Transoceanic Mortality: The Slave Trade in Comparative Perspective

by

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Death in the Middle Passage has long been at the center of the moral attack on slavery, and during the past two centuries estimates of the death rate and explanations of its magnitude have been repeatedly discussed and debated. For comparative purposes we draw on studies of mortality in other aspects of the movement of slaves from Africa to the Americas, as well as the experiences of passengers on other long-distance oceanic voyages.[1] These comparisons will provide new interpretations as well as raise significant problems for the study of African, European, and American history.

The transatlantic slave trade represented a major international movement of persons, and, although only one part of the movement of slaves from the point of enslavement in Africa to their place of forced labor in the Americas, shipboard mortality was its most conspicuous and frequently discussed aspect. Of the more than 27,000 voyages included in the Du Bois Institute dataset, more than 5,000 have information on shipboard mortality. Information is provided on African ports of embarkation; American ports of disembarkation; nationality of carrying vessels; numbers of slaves leaving Africa, arriving in the Americas, and dying in transit; ship size; numbers of crew and their mortality; and length of time at sea. The dataset also permits, with subsequent collecting, the linking of this information to government and private documents containing data on sailing times from Europe to Africa and time on the coast while purchasing slaves. Not all pieces of data are provided for all voyages, but enough are given to allow examination of traditional issues in greater detail. With more detailed analysis, still other problems are generated, and the answers to older questions can be seen more clearly.

A key element in projecting the costs of the slave trade is connecting estimates of deaths in the Middle Passage to the overall deaths due to the trade. The first systematic discussion of the distinctions between deaths in the Middle Passage and deaths to be attributed to the slave trade as a whole can be found in Thomas Fowell Buxton's The African Slave Trade and Its Remedy, first published in 1839. Buxton distinguished mortality resulting from the following: the original seizure of slaves, the march to the coast, and detention before sailing (whether owned by African or European traders); the sufferings after capture (at the hands of the British Antislavery Patrol) or after landing at Sierra Leone or other ports; the Middle Passage; and initiation into New World slavery or " 'seasoning' as it is termed by the planters."[2]

Each of these stages raises important historical concerns about which information is currently too incomplete to provide satisfactory answers. This leads to varying estimates of the mortality consequences of the slave trade. Thus, to Buxton, "the principal and almost the only cause of war in the interior of Africa, is the desire to procure slaves for traffic," and the number

slain in such wars was probably at least equal to the number enslaved. The allocation of this mortality to the slave trade depends on the attribution of motive for African warfare, an issue to which there is no single clear-cut answer, since, as John Thornton argues, warfare and slavery both took place in Africa before major European contact. Nor are the economic factors in allocating captives among the transatlantic, the trans-Saharan, and the internal African slave trade fully understood.[3] The march to the sea, which often was conducted in stages, with sales to various intermediaries, would have had varying death rates depending on distance, diet, and disease environments as well as whether the enslaved were also made to carry goods to the coast. Losses on the coast before sale and departure reflected the length of the waiting time until the cargo was completed and the vessel sailed. Changing efficiencies in marketing and the frequency of voyage arrival could affect mortality by their impact on the length of the period in coastal barracoons or on board vessels prior to sailing.[4] After arrival, the persisting effects of the Middle Passage or the African background-or both-could influence deaths in the immediate interval of adjustment and the first year or so on shore, although the mix of prior conditions and New World circumstances makes precise estimates problematic.

It is difficult to form generalizations about each of these stages. Mortality is affected especially by the age and sex composition of the enslaved, the economic, social, and political circumstances in the various areas in which their enslavement occurred, their disease and climatic environments, and changing shipboard conditions over time as more knowledge of the conditions of successful operation in the trade emerges. Moreover, the specific nature of routes through various climatic regions and shifting disease environments could mean that distance by itself does not provide a satisfactory explanation for mortality. These variations in disease zones affect not only movements in Africa; even seemingly short-distance migrations within Europe or the Americas also appear to have varying mortality outcomes. Nevertheless, these may not be as great as were the changes in going from Africa to the Americas, particularly to temperate mainland North America.

