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Mortality among European settlers in pre-colonial West Africa:

The "White Man's Grave" revisited

Stefan Öberg & Klas Rönnbäck

Department of Economic History

School of Business, Economics and Law
GÖTEBORG UNIVERSITY

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Stefan Öberg & Klas Rönnbäck

stefan.oberg@gu.se & klas.ronnback@gu.se

Abstract: We have created the first longitudinal dataset following European employees of the English Royal African Company during their time in West Africa, 1683–1766. The mortality was catastrophically high with limited geographical differences. Tropical diseases and epidemics thereof, contributed to the high mortality and strong variations over time. The risk was highest for the men who had just arrived from Europe but remained high also after they had spent several years on the coast. The death rate of the Europeans was increased by both the share of newcomers and by the total number of men present on the coast.

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Keywords: Economic History, Mortality, West Africa, Pre-colonial, “White Man’s Grave”

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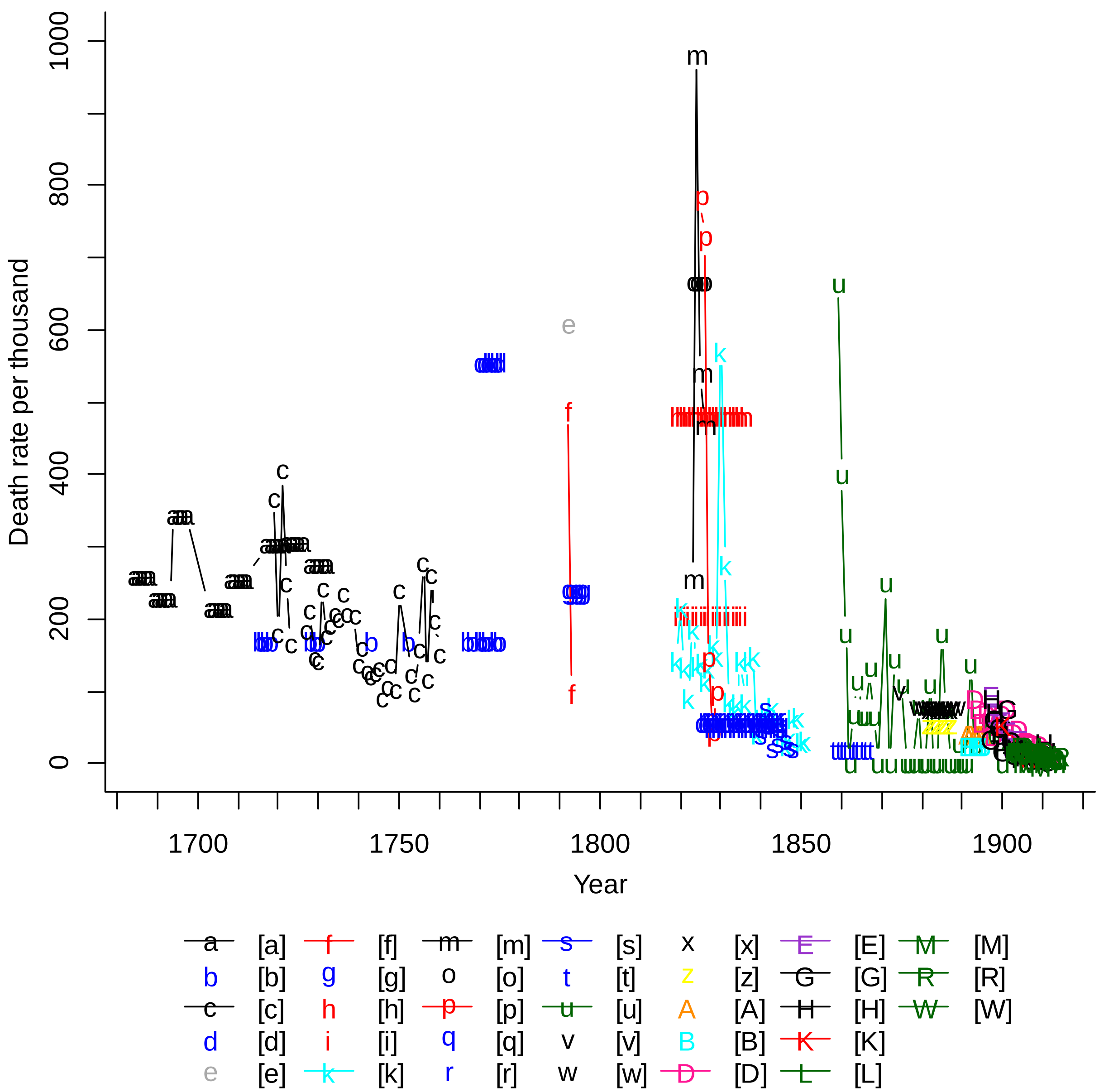
Göteborg University
School of Business, Economics and Law
Department of Economy and Society
Unit of Economic History
P.O. Box 720
SE-405 30 GÖTEBORG
www.econhist.gu.se

1. Introduction

European powers gained money, goods and political power through their international endeavors during the early modern period. But the establishment of European outposts of trade or colonization was also associated with different types of costs through military expenditure and costs of relocations. For the outposts in tropical areas the costs were not least created by the extremely high risk of disease and death for Europeans relocating there. Especially West Africa was considered to be a "White Man's Grave" in the eighteenth century because of the very high mortality of Europeans there. Previous research has shown the extremely high risk of dying but also that the risk varied considerably over time, between places and populations. Figure 1 summarizes the death rates of Europeans in West Africa in the late seventeenth to the early twentieth centuries available from previous research. (Table 1 provides the sources for the series presented in Figure 1.)

FIGURE 1. *Previous estimates of the death rate of Europeans relocating to West Africa, 1686–1914*



Note: See Table 1 for a description of the series and references. The area on the African West Coast is indicated in Figure 1 through colors: Gold Coast – black (series: a, c, m, o, v, w, x, G and H), Ships/Fleets while on the West African coast – blue (series: b, d, g, q, r, s and t), Bulama Island (Guinea Bissau) – gray (series: e), Sierra Leone – red (series: f, h, i, p and K), Senegal – turquois (series: k and B), West Africa (British or French) – dark green (series: u, L, M, R and W), Lagos – yellow (series: z), Benin – orange (series: A), Cameroon – pink (series: D), Niger Coast Protectorate – purple (series: E).

TABLE 1 *Descriptions and references for the previous estimates of the death rate of Europeans relocating to West Africa, 1684–1914*

Series	Place	Years	Population	Reference
[a]	Gold Coast	1684–1730	British Royal African Company, Europeans	Davies (1975), tab.2
[b]	West African coast	1715–1775	Crew mortality rate on French slave ships while on the W. African coast	Stein (1980), p. 37
[c]	Gold Coast	1719–1760	Dutch West India Company, Europeans	Feinberg (1989), tab. 1
[d]	West African coast	1770–1775	Crew mortality rate on English slave ships while on the W. African coast (annualized 30-day mortality rate)	Behrendt (1997), tab. 6
[e]	Bulama Island, Guinea Bissau	1792	European settlers on Bulama Island, first year	Curtin (1964), p. 483
[f]	Sierra Leone	1792–1793	Europeans of the Sierra Leone Company, first and second year	Curtin (1964), pp. 483–484
[g]	West African coast	1792–1796	Crew mortality rate on English slave ships while on the W. African coast	Steckel and Jensen (1986), tab. 2
[h]	Sierra Leone	1819–1836	Military, other than officers, in the British Sierra Leone Command	Curtin (1964), p. 485
[i]	Sierra Leone	1819–1836	Officers in the British Sierra Leone Command	Curtin (1964), p. 485
[k]	Senegal	1819–1851	Military in French Senegal	Curtin (1990), tab. 3
[m]	Gold Coast	1823–1826	British Cape Coast Command (annual values)	Feinberg (1974), p. 359
[o]	Gold Coast	1823–1826	British Cape Coast Command (sample-size weighted average)	Curtin (1968), tab. 1
[p]	Sierra Leone	1825–1829	British Sierra Leone Command (excluding observations based on fewer than 100 people)	Feinberg (1974), p. 359
[q]	West African coast	1825–1845	British anti-slavery blockade, disease mortality	Curtin (1964), p. 486
[r]	West African coast	1825–1845	British anti-slavery blockade, all-cause mortality	Curtin (1964), p. 486
[s]	West African coast	1840–1848	British anti-slavery blockade	Curtin (1964), p. 486
[t]	West African coast	1858–1867	British West African Squadron, anti-slavery blockade	Curtin (1964), p. 487
[u]	British West Africa	1859–1914	Military in British West Africa	Curtin (1990), tab. 4 and 5
[v]	Gold Coast	1874	British Asante expedition (annualized 2 months death rate)	Curtin (1990), p. 75
[w]	Gold Coast	1879–1888	European missionaries, traders and miners	Dumett (1968), p. 155
[x]	Gold Coast	1881–1887	British government employees	Raynes (1930), p. 364
[z]	Lagos	1881–1887	British government employees	Raynes (1930), p. 364

[A]	Benin	1891–1895	French military (incl. “subsequent” deaths, occurring shortly after having left the West African coast)	Curtin (1990), tab. 6
[B]	Senegal	1891–1895	French military (incl. “subsequent” deaths, occurring shortly after having left the West African coast)	Curtin (1990), tab. 6
[D]	Cameroon	1893–1912	European civilians	Curtin (1990), tab. 10
[E]	British Niger Coast Protectorate	1897–1904	Europeans	Dumett (1968), p. 185
[G]	Gold Coast	1897–1911	European officials	Dumett (1968), p. 175
[H]	Gold Coast	1897–1911	European non-officials	Dumett (1968), p. 176
[K]	Sierra Leone	1900–1906	Europeans in Freetown, Sierra Leone	Dumett (1968), p. 179
[L]	French West Africa	1903–1913	French military, disease mortality	Curtin (1990), tab. 7
[M]	British West Africa	1903–1913	British military, disease mortality	Curtin (1990), tab. 7
[R]	British West Africa	1903–1914	European civilian officials	Curtin (1990), tab. 11
[W]	British West Africa	1910–1911	European civilian officials, disease mortality	Horn (1912), p. 1356

The death rates of European settlers have gained increased attention in recent years due to influential studies proposing that they can be used as an influence on later institutional development that is unrelated to other attributes of a region (Acemoglu et al., 2001, 2012). Daron Acemoglu, Simon H. Johnson and James A. Robinson use data on death rates from Philip D. Curtin (1964, 1989, 1998), for example using 668 per thousand per year (series “o” in Figure 1) as the settler death rate for Ghana, Togo and the Côte d'Ivoire. The data used by Acemoglu, Johnson and Robinson has been criticized by David Y. Albouy (2012) for being seriously flawed. Figure 1 shows clearly that the estimates for West Africa from the early eighteenth century are exceptionally high compared to the years before or after.

Previous research has only been able to investigate the experiences of European settlers in West Africa using rather crude data and methods. It has therefore not been possible to evaluate the different possible explanations for why the mortality differed so much between places, times and populations. Understanding this would help us better understand the causes of the high mortality rates among the relocating Europeans and evaluate the results available.

