between life in bondage and life in freedom after 1863.

As mentioned before, the Kaplan-Meier model in Figure 7 shows in general lower age-specific survival probabilities of enslaved men and women on Curaçao compared to Figure 6. The steepest decreased occurred between the ages of 0 and 5, with a survival probability around 0.8 at the ages of 5. The mortality risks of men were slightly higher than the mortality risks of women. However, after the age of 20, the line of women is below the men's, indicating higher mortality risks. These higher mortality risks among women could have been caused by pregnancy-related health risks (Everaert, 2013, p. 9). Unfortunately, it remains unknown if these differences converged or diverged at later ages due to unavailability of data.

6 DISCUSSION AND CONCLUSION

The aim of this explorative study was to map out patterns of mortality on Curaçao between 1839 and 1863 by examining the structural characteristics and developments, as well as studying the (interplay of) variables that influenced individual mortality risks. This research sought to enhance our understanding of the unique demographic characteristics of the enslaved population of Curaçao. With the newly available database, we were not only able to study the entire enslaved population — versus aggregated data in previous studies — but we were also able to conduct analysis on the interplay of factors that influenced individual mortality risks. Therefore, we gained a deeper understanding of the patterns and chances of death among the enslaved population of Curaçao in the last decades before Emancipation.

Results have shown that, except for 1862, birth rates exceeded mortality rates, which resulted in a natural increase and overall growth of the enslaved population on Curaçao. This natural increase varied across the years and mortality rates fluctuated over time as well. The comparison of the death rates of the total free and enslaved population suggested that the enslaved people on Curaçao exhibited lower mortality rates compared to the free people. However, the examination of the age-specific mortality risks of men and women indicated problems with the registration of high-mortality age groups, namely infants and people aged above 60 years. Therefore, this study focused on the mortality patterns of enslaved people aged between 1 and 59 years, as the data on these people is more reliable. The results did not indicate any clear seasonal pattern in the timing of deaths, unlike in other enslaved populations where mortality patterns correlated with variations in the intensity of labour or with seasonal differences in nutrition throughout the year. The absence of a plantation economy on Curaçao, the more evenly distributed workload throughout the year, and the relatively stable weather conditions on Curaçao could explain the absence of seasonal mortality patterns. The results also indicated higher mortality rates among men compared to women, although the differences were minimal and fluctuated across time. The higher male mortality can be primarily attributed to biological factors, as there was no gendered division of work on Curaçao. With regards to age, we

found that infants, younger children and elderly people were the groups with the highest mortality rates. This pattern corresponds with the general mortality pattern within most populations.

The results of this research showed that no single decisive factor shaped mortality patterns on the island, in contrast to other enslaved populations such as Suriname, where some factors, such as type of work, played important roles. We therefore conclude, in accordance with Everaert, that a significant part of mortality derived from biological (sex and age) and external factors (presumably crop failures or epidemics). Whereas other enslaved populations in the Caribbean were characterized by excesses of death, the population of Curaçao showed a unique natural increase, an excess of births over deaths. The mortality pattern of Curaçao seemed to have played a vital part in the demographic development of the population. The relatively low mortality rates allowed fertility rates to exceed, and so, this positive difference between birth and death resulted in a unique pattern of natural increase of an enslaved population in the Caribbean.

Our hypothesis — that mortality of enslaved people on Curaçao predominantly derived from biological and external factors — could be further examined in comparative studies in order to better contextualize the case of Curaçao. We propose a threefold way: (1) by a further comparative analysis with the free population of Curaçao, to examine the effect of (non-)biological factors on mortality and to examine the role slavery played on mortality risks; (2) By a micro-scale comparison of the enslaved population of Curaçao, for example by comparing urban-rural enslaved contexts or a variety of enslaved groups on different plantations, in order to study the role of work and the impact of slaveowners more in depth; (3) By comparative research with the entire population of another enslaved society, for example of Suriname, in order to obtain a better understanding of the exceptional position of Curaçao within the general Caribbean pattern.

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APPENDIX 1 OVERVIEW OF DATABASE

	Count	Missing (%)	Explanation
IDNR	12,793	0	Every unique enslaved person in the database is assigned an unique identifier. Individuals who were moved away from Curaçao and seem to have been brought back are considered to be two unique persons as it cannot be checked if this is the same person.
Name	12,793	0	The name of the Research Person, as registered in the original slave registers.
Sex	12,776	17 (0.13%)	The sex of the Research Person, as registered in the original slave registers (e.g., male, female)
Birth_year	12,745	48 (0.38%)	The year of birth of the Research Person, as registered in the original slave registers (e.g., 1830, 1841)
IN_day_cor	12,793	0	The corrected day of the first time — the first event — the Research Person appeared in this database.
IN_month_cor	12,793	0	The corrected month of the first time — the first event — the Research Person appeared in this database.
IN_year_cor	12,793	0	The corrected year of the first time — the first event — the Research Person appeared in this database.
IN_classification	12,793	0	Information on the type of event (e.g., birth, start of series, imported).
OUT_day_cor	12,793	0	The corrected day of the last time — the last event — the Research Person appeared in this database.
OUT_month_cor	12,793	0	The corrected month of the last time — the last event — the Research Person appeared in this database.
OUT_year_cor	12,793	0	The corrected year of the last time — the last event — the Research Person appeared in this database.
OUT_classification	12,793	0	Information on the type of event (e.g., written off, end of series ("Emancipatie"), manumission, escaped, death, exported).

Source: van Galen et al., 2023.