Besides actual treatment on board ship, many other factors influenced shipboard mortality. First, the period from capture to sailing significantly exceeded the period of sailing from Africa to the New World, although the density of population was greater on board ships than at earlier stages of the movement to the Americas. Second, variations in the internal conditions in Africa had a marked, direct impact on mortality, not to mention a significant indirect effect on the strength of the slaves at the start of the Middle Passage. Care and treatment on slave vessels could correlate with significant differences in shipboard mortality for slaves and for crew. Third, because the numbers of those enslaved and entering into the transatlantic trade varied with internal African political and economic conditions, such as warfare and famine, there should be some obvious link between such conditions and mortality in the transatlantic crossing. At present, too little is known about the relations among economics, climate, disease, and mortality both because knowledge concerning the interconnections of the specific factors in Africa is limited and because the information about how rapidly such changes in African conditions might modify human behavior has not been adequately determined.

One of the longest and most heated of debates regarding slavery and the slave trade is the mortality of slaves in the Middle Passage. It was a major interest to those contemporaries arguing about the slave trade and has recently re-emerged as a source of controversy among scholars. It is a

problem for which the Du Bois database permits an extensive, detailed analysis.[5] This debate has been primarily focused on deaths on the voyage itself, between the ultimate departure from Africa and the arrival in port in the Americas. While this represents only one part of the story of the mortality attributable to enslavement, it is probably the component most frequently discussed, past and present. The high rates of mortality on slave ships greatly exceeded the customary death rates of populations on land, even considering those of the great human disasters such as the Black Death, the decimation of Native Americans in the settlement of the Americas, and the Irish Famine, as well as mortality on other types of sea voyages, such as those carrying indentured workers and free migrants.

The attention given to this one part of the mortality experience of the enslaved may seem surprising, since it is probably neither the longest component in terms of time nor the largest in terms of mortality. While of interest as a historical issue, the Middle Passage is the most easily measured part of the slave movement to the New World. For no other aspect of the enslavement process, in Africa or in the Americas, is the mortality information as extensive or as complete. The attention given the Middle Passage may also reflect the distinctions made, in the eighteenth and nineteenth centuries, between the slave trade and slavery. Almost all nations legally ended the slave trade (seen as the great evil) about two decades before slavery was ended. Abolition of the trade was supposed to force slaveowners in the Americas to ameliorate slavery, creating conditions in which slaves would be self-reproducing and the growing population would eventually permit the development of a free peasantry.[6] Thus in Britain the earlier concentration on collecting data related to the slave trade was important for parliamentary purposes, given that the political goal of ending the slave trade was to be the ultimate ending of slavery in the Americas. By the 1830s and 1840s, however, shipboard mortality was seen to be only one part of the disastrous effect of American slavery on Africa, and more attention turned to developments in Africa. Never absent from earlier debates, concern with Africa became more important than the focus on the Middle Passage in the nineteenth century.

That the transatlantic shipment was the first stage in the large-scale transfer of ownership of slaves from Africans to Europeans permitted the abolitionists to focus on the sins of the Europeans rather than on the behavior of the African suppliers. Shipboard mortality was presumably controllable by the shippers, with or without state regulation, and deaths could be regarded as the responsibility of Europeans, without the possible ambiguity found in the discussion of all steps in the trade, including the initial capture and transit within Africa.[7]

The focus on voyage mortality is misleading for an understanding of the full demographic costs of the process of enslavement, or even for the satisfactory analysis of death in the Middle Passage. The voyage was only one part of the movement from a slave's capture to a slave's laboring on a plantation. Deaths occurred at every stage from capture to acclimatization in the Americas; and the total mortality rates were a multiple of deaths in the Middle Passage, as Buxton argued in 1839. Tables I and II (see below) hint at this additional mortality by showing deaths immediately before the Middle Passage began and immediately after it ended. When added together, these deaths were, in some periods, similar to deaths during the voyage itself.