A first possibility for the variation found in the previous research is that there were geographical differences in the mortality risk. There are not any clear geographic differences in the risk when we compile all available results (see the online color version of Figure 1) but this conclusion rests mostly on comparing results on different populations from different times. The variation over time is, in contrast, visible with clearly elevated death rates in some years and during the early nineteenth century. There is also a tendency for a long-term decline, especially from the second quarter of the nineteenth century onwards. There are at least two explanations for the clearly elevated risk in some years. Firstly, epidemics of infectious diseases could have increased the risk during some years and, secondly, changes in the composition of the populations could also have contributed to the variation over time.

The extremely high risk of disease and death of Europeans relocating to tropical areas was a result of them encountering a new disease environment including diseases such as *falciparum* malaria and yellow fever. The Europeans formed a "virgin soil population" for the tropical diseases and so the first encounter with these diseases led to extremely high mortality rates. The people who survived this first onslaught had improved chances for survival through acquired immunity and resistance. There are illustrations to this effect in previous research where, for example, the death rate in a population was much higher in the first year in West Africa than in the next and following years (for example series “f” and “p” in Figure 1). It is also possible that the number of newcomers and/or Europeans in general increased the risk for everyone by enabling the spread of disease but this has never been tested in the literature.

We often cannot know anything about the cause of the high death rates but these can be tentatively inferred from seasonal variations. If tropical diseases spread by mosquitoes, such as malaria and yellow fever, were important risk factors for the Europeans we should expect a seasonal variation in the mortality risk since the insect populations increase during the rainy season.

In this paper we test these explanations by tracing the life-course of employees of the English Royal African Company and its successor The Company of Merchants Trading to Africa, stationed at several different locations along the West African coast in 1683–1766. We use a newly constructed longitudinal dataset created from linking the information in three types of records: Pay Bills, a Register of Servants, and Lists of Living and Dead. The locations included are the Gold Coast (in present-day Ghana), Gambia, Sierra Leone and Ouidah (in present-day Benin); all the regions where the company had a major presence over an extended period of time. The sources of information and the longitudinal data structure allow us to do an in-depth study of the variations in mortality. We investigate how the rates varied between places, years, groups of people and seasons. The paper focuses upon the time before effective preventive measures and medicines, such as the widespread and effective use of quinine to prevent malaria, which were introduced from the nineteenth century onwards, drastically reducing settler mortality rates in tropical regions (Curtin, 1990, 1998; see also Figure 1).

Our results show that there were limited differences in mortality between the different places along the West African coast. The mortality risk was higher in Ouidah than on the Gold Coast or in Gambia or Sierra Leone. Our sample for Ouidah is small, so the cautious conclusion should be that the geographical differences were limited. The results also show that, even if the risk of death remained high throughout the late seventeenth and early eighteenth century, the rate varied considerably over time. Temporary outbreaks of epidemic diseases do seem to have contributed to this. The rainy season increased the risk for the men by about 30–50 percent, indicating that the seasonality of vector populations (for example mosquitoes) had an important impact on the mortality rates. Men who just arrived from England had a much (60%) higher risk of dying than men who had been on the coast for some time. It was the first six to eight months on the coast that were especially dangerous. The risk decreased with time spent on the coast for all men but remained extremely high even after several years. Both the inflow of new people from Europe and the overall size of the group of Europeans increased the risk for everyone.

2. Previous research

European perceptions of West Africa, and the risks there, varied over time (Hill, 2013: pp. 71–73), but by the seventeenth century there was a widespread idea that West Africa was something of a "White Man's Grave" (Curtin, 1961; Acemoglu et al., 2001). The most frequently cited studies of mortality rates among Europeans migrating to tropical parts of the world have been undertaken by Curtin. Curtin's studies are based on the mortality rates of British soldiers stationed in various places around the world during the nineteenth century. He found that the crude death rates for the Sierra Leone Command during a few years in the early nineteenth century were as high as 483 per 1 000 persons, and the figures for the Cape Coast Command (in current-day Ghana) were a staggering

668 per 1 000 persons (series “o” in Figure 1) (Curtin, 1968: tab. 1, 1990: tab. 1). Harvey Feinberg (1974) refined Curtin’s (1968) estimates and showed that the rates varied considerably from one year to another in both locations, varying between 43 and 783 per 1 000 persons for the Sierra Leone Command (series “p” in Figure 1), and 256 and 982 per 1 000 persons for the Cape Coast Command (series “m” in Figure 1) (Feinberg, 1989: pp. 358–59). Even if the death rate thus was lower in some years than the sample-size weighted average presented by Curtin it was also even higher in some. The rates were always disastrously high in comparison to the rates among troops stationed in Britain at this time: around 15–20 per 1 000 persons per year (Curtin, 1989: tab. A.1–A.2; see also Feinberg, 1989: p. 369).

Harvey M. Feinberg (1974, 1989) estimated the death rate among the European employees in the Dutch fort Elmina on the Gold Coast (in current-day Ghana), 1718–1760 (series “c” in Figure 1). The death rate was then around 185 per 1 000 persons on average, but varying from 91 to 408 per thousand in different years (Feinberg ,1974: pp. 365–66, 1989: pp. 37–38). The lower death rates in the eighteenth than in the early nineteenth century are supported also by Davies (1975) in his study of employees of the English Royal African Company (series “a” in Figure 1). Apart from the studies of Europeans stationed on the West African coast there are also studies of mortality rates among European crewmen working on the slave trading ships during the time on the West African coast. The results in these studies show mortality rates that are high but still, most often, lower than the rates reported for the early nineteenth century (series “b” in Fig. 1: Stein, 1980; series “g” in Fig. 1: Steckel and Jensen, 1986: tab. 2; series “g” in Fig. 1: Behrendt, 1997: tab. 6).

There are no obviously visible geographical differences in the death rates between different places along the African West Coast (Figure 1). The data used by Curtin (1968) and Feinberg (1974) suggest that death rates certainly were very high both in Sierra Leone and on the Gold Coast, but that the death rates were substantially higher on the Gold Coast than in Sierra Leone. Studies of crewmen on slave ships have also found differences in mortality depending on which part of the West African coast the ship was trading with. The results do not show any uniformly higher risk of dying on the Gold Coast than in other places, but rather the opposite (Steckel and Jensen, 1986; Behrendt, 1997: tab. 7; see also Davies, 1975: pp. 89–93).

Modern-day research also does not provide sufficient background for what to expect regarding geographical differences in mortality in West Africa. All the areas we studied had similarly high proportions of children infected with malaria in the early twentieth century (Piel et al., 2010, fig. 1). They also have similar shares of their population with the sickle cell gene. The frequency of this gene increases in the population over time as a result of severe and long-term exposure to *falciparum* malaria. This seems to indicate similar risks of exposure to malaria in all the four areas that we studied. But others do find regional patterns to the prevalence of malaria across the West African region, most likely because the length of the malaria transmission season differs substantially across the region (Kleinschmidt et al., 2001; Gemperli et al., 2006).

The mortality of settler populations depended most importantly on the difference in epidemiological environment in the areas of origin and destination. The tropical areas of the world in general have different infectious agents than temperate areas as well as a larger variety (Smith et al., 2007). The increased mortality for Europeans in the tropical environment was a result of being exposed to a new range of pathogens, including yellow fever and the deadlier *falciparum* malaria (Klepp, 1994; Coelho and McGuire, 1997).

Not much is known for certain about the specific causes of death of the relocating Europeans during the period studied in this paper. The available results indicate that the vast majority of the early European settlers in West Africa who died, did so due to various "fevers", most importantly malaria and yellow fever (Steckel and Jensen, 1986: tab. 2; see also Curtin, 1964: p. 486; Curtin, 1990: tab. 8; Klepp, 1994: p. 495). Still in the early twentieth century about 87 percent of all deaths among British government officials on the African West Coast were due to disease (Horn, 1912: p. 1357), with about one-third of the deaths being caused by tropical diseases specifically, then most importantly malaria (Raynes, 1930: p. 368).

Both malaria and yellow fever, as well as other tropical diseases use mosquitoes as vectors of transmission. The risk of spread of yellow fever and malaria is therefore affected by the conditions for mosquitoes to survive and breed (McNeill, 2010: chap. 2). These are, in turn, strongly affected by variations in temperature and rainfall, with increases in the mosquito populations especially early in the rainy season(s). This also creates a possibility for a seasonal pattern to the mortality rates. Kenneth G. Davies (1975: tab. 4–5) showed that the death rate was higher in June and July on the Gold Coast (1683–1734) and July and August in Gambia (1684–1726). This corresponds well with the rainy seasons in these areas today: April–June in Ghana and July–September in Gambia (McSweeney et al., 2010b). Modern-day studies have also, for example, established a seasonal pattern for malaria in West Africa (Greenwood et al., 1987; Becher et al., 2008), as well as for hemorrhagic fevers such as yellow fever (LeDuc, 1989). Outbreaks of yellow fever would typically occur at the end of the dry season or in the early rainy season (Scott, 1965: p. 58; McNeill, 2010: chap. 2). These results in combination with the results in Davies (1975) provides further support for the importance of tropical diseases for European mortality rates in historical West Africa (see also Behrendt, 1997: tab. 3; but see also the conflicting results in Steckel and Jensen, 1986: tab. 6).

The Europeans had never encountered the tropical diseases before and so had no acquired immunity against them. The Europeans were therefore a so-called "virgin soil population" (Crosby, 1976) for these, and other, tropical diseases. It was realized already in the sixteenth century that it was the initial encounter with the tropical environment that was the most dangerous to Europeans (Hill, 2013: p. 85n47). There is some scattered data to support this: whereas the death rate for the Sierra Leone Company for example was 490 per thousand in their first year of operation, the death rate decreased to 100 per thousand among the remaining staff the following year (Curtin, 1964: pp. 483–84; see also Feinberg, 1974: p. 359; Curtin, 1990: tab. 4; McDaniel, 1992: tab. 3; McDaniel and Preston, 1994: tab. 3–4). K.G. Davies (1975: pp. 89–93) uses a number of convenience samples to study the mortality among newcomers during their first years on the coast. He shows that the death rates were much higher during the first year than during the following year(s). A possible qualification for this result is that four out of the six samples he uses are from the years 1719–1721 when the mortality seems to have been exceptionally high (Figure 1).

A person who is exposed to malaria or yellow fever and survives, can acquire some resistance (malaria) or even immunity (yellow fever) to the disease (Doolan et al., 2009; McNeill, 2010). This was also the historical experience, and naturally reduced mortality rates among the first settlers who had become "seasoned" to West Africa in this way (Curtin, 1961).

Given that the initial exposure to the new, tropical disease environment constituted a high risk for the individual, it is possible that the overall death rate in a year could have been influenced by the number of men in the population who had just arrived from

Europe. The native populations can be expected to have some acquired immunities and/or partial resistance against the diseases that contributed to the very high death rates among the Europeans (Coelho and McGuire, 1997, 1999; Piel et al., 2010). Yellow fever was, in all likelihood, endemic in the studied areas so that most natives would have been exposed to and acquired immunity against it during childhood when it is a relatively mild disease (Espinosa, 2014). The tropical diseases, as any infectious diseases, need non-immune/resistant hosts to spread. It is therefore possible that both the number of newcomers and the total number of European men present influenced the risk level and thus also the overall death rate.