APPENDIX 2 POPULATION, POPULATION CHANGE AND YEARLY EVENTS (N = 12,793)

Year	IN			Out						Population (Dec. 31)
	Birth	Start series	Transferred	Death	End Series	Escaped	Manumission	Transferred	Written off	
1839	249	6,491	13	117			12	28		6,596
1840	209		53	93		1	15	46		6,703
1841	267		22	164		19	22	16		6,771
1842	197		8	130			14	41	2	6,789
1843	226		21	132		1	30	53		6,820
1844	237		5	154		2	45	52		6,809
1845	237		24	95			45	32	1	6,897
1846	229		6	135			44	95	5	6,853
1847	209		30	96	1		53	226	3	6,713
1848	248		13	92			48	4		6,830
1849	249		12	104			29	10		6,948
1850	272		16	137		1	223	12		6,863
1851	258		27	120			71	2	1	6,954
1852	192		16	163			59	12	3	6,926
1853	250		12	137		2	58	12	6	6,973
1854	287		7	139		1	61	5	2	7,059
1855	286		22	127	1		82	4	1	7,152
1856	250		41	151		1	122	11	26	7,132
1857	262		38	129		1	122	13	15	7,152
1858	302		13	125			71		3	7,267
1859	236		4	168		1	63	4	6	7,265
1860	267		6	236		90	75	29	5	7,103
1861	283		3	134		22	64	1		7,168
1862	184		4	229		8	104	8	3	7,004
1863				83	6,810	108	2		1	

Source: van Galen et al., 2023.

APPENDIX 3 UNADJUSTED LIFE TABLE ENSLAVED MEN ON CURAÇAO, 1840–1862

Age	Total N death	q(x)	l(x)	d(x)	L(x)	T(x)	e(x)
< 1	227	0,087077811	100000	8707,781	93469,16	4342124	43,4
1–4	346	0,141859838	91292,22	12950,7	339267,5	4248655	46,5
5–9	84	0,040005518	78341,52	3134,093	383872,4	3909387	49,9
10–14	55	0,028993109	75207,43	2180,497	370585,9	3525515	46,9
15–19	39	0,023403869	73026,93	1709,113	360861,9	3154929	43,2
20–24	47	0,033394189	71317,82	2381,601	350635,1	2794067	39,2
25–29	40	0,039140251	68936,22	2698,181	337935,6	2443432	35,4
30–34	51	0,061101878	66238,04	4047,268	321072	2105497	31,8
35–39	43	0,062045242	62190,77	3858,641	301307,2	1784425	28,7
40–44	42	0,063833907	58332,13	3723,567	282351,7	1483117	25,4
45–49	61	0,095072868	54608,56	5191,792	260063,3	1200766	22,0
50–54	73	0,121752879	49416,77	6016,633	232042,2	940702,3	19,0
55–59	73	0,148367172	43400,13	6439,155	200902,8	708660,1	16,3
60–64	92	0,203405718	36960,98	7518,074	166009,7	507757,3	13,7
65–69	84	0,261977783	29442,9	7713,387	127931,1	341747,6	11,6
70–74	79	0,340793317	21729,52	7405,274	90134,4	213816,6	9,8
75–79	65	0,387154742	14324,24	5545,698	57756,97	123682,2	8,6
80–84	44	0,49138592	8778,544	4313,653	33108,59	65925,21	7,5
85–89	22	0,486538603	4464,891	2172,342	16893,6	32816,62	7,3
90–94	11	0,407259623	2292,549	933,6627	9128,589	9128,589	4
95+	6	0,173606215	1358,887	1358,887	6794,433	6794,433	5

Note: This life table includes observations of later entries (i.e. persons that entered the data at later ages during the start of the registration or after transport), which might distort the estimations of survival chances.

Source: van Galen et al., 2023.

APPENDIX 4 UNADJUSTED LIFE TABLE ENSLAVED WOMEN ON CURAÇAO, 1840–1862

Age	Total N death	q(x)	l(x)	d(x)	L(x)	T(x)	e(x)
< 1	182	0,07069966	100000	7069,966	94697,53	4538563	45,4
1–4	323	0,130544054	92930,03	12131,46	347457,2	4443865	47,8
5–9	107	0,051826054	80798,57	4187,471	393524,2	4096408	50,7
10–14	63	0,032771731	76611,1	2510,678	376778,8	3702884	48,3
15–19	54	0,030163258	74100,42	2235,11	364914,3	3326105	44,9
20–24	76	0,047519162	71865,31	3414,979	350789,1	2961191	41,2
25–29	62	0,046459088	68450,33	3180,14	334301,3	2610402	38,1
30–34	62	0,053611474	65270,19	3499,231	317602,9	2276100	34,9
35–39	49	0,052162154	61770,96	3222,106	300799,5	1958498	31,7
40–44	57	0,066499022	58548,85	3893,442	283010,7	1657698	28,3
45–49	71	0,094138433	54655,41	5145,175	260414,1	1374687	25,6
50–54	65	0,099641716	49510,24	4933,285	235218	1114273	22,5
55–59	57	0,103407871	44576,95	4609,608	211360,7	879055,2	19,7
60–64	77	0,165178469	39967,34	6601,745	183332,4	667694,5	16,7
65–69	67	0,200576969	33365,6	6692,371	150097,1	484362,1	14,5
70–74	62	0,225064034	26673,23	6003,185	118358,2	334265	12,5
75–79	62	0,344823377	20670,04	7127,515	85531,44	215906,8	10,4
80–84	49	0,34760401	13542,53	4707,438	55944,06	130375,4	9,6
85–89	25	0,369419247	8835,092	3263,853	36015,83	74431,34	8,4
90–94	20	0,413956391	5571,239	2306,25	22090,57	22090,57	4
95+	10	0,255564876	3264,989	3264,989	16324,95	16324,95	5

Note: This life table includes observations of later entries (i.e. persons that entered the data at later ages during the start of the registration or after transport), which might distort the estimations of survival chances.

Source: van Galen et al., 2023.