Earlier than Buxton, in his 1789 speech opening the parliamentary debate on the slave trade, William Wilberforce had estimated that about 12.5 percent of slaves transported died in the Middle

Passage, 4.5 percent died on shore before the date of sale, and one-third died in the process of acclimating to the Americas-a total mortality of about 50 percent, of which the Middle Passage accounted for about one quarter.[8] Buxton estimated that 50 percent of all those intended for transatlantic markets died during seizure, march, and detention. Twenty-five percent of the survivors died on the Middle Passage (12.5 percent of all those captured), and 20 percent of those reaching the Americas (7.5 percent of the originally enslaved group) died during "seasoning." Thus, the Middle Passage, by Buxton's estimates, accounted for less than one-fifth of the loss due to the slave trade. The corresponding figure for the "Mohammedan Slave Trade" across the desert, Buxton estimated as "for every slave embarked, one life sacrificed." Thus, allowing for some exaggeration in these estimates, even the leaders of the attack on the slave trade did not make the Middle Passage an exclusive factor in slave transport mortality.[9]

Mortality in the slave trade can be measured directly or indirectly. Direct measurement refers to the number of deaths at each stage. Indirect measurement would, for example, consider those deaths during the Middle Passage that had been influenced by physical conditions and diseases present prior to boarding the ship. Obvious parallels exist to the varying conditions of European migration to ports, explaining in part the presence of passage mortality variations from different ports. In Africa, famines and malnutrition influenced both the probability of enslavement and the subsequent mortality prior to, as well as during, the voyage. Longer marches to the coast or marches through assorted disease environments may have led to more deaths in transit as well as, by weakening the slaves, higher shipboard mortality. That not all slaves entered the transatlantic voyage with equal probability of dying on board is, of course, an important reason for comparing African ports of departure. It is equally important to try to determine the precise sources of slaves, even when actual sailing times were similar, or, if voyages came from the same port, when trying to understand why mortality rates fluctuated so frequently.

Information on the other transatlantic and transoceanic voyages to compare with the slave trade is more frequently available for the nineteenth century than for the eighteenth and earlier centuries. These other voyages include those that carried free emigrants from Europe to the Americas and Australia, indentured laborers from various parts of the world to the Americas and elsewhere, convicts from Europe to North America and Australia; and troops to and from Europe. Each of these migrations was dissimilar in the origins of the passengers, controls and treatments of passengers, as well as in distance and sailing times. Major variances in mortality rates among types of migration and over time are therefore to be expected.

Contemporaries often compared mortality in the Middle Passage with mortality on land in the country of outmigration for those who remained. This comparison entails comparing the annual experience on land with the fraction of a year spent at sea and also requires adjustments for age and sex composition. Though systematic quantitative information on death rates of African populations is unavailable, average slave trade mortality probably exceeded death rates in Africa. Similarly, for Europeans, transatlantic mortality rates exceeded those of the European country of departure. Nevertheless, despite the high death rates in Africa, the ratio of mortality in the slave trade to African death rates probably exceeded the ratio between transatlantic mortality and resident death rates for Europeans. This pattern was no doubt influenced by the changing disease environment and greater density on board ship. Both voyage and non-migrant mortality experiences were similar, however, in that the average rates often were the outcome of many relatively low mortality

experiences. On land, the crisis years reflected famines or epidemics or both, while the higher rates on voyages derived from abnormally long passages that created famine-like situations or where water was short or from epidemic diseases boarded at the time of embarkation. Major factors in reducing average mortality in both cases were a reduction in the frequency of abnormal occurrences and the fall in normal rates over time.