One possible explanation for the large variation in the death rate between different years is that there were epidemics of infectious diseases. It is clear from the results in previous research that there were some years with much higher death rates than usual (Figure 1). Yellow fever caused very high mortality among Europeans during outbreaks (McNeill, 2010: chap. 2). The disease still occurred as an epidemic disease in early twentieth century Ghana, reappearing in certain years with clearly higher morbidity and mortality rates (Scott, 1965: fig. 3). Outbreaks of yellow fever can be highly geographically concentrated, but all epidemic outbreaks in Ghana in the early twentieth century were part of an outbreak that also affected other parts of the West African coast (Scott, 1965: pp. 58–60). The first documented outbreak of yellow fever in West Africa happened in Senegal and Gambia in 1778 (Findlay and Davey, 1936: pp. 667–68). This is much later than the first recorded outbreaks in the West Indies which happened in the 1640s (Curtin, 1993). It has been established that the disease originated in Africa (McNeill, 2010: pp. 32–33) so it is likely that there were epidemics of yellow fever among Europeans there also before the late eighteenth century. The settler mortality might also have changed over time for other reasons. There is a tendency for a long-term decline in the rates found in previous research (Figure 1; see also Curtin, 1990). It is not known if changes in the size and composition of the groups present on the coast contributed to the changes over time.

3. The Aim of the Study

The aim of this study is to investigate the above mentioned possible explanations for the variations in mortality among Europeans relocating to West Africa in the pre-colonial time. The paper will specifically attempt to test four sets of explanations for why the risk varied over time and across populations:

Were there systematic *geographical differences* to the risk of death? Differences in the risk of death would point to important influences from the local geography and the different infrastructure created in the different places.

How did the risk of death *vary between years*? Was there any decline over time indicating that successful preventive measures were introduced? Were there similarities between the different locations which could indicate epidemics of, for example, yellow fever? Was the mortality rate influenced by the group composition, so that a larger share of newcomers increased the overall rate? Did the size of the population have any effect on the mortality risk?

How did the risk of death change *over time for the individual* while on the West African coast? Did the risk decline over time as suggested by the historical narratives describing "seasoning"?

Were there seasonal differences to the risk of death (with a higher risk during the rainy season), indicating that mosquito borne diseases contributed to the high risk? Were the trips timed to not arrive during the rainy season to reduce the risk for the newcomers?

4. Sources

We use the accounts of the English Royal African Company, in other words the English chartered slave trading company (later reassigned to be in charge of maintaining the English castles and forts along the coast) and its successor The Company of Merchants Trading to Africa as the sources for information on the European employees that were stationed in West Africa (a more extensive description of the sources used is included in the appendix). We use three sets of similar sources from these accounts for the analyses: the Pay Bills, the Register of Servants and the Lists of Living and Dead. The records are neatly kept, in standardized tabulated lists throughout the period studied allowing us to extract similar information from the different sources.

The first set of sources used is the lists of payments, Pay Bills, to employees of the English Royal African Company between 1707 and 1745. The Pay Bills primarily include data on people working on the Gold Coast, but for some periods also in Gambia and Ouidah.

The contents of the lists were extracted to study the levels and differences in income in pre-colonial Western Africa (Rönnbäck, 2014, 2015). The payment lists were created each time the companies paid their employees, usually with an interval of one to six months, most commonly bimonthly. The employees were listed with names, occupation, pay and comments on occurrences (moves, promotions, etc.). The comments also include dates of arrivals, employment and deaths.

The second set of sources is a Register of Servants covering the years from 1751–1766. The register is a list of employees of the company with names, titles, dates of recruitment, arrival to the Cape Coast Castle (CCC) for those arriving from Europe (or date of entering into the service of the company for those employed locally) and the date and cause of termination of the employment.

The Pay Bills and Register of Servants have (almost) only been preserved for the Gold Coast (and then the CCC in particular). The company did, however, also have establishments in Gambia, Sierra Leone and Ouidah. For these locations we have therefore instead made use of a series of documents called the Lists of Living and Dead. Some of the lists only report the people present on a specific date but others also report people who arrived on the coast or started to work for the company (and then often exactly when they started to do so) during the same period, as well as those alive at the end of the period covered by the list in question. The Lists of Living and Dead formed the basis for Davies' research on the death rates among the company's employees (Davies, 1975). Feinberg (1974, 1989) also used a similar source for his study of the death rate among employees of the Dutch company. The most important difference between our use of these sources and the previous research is that we link the different lists over time to create longitudinal observations of the employees.

Both the company and the employees had monetary incentives to include the right people in the lists. The company wanted to have correct information so as to pay the correct amount of wages, just as the employees wanted to actually get paid. The pay to the employees started when the person arrived on the coast (Davies, 1975: p. 84) so there were reasons to record this date accurately. There were also reasons for the company to record the date of death accurately to pay out the accurate wage to the heirs. There were mechanisms in place to counteract any fraudulent inclusion of dead people in the payment lists.

The sources we use for the Gold Coast, the Pay Bills and Register of Servants, include information that allows us to separate the men who had just arrived from England from the ones recruited locally. Most importantly, two phrases were commonly used: either that the person in question "arrived on" a particular (often named) ship, on a particular date, and started working for the company, or that the person in question "entered into the service of the company" (sometimes only shortened to "entered") on a particular date. The "arrivals" sometimes have notes on the person arriving "from England", of payment left behind in London or the date the ship left England. Persons "entered" into service seem to be a more mixed group, for example the African employees are noted as "entering". Some of these local recruits are most probably re-recruited previous employees, who for one reason or another had been discharged at an earlier stage (and then stayed on the African coast rather than returning to England). Others were recruited from other European companies on the coast, or from ships visiting the coast, or were recruited among the victims of marooning or shipwrecks on the coast. In most cases, however, the background of the locally recruited staff is simply unknown. The classification we use is of course not perfect but sufficiently good that the two groups show differences in their level of mortality. Erroneous classifications would tend to reduce the differences between the groups.

Overall, very little is known both about the actual recruitment process of the staff and about the previous experiences of those recruited. Davies (1975: pp. 85–86) found out from passenger lists that over 94 percent of the men recruited in England were British (with 90% coming from England and Wales). The company normally seems to have recorded the ethnicity of the staff (by adding comments such as "black", "negro" or "mulatto").[1] This recording of ethnicity was incomplete. Since the aim of the paper is to study the mortality of Europeans in West Africa we excluded all persons with any indication of being of non-European origin from our sample, using the available comments and typical local African names.

[1] The Dutch lists, used by Feinberg, apparently included the place of birth (Feinberg, 1974: p. 361), but that was not the case for the English sources.

One particular piece of information missing in all three types of records is the age of the staff. It does however seem safe to assume that the staff was quite young, around 15 to 30 years old at the time of recruitment. Exceptions might include some of the senior officers and civil servants. Davies (1975: p. 87) studied the passenger lists of the Royal African Company's ships in which the age of the passenger was sometimes stated. He reports that the average age at recruitment was 25.6 years, with the oldest recruit being 64 and the youngest 12 years old.

5. Linking the Sources

We, as mentioned, linked the extracts of the different records over time to create longitudinal observations of the employees' stays in West Africa. We linked extracts of the cross-sectional sources, the Pay Bills and Lists of Living and Dead. The information in the Register of Servants is "pre-linked" by the company's accountants at the time, thus requiring no linking of information on our part.

The pieces of information available for linking the observations are the full name, the occupation, the time and the geographical place of station. The extracts of the different lists were nominally linked through a semi-automated procedure. The spelling of the names was standardized in the initial extraction of the data. Links were then created between observations with the same name that appeared in two consecutive lists. The linking was made easier by the limited number of men that were present in each location and point in time. After the linking we carried out extensive manual checks of all conflicting and missing information in the linked data. The linking is described in detail in the appendix.

6. Data and Methods

The sample consists of 3,756 (as far as it is possible to determine) unique men of (to the best of our knowledge) European birth that were working on the coast of West Africa for the English Royal African Company and its successor between 1683 and 1766. Each employee is included from the date of arrival, employment or first appearance in the records and is followed until death, discharge, leaving the coast or being lost to follow-up (most often due to lists missing in the archives). We split the individual observations into month-specific spells to be able to study the possible effects of the rainy season and the group size on the mortality risk. We limit the analyses to the three years following the first observation for each individual. We have more information for the first years both because of the high mortality rate and because we lose people in the linking (Figure 2). The included individuals are followed over a total of 4,747.1 person-years on the coast in the analyzed data during which time 1,326 of them die. Table 2 presents summary statistics for the samples (see also Figure 2).

TABLE 2 *Summary statistics of the analyzed sample of male employees of European origin working on the West African coast between 1683 and 1766*

	Individuals	Person-years	Deaths	Median survival time (years)	Mortality rate
Gold Coast:					
Arriving from England	691	901.1	303	2.2	336
Employed locally /unknown	1,481	1,738.7	397	5.1	228
Gold Coast, all	2,170	2,639.8	700	3.5	265
Gambia	1,115	1,547.1	430	3.2	278
Sierra Leone	271	322.2	103	4.7	320
Ouidah	215	238.0	93	2.2	391

Note: The sample includes the three years following the date of the first observation for each individual. The median survival times were estimated when including the first six years on the coast for all locations and so the summary statistics are somewhat different for this sample.

We have much more information on employees stationed on the Gold Coast or in Gambia than on those stationed in Sierra Leone or Ouidah. The number of men stationed at these different locations differed with between 50 and 100 European men being present on the Gold Coast in a typical month, 30–90 in Gambia, 20–30 in Sierra Leone and 10–20 in Ouidah (Appendix Table A1). We also cover different time periods for the different locations; the Gold Coast 1707, 1713–1745 and 1751–1766, Gambia 1683–1695, 1701, 1703–1711 and 1718–1745, Sierra Leone 1692–1695 and 1701–1728 and Ouidah 1704–1717 and 1736. We have the most observations for all locations for the 1720s which is therefore used as the reference category in the models presented below.

We have estimated both the mortality rate and the "crude death rate". The mortality rate is the total number of deaths in a year divided by the total number of person-years at risk, in other words the total time of presence on the coast that we observe for all individuals in the sample. A range of different methods have been used in the previous literature on the mortality of European settlers in tropical areas of the world. Most are crude approximations of the mortality rate. To increase the comparability with the previous research we also present results based on a method closer to what has been used before. This "crude death rate" is the total number of deaths in a year divided by the total number of persons present, for any length of time during the year. This is not the textbook definition of a crude death rate but is closer to the measures used in previous research.

In order to study seasonal effects, specifically the potentially increased mortality risk in the rainy as compared to the dry season, we define which months constituted the rainy season for each area. Modern-day research has shown that the length and timing of the rainy season varies between years and also somewhat within the countries (McSweeney et al., 2010b). In Ghana and Ouidah (present-day Benin) the rainy seasons cover large parts of the year, from March to July and from September to November. In the immediate coastal region, where virtually all of the settlers came to stay, much of the rain is concentrated to just three months of the year: April, May and June (Manzanas et al., 2014: fig. 2; see also McSweeney et al., 2010b). These three months will thus be considered as the rainy season for the Gold Coast and Ouidah for the purposes of this paper, in order to compare mortality rates between the rainy and the dry season (McSweeney et al., 2010a). The peak of the rainy season in Sierra Leone and Gambia is from July to September (McSweeney et al., 2010a, 2010b). The accountants in Gambia (and to some extent also in Sierra Leone) made notes when someone died a violent death, for example drowning or dying when the fort was blown up. We could therefore exclude these deaths (counting them as censoring events) when we estimate the seasonal pattern (we reclassified 20 deaths in Gambia and 1 in Sierra Leone).

To estimate the possible effect from the number of men present in the different locations we counted the number of unique individuals present in each location each month. This count is included in the estimated regressions as categorical variables indicating the size of the group present as quartiles of the distribution for each location and decade. We also counted the number of new arrivals on the Gold Coast per year (See Table A2 in the appendix for the number of new arrivals per decade). This is also included in the regressions as a categorical variable 0, 1–10, 11–20 or 20+ newcomers in a year. In Table 4 we present results adjusted also for epidemic years including an indicator for 1719, 1756 and 1766 on the Gold Coast, 1695, 1704, 1721 and 1729 for Gambia, 1703, 1713 and 1721 for Sierra Leone and 1714 and 1735 for Ouidah. The analyses of the data on the Gold Coast also include an indicator for men who were only observed as working in any of the outforts. The sources covering the outforts have only been kept for the period from 1730 onwards. There are fewer deaths recorded for the men working in the outforts since they seem to, if possible, have been sent to the Cape Coast Castle when they were seriously ill.

We do not know the age of the employees and so cannot adjust for this in the analyses. The employees were, as discussed, young adults. The differences in mortality between different age groups among young adults are small (see Rönnbäck et al., 2016 for further discussion). It is therefore not a big problem that we cannot adjust for age in the analyses.

7. Results

The mortality of the European men stationed on the West African coast between 1683 and 1766 was extreme. The mortality rates in the different locations vary between 265 and 391 per thousand person-years at risk. These rates bear more resemblance to contemporary infant and child mortality rates than any recorded adult mortality rates. The mortality also has the resemblance with infant and child mortality in that there is a rapid drop in the survival curve during the first year for all four locations (Figure 2). The survival curves are in general very similar despite the differences regarding the amount and type of information available. The curves for the Gold Coast and Gambia, for which we have the most information, are almost identical. The mortality is higher and the early drop in the survival curve is even more drastic in Sierra Leone and Ouidah but the samples for these places are, as mentioned, much smaller.

FIGURE 2. *Survival curves for male employees of European origin working on the West African coast between 1683 and 1766*

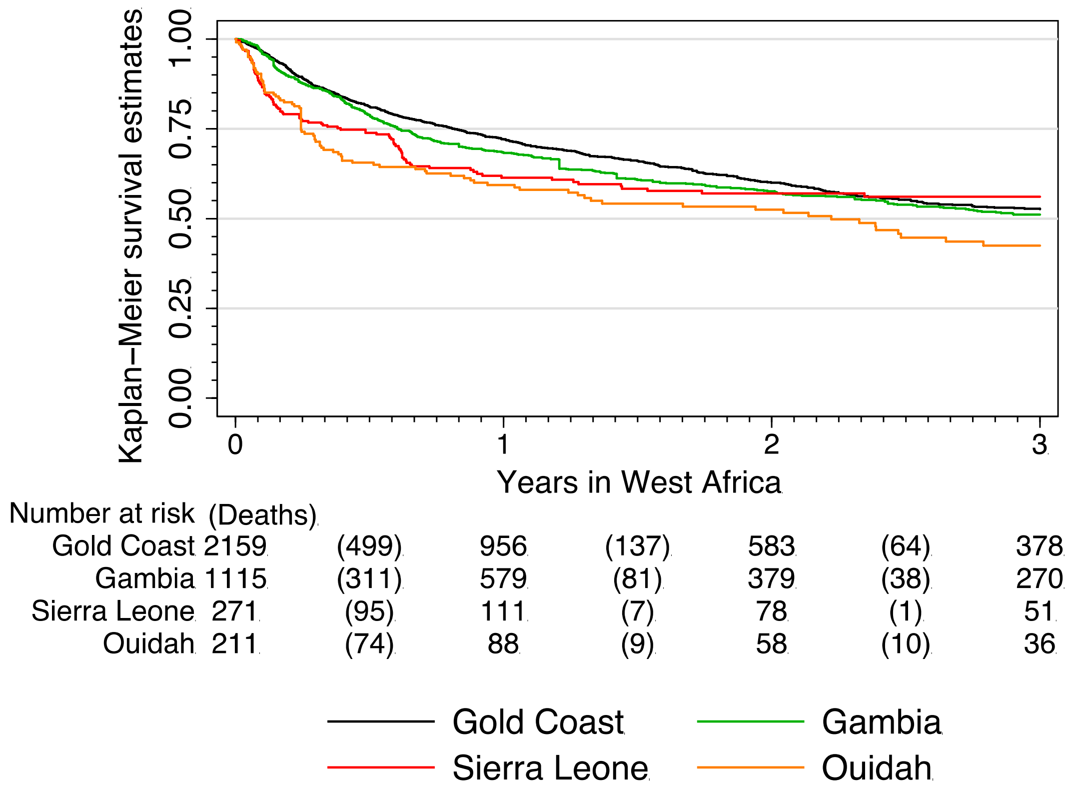
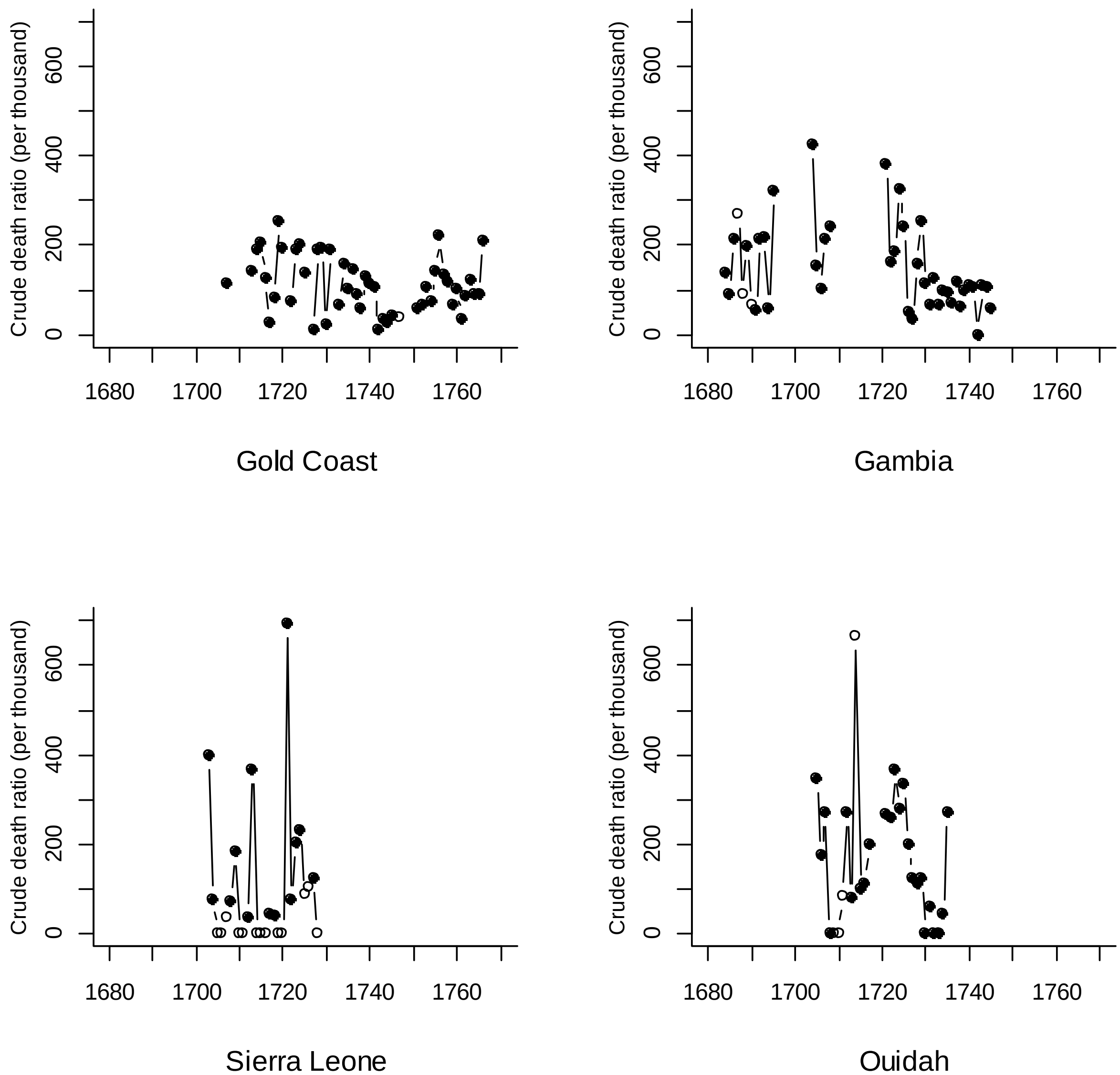


Figure 3 presents annual crude death rates by location. We present the crude death rates since this allows us to also include information from lists that were not possible to link to make the results comparable to previous research. We calculate the crude death rates as the number of deaths divided by the number of people present in each location and year. There is no clear tendency for any uniform change over time in the crude death rates. The death rates are lower in the 1740s on both the Gold Coast and in Gambia. The analyses presented below show that this was a result of fewer men working at the stations during this period and that there were therefore fewer men arriving from Europe to be exposed to the tropical disease environment for the first time.

FIGURE 3. *The crude death rate per year and location for male employees of European origin working on the West African coast between 1683 and 1766*



Note: Years for which we have limited information are indicated as open circles.

The crude death rate is lower and less variable for the Gold Coast for which we have the best data and largest sample size. The rates vary more in the other locations. There is a larger degree of uncertainty regarding the death rates in Sierra Leone and Ouidah than in Gambia or on the Gold Coast. The uncertainty is larger for Sierra Leone and Ouidah partly because there were fewer people working there and partly because there are years were we either only have a list of deaths or a list of the living. Almost all of the zero death rates, in other words no deaths in that year, for some years in Sierra Leone and Ouidah in Figure 3 are the result of the missing lists of dead. We also overestimate the death rate for some years since we infer the population size from the survivors (and deaths). An example of this is the mortality peak in Ouidah in 1714. The number of deaths increases sharply in 1714 but the estimate of the death rate (667) is highly uncertain because we have to infer the population size in the way mentioned.

The crude death rates in our sample are somewhat lower than previous estimates from the eighteenth century. The average crude death rate is 111 per thousand for the Gold Coast, 149 for Gambia, 107 for Sierra Leone and 170 for Ouidah. The average crude death rate for the Dutch working on the Gold Coast as estimated by Feinberg (1989: tab. 1) is by comparison 185 per thousand.[2] The mortality rates presented in Table 2 are higher than the crude death rates because so many men died after only a very short stay on the coast.[3]

[2] The averages when we exclude the years with deficient data (hollow circles in Figure 3); the average crude death rates are 114 per thousand for the Gold Coast, 150 for Gambia, 197 for Sierra Leone and 167 for Ouidah.