Another way of placing the transatlantic slave trade in perspective is to survey long-distance and transatlantic voyages of free populations and of various forms of contract or indentured laborers. Long-distance ocean voyages were the principal means of providing workers to many parts of the world. Comparing the mortality experience on such journeys will demonstrate what was unique to the slave trade and what patterns were similar to all trades. In discussing non-slave voyage mortality, it is also useful to compare the death rates of crews on slave ships with that of the slaves, a comparison made familiar by Thomas Clarkson in his first major attack on the slave trade.

A dramatic change in transoceanic transport over the course of the nineteenth century was the substitution of steam for sail as a source of power on many boats. Until the mid-nineteenth century at least, sail was always the principal means of power. Steam came later and then only on certain routes.[10] For all types of voyagers-free, slave, and indentured labor-there was time and expense in traveling to ports and waiting for ship departure. All vessels on the same route were obviously not subject to similar wind and current conditions, but, typically, sailing times did not vary significantly by type of population carried. Some difficulties arose because for much of the century most ships involved in passenger traffic were designed to carry freight, not passengers. In spite of these basic similarities regarding ships and shipping, important variations existed. Slave ships tended to include more individuals per ton (or per unit of space) than did other vessels. Such a characteristic does not, however, resolve the debate about what was called "tight-packing," which concerned the effects on mortality of increasing (or decreasing) the number of slaves on board slave ships. Moreover, slave ships were more likely to sail from tropical areas and thus, for slaves, to suffer from tropical diseases. Emigrants and (eighteenth-century) indentured laborers going from Britain to North America sailed basically in one climate zone, a temperate one. As Table III indicates, even in the eighteenth century these differences between slave and non-slave ships contributed to the most striking contrast-the higher mortality on slave ships during the eighteenth century (12.2 percent, based on the full dataset) than on ships carrying British convicts to North America and German immigrants to Philadelphia (7.9 percent; see Table III). Indeed, a comparison of slave trade mortality with that of other ocean voyages indicates that all others had lower rates than did the slave trade, whether measuring mortality per voyage or per month at sea (compare Table III with Tables IV and V).

Slave trade mortality tended to be high relative to that of other traffics, as well as to mortality rates in land-based settlements and overland migration. This higher mortality is observed whether the basic measure is per voyage, per day at sea, or per unit of ship size. Occasional voyages in other trades did exceed the average rates in the slave trade, but unusual circumstances such as disease outbreaks or extreme length of time at sea account for these exceptions. Many slave ships had mortality rates as low as those in other trades, since only a limited number of ships suffered from high mortality, but average slave ship mortality was usually above that of the other voyages.

The number of days at sea on given routes had only a limited effect on mortality except for those unusually long voyages owing to difficulties of weather and sailing conditions. The measurement of mortality used here is number of deaths per thousand per month. Table IV shows the distribution of this rate over length of voyage for seven quarter-century periods from 1676 to 1850. Mortality rates remained high throughout the trade. No strong pattern across voyage length is apparent. Constraints on the amount of food and water supplies that could be carried on board meant that particularly long voyages could create major problems. Captains, in particular, were aware of the need to carry extra supplies, but financial and spatial concerns limited their options.[11]

The mortality rates in the legal slave trade, as in other trades, declined over time even though a relatively small increase in slave trade mortality, caused by the illegal slave trade, occurred in the nineteenth century.[12] Table IV also shows a decline in duration of voyage even without the use of steamships. At times the decline in mortality exceeded that in length of voyage, but there remained some important exceptions, particularly after 1840. Deaths aboard ship, as Table IV indicates, were somewhat randomly distributed by days at sea, and, except for a concentration during the spread of epidemics, many days had none or only one death. [13] This distribution by days at sea may be surprising given expectations that many of the deaths would occur early in the voyage, based on the severity of African conditions, or else late in the voyage, because of the effects of more days at sea and possible shortages of food and water. Under normal circumstances, neither pattern appears with any frequency, and there were few days with numerous deaths, at start, middle, or end of the voyage.