[3] The average of the crude death rates is somewhat more comparable to the mortality rates if we use a sample-size weighted average. The weighted averages are still lower than the mortality rates; 117 for the Gold Coast, 167 for Gambia, 167 for Sierra Leone and 202 for Ouidah. The weighted average for the crude death rates in Feinberg (1989: tab. 1) is 266 per thousand.

FIGURE 4. *Crude death rates of male employees of European origin on the Gold Coast 1684–1766, comparing our results with the results in Davies (1975) and Feinberg (1989)*

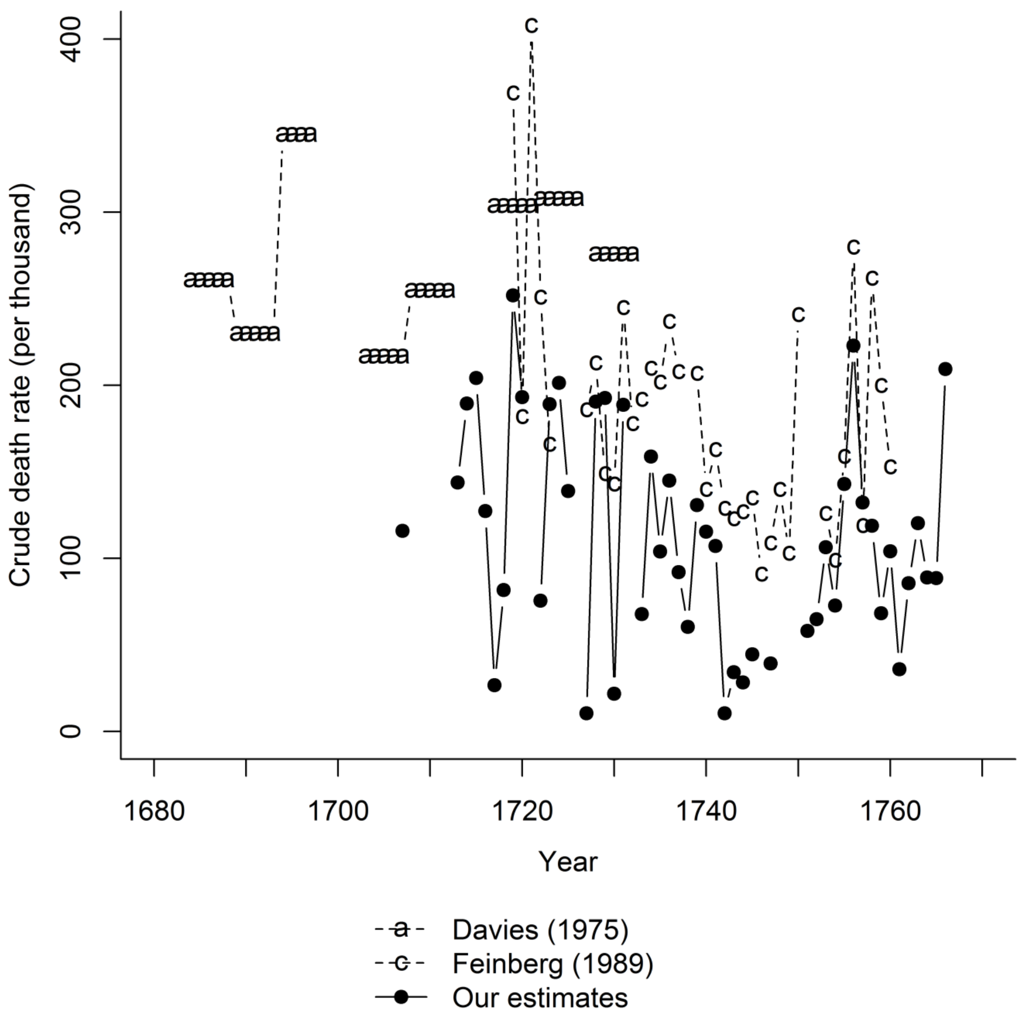


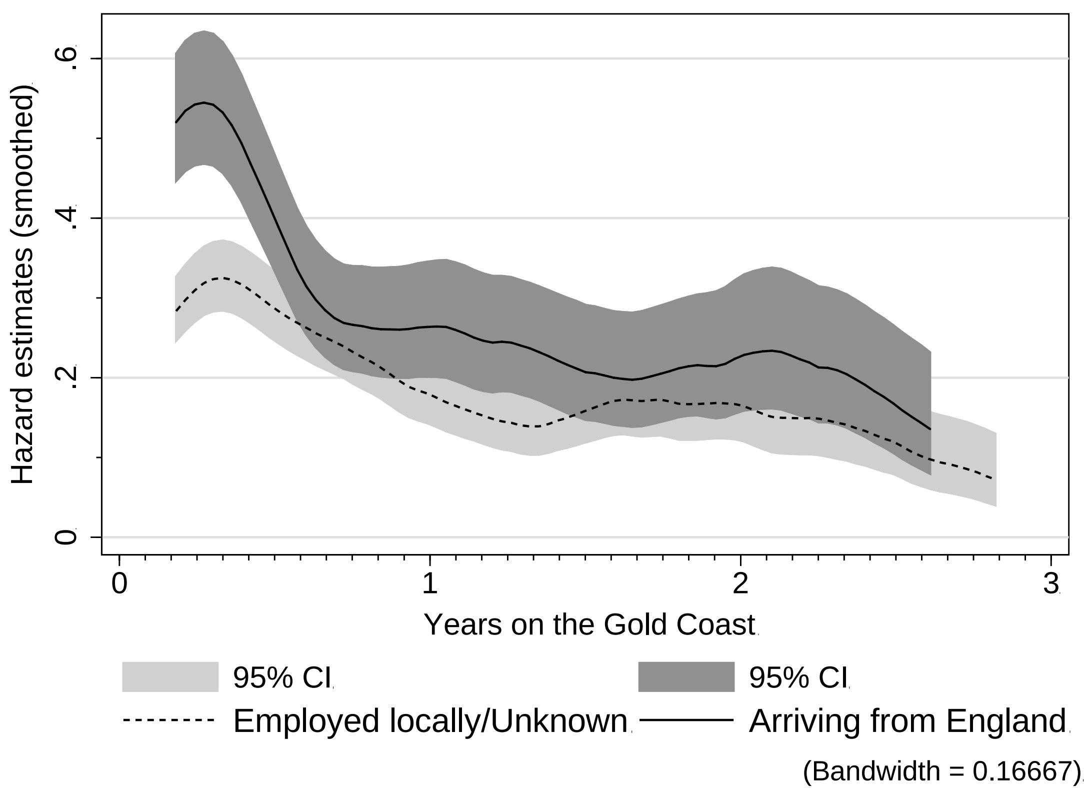
Figure 4 compares our crude death rates for the Gold Coast with the previously available estimates. Here it is clear that our estimates are lower than Feinberg's for all but three years. Feinberg (1989: tab. 1) writes that he used the population count on December 31 in the previous year plus half of the net inflow during the year as a denominator. Feinberg must have constructed some type of longitudinal dataset to know the exact population size on these dates but it is not clear how he did this. If we change the risk population in the data in Feinberg (1989: tab. 1) so that all new persons are included, it lowers the death rate by on average 16 per thousand or 7.5 percent. The difference in method can thus explain some if not all of the difference between our estimates. Davies used the first surviving List of Living and Dead for each year (averaged over 4–5 years) as the denominator for the death rates he calculated and the average number of dead per year as the numerator (Davies, 1975: pp. 88–89). Davies would therefore have excluded some people from the risk population that are included by us or Feinberg and it is therefore not surprising that his death rates are higher.

What is clear from Figure 3 is that the death rates varied considerably from one year to the next in all the studied locations. There are some years where the death rates increase a lot from the year before to sometimes reach more than 400 deaths per thousand. During the earlier decades there are few years where there were not exceptionally high death rates in some or several places. Not the least 1703–1729 seems to have been a bad period on the coast. In 1721 the death rates were high in all locations for which we have data (as well as in Feinberg, 1989: tab. 1). There are peak years also in the later decades with for example 1756 being a bad year on the Gold Coast. Here our results are supported by Feinberg (1989: tab. 1) who also found an especially high death rate among the Dutch on the Gold Coast during this year.

We cannot know for sure from our results what caused the temporary peaks in the death rates but it is likely that epidemics were the most important cause. This is made more likely by the fact that the deaths during these years were concentrated in one or two months: 31% (9) of all deaths in Gambia in 1704 happened during August of that year, 34% (11) of all deaths on the Gold Coast in 1719 happened during April alone, 76% (45) of all deaths in Sierra Leone in 1721 happened in October or November, and 33% (21) of all deaths on the Gold Coast in 1755 and 1756 happened in December 1755 and January 1756, with another 13% (8) in April of 1756.

The first encounter with the tropical disease environment constituted an extreme risk for the European men. We can compare the experience of men arriving from England with men who had spent some time working on the Gold Coast (Figure 5). The first six to eight months on the coast were more dangerous than the rest of the stay, meaning that if the men survived these months the risk of dying decreased somewhat. People were aware of this effect and it was discussed by contemporaries as "seasoning", meaning adapting to the tropical climate. But while the first six to eight months were the most dangerous, the risk continued to be extremely high also during the following years. The risk remained higher for the newly arriving men than for men who were employed locally or with unknown background throughout the first three years even if the difference only is clearly statistically different during the first six months. The risk declines somewhat over time for both groups but remains extremely high. The hazard after more than two years on the coast is still magnitudes higher than that for contemporary men in Europe (see Rönnbäck et al., 2016 for further discussion).

FIGURE 5. *The mortality hazard for male employees of European origin by time spent on the Gold Coast, 1707–1766*



The reason behind the initial spike in the hazard for newly arriving men is that several newly arrived men died shortly after arriving at CCC, sometimes as quickly as within one or two weeks. We unfortunately do not know anything about the cause of death for the men dying this soon after arriving on the coast. Yellow fever could possibly kill a person within a week (Findlay and Davey, 1936: pp. 670–72). But it is also possible that the men had become ill during the sea voyage and died from this disease after arriving (for an illustration of this possibility see Maxwell-Stewart and Kippen, 2015: fig. 3.1). If some died as a result of already being ill when landing on the coast this would reduce the amount attributed to encountering a new disease environment.

The increased risk for newcomers is confirmed also when we estimate the relative differences in the mortality risk in a Cox regression (Table 3). The newly arriving men also increased the risk for the men already present on the coast. The risk was lower during years when no new men arrived from England and this effect was present also among men that were not themselves newly arriving (results not shown).

TABLE 3 *Analyses of factors influencing the risk of dying for male employees of European origin on the Gold Coast, 1707–1766*

	Share of sample (%)	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio
Decade:						
1700s	1.4	0.66	0.68	0.69	0.72	0.75
1710s	15.2	1.01	1.00	1.13	1.09	1.08
1720s	18.6	ref.	ref.	ref.	ref.	ref.
1730s	24.3	0.73**	0.72**	0.81†	0.80†	0.82
1740s	5.2	0.80	0.80	1.39	1.36	1.41†
1750s	21.7	0.79*	0.80†	0.77*	0.76*	0.64**
1760s	13.6	1.03	1.02	1.00	1.00	0.78†
Number of men present:						
N≤p25	26.9		0.75*		0.81†	0.81†
p25<N≤p50	25.3		0.80*		0.80*	0.80*
p50<N≤p75	24.9		ref.		ref.	ref.
N>p75	22.9		1.00		1.10	0.95
Rainy season?						
No	74.2		ref.		ref.	ref.
Yes	25.8		1.34***		1.33**	1.32**
Number of new arrivals during the year:						
0	9.9			0.36***	0.39***	0.41***
1–10	30.3			ref.	ref.	ref.
11–20	25.6			1.14	1.18	1.12
21+	34.2			1.08	1.10	1.05
Arriving from England?						
No	65.3					ref.
Yes	34.7					1.60***
Place of employment:						
Cape Coast Castle	96.9					ref.
Outfort	3.1					0.61
Summary of sample:						
Persons	2,170					
Observations	32,785					
Deaths	700					
Years at risk	2,639.8					

The table presents odds ratios from Cox regressions. The standard errors are robust and clustered on the individual level.

† = Significance at the 10 percent level.

* = Significance at the 5 percent level.

** = Significance at the 1 percent level.

*** = Significance at the 0.1 percent level.

The number of men present also had an independent effect on the risk level (Table 3). The risk of dying was about 20 percent lower for everyone during months when there were fewer men present than usual. This effect was even stronger in the other locations on the coast (Table 4). The stronger effect is likely to be at least partly a result of not being able to control for the increased risk for the newly arriving men themselves in locations other than the Gold Coast. The increased risk for newly arriving men and from the group size was strong enough to influence the overall death rate. The lower death rate in the 1740s seen in Figure 3 was caused by fewer men arriving and working on the coast during this time. In our regression results it is instead the 1750s that stand out as a favorable period on the coast when mortality was low despite many new men arriving to work on the coast. That the number of European men present at the locations had an independent effect on the risk for everyone is a strong indication that disease was the most important risk factor. We cannot conclude that it was especially tropical diseases that caused this risk. A larger group of non-resistant/non-immune men increase the possibilities for the spread of all types of diseases. The effect of the number of men present could also have been a result of the larger number of men present posing challenges to the sanitation in the forts.

TABLE 4 *Analyses of factors influencing the risk of dying for male employees of European origin in West Africa, 1683–1766*

	Share of sample (%)	Odds ratio	Odds ratio	Odds ratio
Decade:				
1680s	8.8	0.54***	0.54***	0.82
1690s	5.2	0.44***	0.44***	0.66**
1700s	7.0	0.75*	0.76*	0.75**
1710s	11.6	0.77**	0.76**	0.70***
1720s	21.1	ref.	ref.	ref.
1730s	23.2	0.45***	0.44***	0.53***
1740s	3.7	0.64**	0.64**	0.73†
1750s	12.0	0.64***	0.66***	0.66***
1760s	7.5	0.83	0.85	0.80†
Number of men present (by location):				
N≤p25	27.5		0.69***	0.62***
p25<N≤p50	24.5		0.86†	0.87†
p50<N≤p75	24.3		ref.	ref.
N>p75	23.7		1.39***	1.30***
Rainy season?				
No	76.1		ref.	ref.
Yes	23.9		1.54***	1.50***
Epidemic year?				
No	90.9			ref.
Yes	9.1			2.73***
Location; share of observations (%):				
		Gold Coast	55.8	
		Gambia	32.2	
		Sierra Leone	6.9	
		Ouidah	5.2	
Summary of sample:				
		Persons	3,756	
		Observations	59,468	
		Deaths	1,326	
		Years at risk	4,747.1	

Note: The table presents odds ratios from Cox regressions. The analyses were stratified by location. The standard errors are robust and clustered on the individual level.

† = Significance at the 10 percent level.

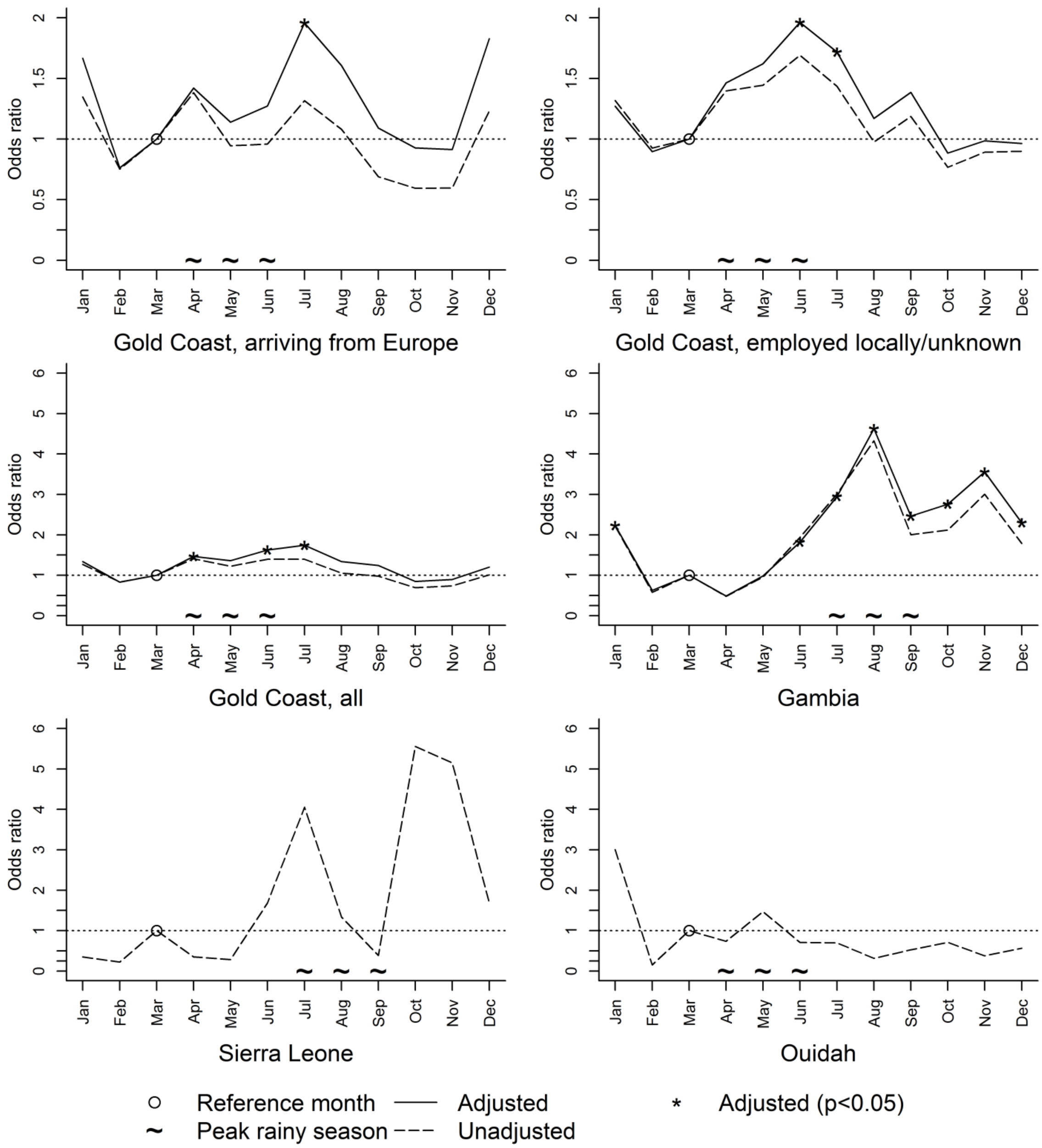
* = Significance at the 5 percent level.

** = Significance at the 1 percent level.

*** = Significance at the 0.1 percent level.

The seasonality of the mortality risk does however lend support to that tropical diseases were important risk factors for the European men. The risk of dying was 30–50 percent higher during the peak months of the rainy season. The mortality risk increased with the start of the rainy season and remained high also in the month(s) after the peak months (Figure 6). The increased risk during the rainy season was much larger in Gambia than on the Gold Coast but the patterns are similar. There is a less clear seasonal pattern for Sierra Leone and Ouidah. Figure 6 presents the risk per month (relative to March) estimated without including any other controls and after adjusting the estimates for other risk factors including the month of arrival. The seasonality in new arrivals on the coast did not have any strong effect on the seasonality in mortality (results not shown). Adjusting the risk for the other factors brings out a stronger seasonal pattern.

FIGURE 6. *The seasonal variation in the risk of dying for male employees of European origin in West Africa, 1683–1766*



Note: The figure presents odds ratios from Cox regressions estimating the variation over the year in the risk of dying. The model for the "unadjusted" results include only the months. The "adjusted" results for men arriving from England and employed locally/unknown background are results from models including controls for month of arrival/first observation, decade, group size, number of new arrivals during the year, epidemic years and if the person was observed only at any of the outforts. The "adjusted" results for all men on the Gold Coast and in Gambia are results from models including controls for month of arrival/first observation, decade, group size and epidemic years. The standard errors are robust and clustered on the individual level. The sample analyzed for this figure treat the specified violent deaths in Gambia and Sierra Leone as censoring events instead of deaths.

The timing of the arrivals on the coast changed somewhat over time (Appendix Table A2). The share of the new arrivals that came to the coast during the peak months of the rainy season seems to have increased in the 1750s and 1760s. The risk of dying was unexpectedly lower for men arriving during these months (Appendix Figure A1). This change of time of arrival could therefore indicate an attempt to reduce the risk for the newly arriving men. If it was a conscious strategy it was not successful. The risk for the newcomers does not seem to have changed over time. The survival curves are almost identical for newcomers on the Gold Coast in 1713–1745 (linked Pay Bills) and in 1751–1766 (Register of Servants) (Appendix Figure A2).

8. Concluding discussion

Returning to the proposed explanations for the variations in mortality, we only find limited support for geographical differences in mortality along the West African coast. The initial mortality is higher in Sierra Leone and Ouidah, and remains higher over time in Ouidah. The uncertainty is however, as discussed, larger for these estimates than for the other places due to small sample sizes and fewer sources. Despite the geographical distance and differences between places, the mortality is almost identical in the two places for which we have the largest samples, the Gold Coast and Gambia. There is a tendency in the results that the more information we have, the lower the mortality is. Davies (1975: p. 93n12) also hypothesizes that mortality was lower on the Gold Coast than in other locations because the facilities most likely were better on the Gold Coast than in other locations due to the larger number of people working there and that the fort was continuously manned for a longer period than the other places.

One key result of this paper is that the crude death rates among settlers in pre-colonial West Africa were substantially lower than the mortality rates. The mortality rate in the different locations studied ranged from 265 to 391 per 1 000 person-years at risk whereas the crude death rate ranged from 107 to 170 per 1 000 persons at risk. The reason for this is that a large fraction of the settlers died within a very short time after arrival in Africa, yielding extremely high mortality rates. Despite that the death rates presented in previous research were very high, they in that sense underestimate the risk of dying in the "White Man's Grave".