Variations in mortality on vessels leaving different African ports remain of great importance in understanding the impact of the slave trade on vital rates. As seen in Table V, rates varied little by flag carrier, especially considering that accidents of geography and wind systems meant that the Portuguese focused their activities on the relatively low-mortality regions. To an even greater extent than earlier and less complete studies, Table VI (a) shows the enormous differentials in shipboard mortality by region. The All Years totals show that losses on vessels leaving the Bight of Biafra were 120 percent greater than those on vessels leaving Angola-by far the biggest single region of embarkation-30 percent greater than on vessels leaving the next highest mortality regime among West African regions, and more than 50 percent greater than for the mean for the whole of sub-Saharan Africa.

The reasons for the regional variations are as yet poorly understood, but analysis of embarkation points using the Du Bois data provides some new clues. Most strikingly, dramatic spreads in mortality rates among African ports of origin emerge from Table VI (b), even among ports in the same region and not far distant from each other. These persisted over time, influenced presumably by the nature of the enslavement areas and the distances from inland point of capture to the port. Marked and long-standing variations in mortality occurred between ships sailing from ports located close together. Such port differentials were found in all regions and likely arose from events in the areas of enslavement and the nature of the movement to the coast.[14] In the Bight of Biafra, for example, mortality rates on ships leaving Old Calabar, to which slaves could be moved by the Cross River, tended to be much higher than on those leaving Bonny, along the Niger River. These ports are only about seventy-five miles apart. An analogous situation is apparent for Loango, Cabinda, and Malembo, north of the Congo River, where death was more than twice as likely on vessels departing Loango as it was on slavers leaving from the latter two ports. The strong variation

in mortality between African regions is well recognized in the literature, though not as well known as that mortality on board all vessels declined at similar rates over time.

In the slave trade, as can be seen in Tables VII and VIII , there were small but noteworthy differences in rates of mortality by age-children (that is, those under age fifteen) tended to have higher rates-and by gender-adult women sometimes experienced lower death rates. Nevertheless, before the last half century of the traffic, children seldom accounted for a large proportion of the slaves shipped, and the male-female ratios did not differ by very much among ports of embarkation, so that changes in these ratios cannot account either for much of the movement in the overall mortality rate or for the differences among African regions.

Mortality rates in the American ports of arrival varied much less than in African ports of origin. Thus the range in mortality rates throughout the transatlantic slave trade was based primarily on African ports of departure. Environmental and economic conditions among various parts of Africa thus become of central importance for understanding the slave trade and its mortality experience. Perhaps most striking is the skewed distribution of ship mortality rates at any moment of time, appreciable even for ships sailing from the same port in Africa and going to the same American port. Very few ships had the high mortality rates that attracted abolitionists' attention; many more ships tended to have low rates.[15] The mortality patterns of ships ranged widely, even when almost all conditions and circumstances appear to have been the same.[16] The median for each route and each time period is always below the mean, often by as much as one-half of the mean, since the size of the mean is heavily influenced by those voyages with high rates. The decline in the average rate of mortality over time is due to lowered rates for most vessels, indicating a wide diffusion of whatever factors caused the decreases. Moreover, as can be seen in Tables I and II, mortality on the coasting and pre-sail phases of the voyage exhibits the same decline over time as is apparent in voyage mortality. Further, Tables IX and X indicate that the vessels with the highest mortality during the voyage also experienced the highest mortality both before and after the voyage. Overall high average death rates indicate abnormal conditions-disease, poor weather, extended duration-on specific voyages or for conditions prior to sailing. High rates from specific ports were based on nontypical factors and occurred with limited frequency.