We do not find any clear and uniform change over time, thus suggesting that there was no steady improvement indicating the successful implementation of preventive measures. The mortality was unexpectedly low on the Gold Coast in the 1750s but rose again in the 1760s. The most important change from one decade to another was that the 1720s was a particularly bad time for the survival of Europeans on the West African coast.

We find strong indications of epidemics which caused many deaths typically highly concentrated in time. The year 1721 saw high death rates in all locations and it is therefore likely that there was a pandemic in West Africa during this year. There were also other times where we see years with high death rates in different locations close together, for example 1703–1705 and 1723–1725.

The cause of death is rarely recorded in the primary sources consulted. The data at least from the two regions with larger samples, the Gold Coast and Gambia, did however exhibit a seasonal pattern, with elevated mortality rates (30–50 percent higher risk) during or in the month immediately following the rainy season in each respective region. This lends support to the conclusion that the main causes of death were tropical diseases spread through vectors that also exhibited seasonal patterns, such as the mosquitoes transmitting malaria and yellow fever. That a larger number of European men present was a risk factor with everyone together in the rainy season further increasing the risk, makes it very likely that tropical diseases were a major cause of the high mortality.

The European men were a "virgin soil population" for the tropical diseases. We show that the risk was extremely high but falling during the first six to eight months on the coast. What we can contribute further to this is that the risk reduced somewhat over time but still remained extremely high even after having spent years on the coast. The evidence also shows that mortality rates were substantially higher among the people that we know arrived from England on a certain date, compared to the Europeans who for one reason or another were recruited locally on the African coast (and thus might have been "seasoned" already prior to entering into the service of the company).

Some of the initially extremely high risks for men arriving from England might have been caused by diseases they contracted during the sea voyage from England. The voyage took about 51 days in the mid-eighteenth century. To the extent that this contributed to the initial extreme risk, affirms the result that it was not only the initial exposure that was dangerous but that the risk remained extremely high during the years spent on the coast. Diseases contracted and deaths occurring during the voyage from England and along the coast are also possible explanations for the unexpected result that the mortality risk was lower for men who arrived during the peak months of the rainy season. It is possible that some of the men had already contracted and died from any of the diseases that increased the mortality risk during the peak months.

The newly arriving men did however not only face a high risk themselves: they also increased the risk of dying for everyone – both new and old settlers – present at the European forts. A larger group of Europeans present at a fort at any one time also elevated the risk of dying, implying that the population density in the forts might have had an effect on the risk of an epidemic disease spreading from one person to another. Any attempts at expanding the operations on the coast therefore risked resulting higher mortality among the employees.

Albouy (2012), as mentioned, criticized the data used by Acemoglu, Johnson and Robinson (2001). Acemoglu, Johnson and Robinson (2012) replied to his criticism and showed that their results were not dependent on the extremely high death rates for some areas, as they do not change much when they cap all exceptionally high death rates at 250 per thousand. Our results presented in this paper suggest that the death rate was lower than that in the eighteenth century but supports using a similar level of mortality for different regions on the coast of West Africa. We show that the mortality risk was much higher for men just arriving from Europe and that the size of the group of Europeans also increased the risk for everyone. The results therefore indicate that the simultaneous movement of large groups of men from Europe to a place in the tropics is a likely explanation for the exceptionally high death rates in the early nineteenth century.

When using the death rates as an instrumental variable the assumption regarding exogeneity is more important than the exact level of the estimated death rates. Using the death rates as an instrumental variable for later institutional development assumes that the death rates and changes of these over time were not related to human behaviors or choices or to the natural resource endowments and the demographic and political situation in an area. We do not find any indication of any clear or continuous decline in the mortality rate that would support that successful preventive measures were introduced. Given that the mortality risk remained so high even after several years on the coast, the most effective strategy to reduce the mortality would have been to establish a permanent European population on the coast. The children of these people would have been able to acquire similar levels of resistance and immunity to the tropical diseases as the native population. There was also no healthier in- or highlands which could have worked as a refuge for the Europeans in West Africa as there were in for example East Africa (Raynes, 1930: p. 367). The European settlers in West Africa largely had to remain in the coastal area where the spread of tropical diseases remained a huge problem. The cost in human lives from establishing any permanent population would therefore have been extremely high and the trade carried out on the coast only required a relatively small scale presence. The high risk of dying for Europeans in West Africa therefore in itself contributed to the region for a long time remaining a “White Man’s Grave”.

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Appendix: Detailed description of the sources and linking methods used to create the dataset

Sources

We use the accounts of the English Royal African Company, in other words the English chartered slave trading company (later reassigned to be in charge of maintaining the English castles and forts along the coast) and its successor The Company of Merchants Trading to Africa as the source for information on the European employees that were stationed in West Africa. We use three sets of similar sources from these accounts for the analyses: the Pay Bills, the Register of Servants and the Lists of Living and Dead.

The first set of sources used is the lists of payments, Pay Bills, to employees of the English Royal African Company from between 1707 and 1745. The Pay Bills primarily include data on people working on the Gold Coast, but for some periods also in Gambia and Ouidah. For the Gold Coast the lists from before 1730 (almost) only include people working at the Cape Coast Castle (CCC), but from 1730 the lists also include people working in the various "outforts" on the Gold Coast, for example Sekondi, Dixcove, or Accra. The contents of the lists were extracted to study the levels and differences in income in pre-colonial Western Africa (Rönnbäck, 2014, 2015). The payment lists were created each time the companies paid their employees, usually with an interval of one to six months, most commonly bimonthly. The employees were listed with names, occupation, pay and comments on occurrences (moves, promotions, etc.). The comments also include dates of arrivals, employment and deaths. The cause of death is as a rule unfortunately not reported. If an employee happened to die, the accounts often recorded that any wages owed to the employee were paid to a third person, designated as the heir of the deceased. The company therefore had an interest in recording the exact date of death. The lists were created frequently enough to allow imputing dates with reasonable accuracy in the few cases where they were missing. The records are neatly kept, in standardized tabulated lists, throughout the period studied.

The second set of sources is a Register of Servants covering approximately the years from 1747–1771. This was combined with information from the Pay Bills of 1747, 1751 and 1760. The register is a list of employees of the company with names, titles, dates of recruitment, arrival to the CCC for those arriving from Europe (or date of entering into the service of the company for those employed locally) and the date and cause of the termination of the employment. For our purpose, information is "pre-linked" by the company's accountants at the time, thus requiring no linking of information on our part. The original lists seem to have been set up carefully and accurately. There are very few cases with missing or obviously inaccurate information. The quality of the recordkeeping in the register seems to have been good up until December 1766. After this time, however, the final fate of the employees is rarely recorded. We therefore only include individuals arriving in CCC before 10 December 1766 in the analyses and censor all remaining observations at that date.

The Pay Bills and Register of Servants have (almost) only been preserved for the Gold Coast (and then the CCC in particular). The company did, however, also have establishments in Gambia, Sierra Leone and Ouidah. For these locations we have therefore instead made use of a series of documents called the Lists of Living and Dead. These lists were assembled quite irregularly – occasionally a couple of times per year, but at other times only at intervals of several years – seemingly in order to inform the company board in London of the mortality rates at the various settlements in Africa. The lists are generally of two types. A first type only reports the people alive on a specific date, when the list was assembled, and therefore only gives a momentary count of the staff present at a specific point in time. A second type of list provides considerably more detail: reporting people who have died since the previous list was assembled, or people who have arrived on the coast or started to work for the company (and then often exactly when they started to do so) during the same period, as well as who was alive at the end of the period covered by the list in question. For Gambia and Ouidah we combine the information from the Lists of Living and Dead with information from the Pay Bills for the years when it is available.

The Lists of Living and Dead formed the basis for Davies' research on the death rates among the company's employees (Davies, 1975). Feinberg (1974, 1989) also used a similar source for his study of the death rate among employees of the Dutch company. While this source initially might seem to be ideal for studying the mortality rates among the settlers, three factors make it less ideal: firstly, these lists were produced at quite irregular intervals, and often at quite low frequency, and secondly, only some of the lists include the date when a person arrived or started working, and lastly, they almost never make any distinction between whether a person was recruited from England, or recruited locally on the African coast. We therefore have better data on the men working on the Gold Coast than in the other locations.

Both the company and the employees had monetary incentives to include the right people in the lists. The company wanted to have correct information so as to pay the correct amount of wages, just as the employees wanted to actually get paid. The pay to the employees started when the person arrived on the coast (Davies, 1975: p. 84) so there were reasons to record this date accurately. As mentioned above, there were also reasons for the company to record the date of death accurately in order to pay out the accurate wage to the heirs. What might be problematic is that the individual accountants might have had incentives to keep dead souls on the Pay Bills, in order to try to embezzle some of the company's money (reportedly paid as wages) into their own personal pockets. The number of dead would then be underreported. Since the company required that several high-ranking officials guaranteed that the accounts were correct, they did however stand a lot to lose if they were found cheating. We therefore tend to assume that this possible bias is not a major concern (compare Davies, 1975: pp. 84–85).

Overall, very little is known both about the actual recruitment process of the staff and about the previous experiences of those recruited. Davies (1975: pp. 85–86) found out from passenger lists that over 94 percent of the men recruited in England were British (with 90% coming from England and Wales). The company normally seems to have recorded the ethnicity of the staff (by adding comments such as "black", "negro" or "mulatto"). The Dutch lists, used by Feinberg, apparently included the place of birth (Feinberg, 1974: p. 361), but that was not the case for the English sources. This information was recorded in the "Comments" column. This recording of ethnicity was incomplete. Since the aim of the paper is to study the mortality of Europeans in West Africa we excluded all persons with any indication of being of non-European origin from our sample using the available comments and typical local African names. Our classification is most likely imperfect. Any erroneous inclusion of men with African origin would most certainly lead to a downward bias in our mortality estimates. Our sources are not complete enumerations of the European population present in the area. There are many people, also with European names, in the lists that were employed locally. Our estimated mortality rates are therefore not mortality rates for Europeans on the African West Coast in general, but only for employees of the English trading companies.

A particular strength of the Pay Bills and the Register of Servants, is that these records generally took explicit note, in the column for "Comments", of when people started working for the company. Most importantly, two phrases were commonly used: either that the person in question "arrived on" a particular (often named) ship, on a particular date, and started working for the company, or that the person in question "entered into the service of the company" (sometimes only shortened to "entered") on a particular date. The "arrivals" sometimes have notes on the person arriving "from England", of payment left behind in London or the date the ship left England. Persons "entered" into service seem to be a more mixed group, for example the African employees are noted as "entering". Some of these local recruits are most probably re-recruited previous employees, who for one reason or another had been discharged at an earlier stage (and then stayed on the African coast rather than returning to England). Others were recruited from other European companies on the coast, or from ships visiting the coast, or were recruited among the victims of marooning or shipwrecks on the coast. In most cases, however, the background of the locally recruited staff is simply unknown.

We use the available information to separate the men arriving from England from the ones employed locally. We have interpreted "arrivals" and/or information on payment left in London as indicating that this is the first time a person appears on the Gold Coast. We have on the other hand assumed that the wording "entering" indicates that a person was being recruited on the coast. We have also used all information given regarding from where a person was arriving to exclude men arriving from other locations on the coast. The classification we use is of course not perfect but sufficiently good that the two groups show differences in their level of mortality. Erroneous classifications would tend to reduce the differences between the groups. There are also cases where we have not been able to determine when or from where a person was employed – in other words not even whether the person arrived on a ship from England or was recruited locally. This is most commonly due to them arriving or being employed at a time when there are gaps in the available source materials. To begin with we investigated this group separately from the others but they did not differ in any way from the group employed locally so these two groups are therefore analyzed together.

One particular piece of information missing in all three types of records is the age of the staff. It does however seem safe to assume that the staff was quite young, around 15 to 30 years old at the time of recruitment. Exceptions might include some of the senior officers and civil servants. Davies (1975: p. 87) studied the passenger lists of the Royal African Company's ships in which the age of the passenger was sometimes stated. He reports that the average age at recruitment was 25.6 years, with the oldest recruit being 64 and the youngest 12 years old.

Linking the sources

We linked the extracts of the different records over time to create longitudinal observations of the employees' stays in West Africa. The pieces of information available for linking the observations are the full name, the occupation, the time and the geographical place they were stationed at. The linking was made easier by the limited number of men that were present in each location and point in time.

The extracts of the different lists were nominally linked through a semi-automated procedure. The spelling of the names was standardized in the initial extraction of the data. Links were then created between observations with the same name that appeared in two consecutive lists. The Pay Bills are often missing for the outforts along the Gold Coast and a person could also be left out of the payment list if they were, for example, sent on a journey. We checked all short gaps manually and bridged them where there was enough information to conclude that it was the same individual. We, for example, concluded that John Whitford employed as a carpenter at the Cape Coast Castle with a note stating that he was sent to Tantumquerry in March 1723 was the same individual as John Whitford who came to the Cape Coast Castle in November 1723 with a note that he came from Tantumquerry, even if though we had no information from Tantumquerry on his stay there. In the Pay Bills we bridged gaps of up to a year but the longer the gap, the more non-conflicting information was required to accept the link. In the case of the Lists of Living and Dead, we occasionally linked records covering a longer period of time than one year, but then only in case a list explicitly claimed to cover this longer period of time (to take one example, one list from Sierra Leone is reported to cover events occurring during the period from 1 October 1723 to 1 November 1724, thus stretching over more than one year in itself).

We also checked cases where a linked individual seemed to be in two places at the same time. Almost all of these cases were a result of the fact that the Pay Bills were created bimonthly and individuals moved from one fort to another during this time period. In these cases, we adjusted the start and end dates to remove the overlap. Also other cases with conflicting information could almost always be solved by checking the pictures of the original lists. We detected a small number of repeated entries for the same individual and a few cases where information had ended up on the wrong row. In all cases where it was not possible to make an unambiguous link we left the observations unlinked. These cases are treated as left-truncated and/or right-censored observations in the analyses. We also double checked the sources for previously overlooked information for all individuals without information on how and when they were employed or ended their employment.

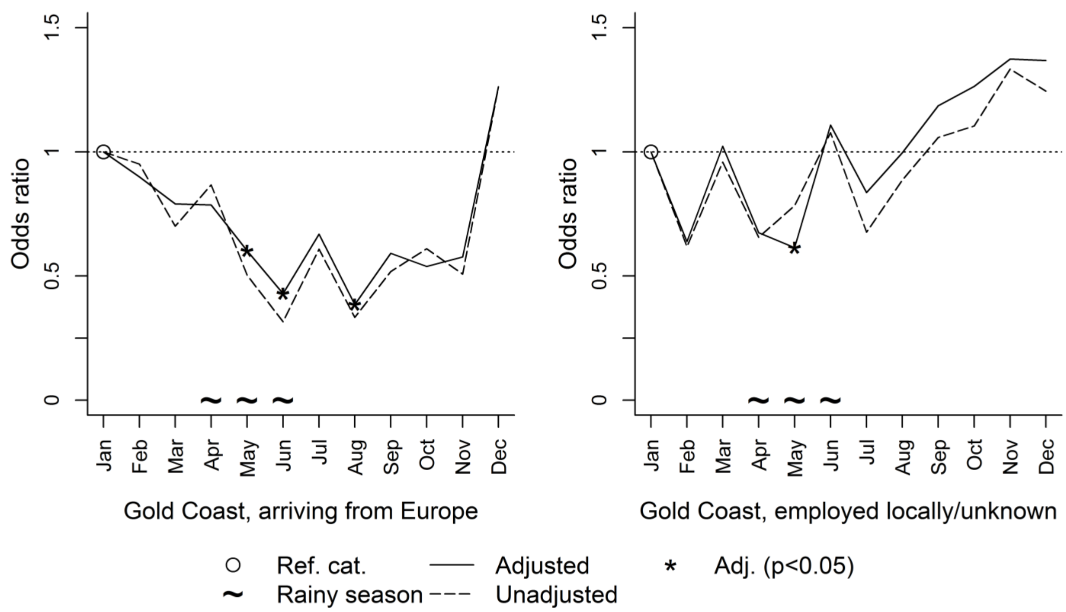
We could link on average 7.9 consecutive observations per individual in the Pay Bills from the Gold Coast covering the period 1713–1747. The difference in successful links is not very large between the men coming from England and those recruited locally. We linked on average 7.3 observations for men from England and 8.0 for men recruited locally or with unknown origin. Figure A2 shows the survival curves for men arriving from England in 1707, 1713–1745 and 1751–1766. The sources for the men arriving in 1707, 1713–1745 are linked to the Pay Bills. The source used for the men arriving from 1751–1766 is primarily the Register of Servants. The similarity of the two lines is thus also a confirmation that our linked data produces very similar results to the "pre-linked" source.

When conducting nominal linking of sources there is always a risk of false links, in other words assuming that different individuals with the same name are the same person. The risk of false links is especially high when there is little additional information besides the name to use for the linking as is the case in the materials used for this study. But, the materials have several features reducing the risk of false links. Firstly, notations were made in the payment lists each time the company paid an employee which was most often done monthly or bimonthly. The high frequency of observations from the Pay Bills reduce the likelihood that a person with a certain name leaves or dies unnoticed and of another person with the same name appearing, also without any notes being taken, before the creation of the next payment list. Secondly, the notaries as a rule made notes in the lists if a person had just arrived, was moved to another location or died. We have used the information available in the notes to evaluate the nominal links.

Another potential weakness of our methodological approach is that we were more willing to link observations of men with uncommon names than for men with common names. We tried estimating the death rates also for a sample with a stricter linking, for example not linking across the known gaps in the data. The resulting rates were almost identical to the ones presented below. We therefore concluded that our linking strategy resulted in sufficiently accurate links to produce reliable results.

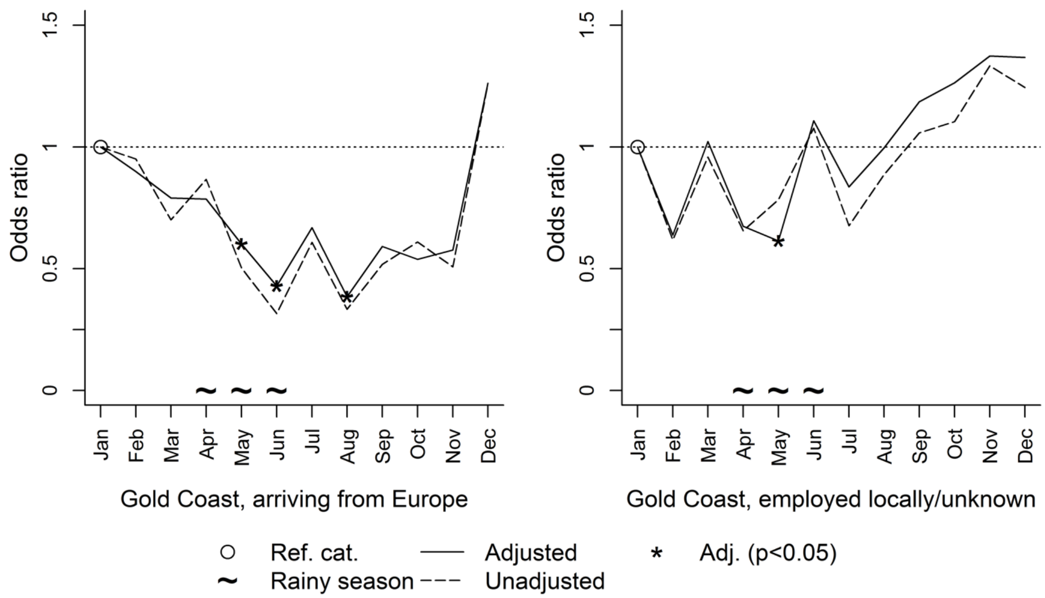
Appendix tables

FIGURE A1. *The association between the month of arriving on the Gold Coast and the risk of dying for men of European origin*



Note: The figure presents odds ratios from Cox regressions estimating the association between the month of arrival/first observation and the risk of dying. The model for the "unadjusted" results includes only the months of arrival/first observation. The "adjusted" results are from models including controls for month, decade, group size, number of new arrivals during the year, epidemic years and if the person was observed only at any of the outforts. The standard errors are robust and clustered on the individual level.

FIGURE A2. *Survival for men arriving from England to the Gold Coast in 1707, 1713–1745 and 1751–1766*



Note: The sources for the men arriving in 1707, 1713–1745 are the linked to the Pay Bills. The source used for the men arriving 1751–1766 is primarily the Register of Servants.

TABLE A1 *The number of male employees of European origin ever observed and present in any specific month per location and decade, 1683–1766*

		Decade								
		1680s	1690s	1700s	1710s	1720s	1730s	1740s	1750s	1760s
Gold Coast										
Individuals	*N*			85	420	554	564	173	391	307
Group size	*p50*			59	80	82	94	47	93	90
	(p25–p75)			(57–60)	(66–95)	(72–95)	(83–108)	(41–64)	(87–102)	(83–97)
Gambia										
Individuals	*N*	273	218	197	11	338	276	52		
Group size	*p50*	72	85	35	10	48	62	29		
	(p25–p75)	(66–93)	(60–104)	(27–50)	(1–10)	(38–59)	(53–72)	(20–39)		
Sierra Leone										
Individuals	*N*		1	64	71	163				
Group size	*p50*		1	24	20	27				
	(p25–p75)		(1–1)	(20–34)	(16–22)	(22–34)				
Ouidah										
Individuals	*N*			53	53	73	43			
Group size	*p50*			10	8	18	15			
	(p25–p75)			(6–13)	(7–11)	(11–22)	(12–20)			

TABLE A2 *The month of arrival on the Gold Coast for men observed as arriving from England, 1707–1766*

Decade:	1700s	1710s	1720s	1730s	1740s	1750s	1760s
Month of arrival:	Share of all new arrivals per decade (%)						
January	0	14	19	18	50	7	17
February	14	36	2	17	25	12	17
March	86	0	21	6	0	15	1
April	0	0	8	5	0	10	11
May	0	22	7	4	0	22	28
June	0	6	1	0	0	21	4
July	0	14	2	1	0	0	17
August	0	0	2	17	0	0	0
September	0	7	4	24	0	0	1
October	0	1	26	1	0	1	2
November	0	0	1	5	0	0	2
December	0	1	7	2	25	12	0
Individuals (*N*)	7	88	121	96	4	241	134

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