Despite the long and continuing debate on tight packing versus loose packing of slaves, which refers to the range of slaves carried per ton or per-unit of ship size, "tighter" packing seems to have had little impact on mortality. Whatever the rate of packing, the number of slaves carried per ton on slave ships was usually in excess of the number on voyages of free individuals or contract laborers. The higher density of people on slave vessels may have made a major contribution to their higher rates of mortality, although, within the observed range, density did not seem to affect slave mortality. Why this pattern of mortality occurred and what were the crucial ratios of number carried per ton remain unclear. In discussions of density and of regulating carrying capacity, there was a long-standing controversy as to the best measure to be used in defining crowding. Some regulations were based on numbers carried relative to ship's tonnage; at other times regulations were based on the amount of space allowed per person. [17] The effects on numbers carried and mortality make these distinctions important.

Indicative of the contemporary concern with the morality of the slave trade, the slave trade was probably the first sea voyage that European governments made continued and prolonged

attempts to regulate, perhaps because mortality was higher than on other long-distance voyages. These regulations covered the carrying capacity of the ships, the amount of provisions to be carried, and medical care on board. While during the course of the nineteenth century, following the lead of England in 1803 and the United States in 1819, most European countries introduced some regulations concerning passenger traffic, the slave trade had been regulated by Portugal starting in 1684, by Britain in 1788, and by the Netherlands in 1789.[18] Although Pennsylvania in 1749 and the Massachusetts Bay colony in 1751 introduced restrictions on passengers carried by immigrant ships, these were unusual policies in the eighteenth century.[19]

Dolben's Act (1788) required that surgeons be in attendance on British slave ships, a practice that had begun earlier on an informal basis without the legal requirement. The legislation also provided a system of bonuses for doctors and captains on ships that arrived in the Americas with what were considered to be low mortality rates: payments were made on ships with rates below 3 percent, and payments were higher on ships with rates below 2 percent. Contributing to the decline in mortality in the Middle Passage was greater selectivity in choosing slaves for the transatlantic voyage, although these decisions meant that overall African mortality need not have been reduced.

The extent to which these laws were effective is debatable, but the frequency of changes in legislation for slave (and emigrant) vessels confirms that intense scrutiny at the legislative level led to constant refinements to the legal requirements of captains and owners of slave, convict, and emigrant vessels in an official quest to contain mortality on British vessels. The often parallel movements of mortality for carriers of various nationalities, however, some with, others without, regulations, raises questions about their impact. In the British case, Dolben's Act apparently led to some reductions in numbers carried and also, possibly, in mortality. On the other hand, in the nineteenth century, captured slave vessels conducted under British control to the Mixed Commission Courts on voyages lasting several weeks experienced mortality similar to that on vessels that escaped capture despite large bonuses to crew members for recaptured slaves landed alive.[20]

Comparisons of shipboard mortality are, however, not the only comparisons that provide useful information. There are, for example, comparisons with other parts of the slave trade, including during the coasting period or after arrival to the New World, but before disembarkation and sale. Overland travel in Africa to the coast can also be compared with overland migration in North America and in Europe. Studies of the overland trips to California and Oregon from the Missouri River in the 1850s place the overall mortality rate at about 4 percent for a trip that averaged between about 110 and 160 days.[21]

Comparisons can also be made with relocated populations. Considerably more is known, thanks to the studies of Philip Curtin, about the mortality of British and French troops stationed overseas in various parts of the world.[22] The striking aspect of these mortality rates is their variation by location, with rates of more than 100 per thousand for the Dutch in the Dutch East Indies, for the British in Jamaica and Sierra Leone (483 per 1,000 in 1819-1836), and for the French in Guadeloupe, Martinique, and Senegal, all for roughly the two decades between 1817 and 1836. These are suggestive of earlier high mortality rates for whites in the tropical West Indies and

on the coast of West Africa, rates that sometimes exceeded those on slave voyages, even when standardized for duration.

Not only did slaves suffer high mortality on the transatlantic route, so did crews. Table XI is consistent with Thomas Clarkson's collection of information demonstrating that crews on the slave ships he audited had considerably higher death rates than the crews on other voyages. Their mortality experience on the longer voyage-from England to Africa, to America, returning to England-was often similar to the mortality rates for slaves on the same ships, but the slaves had a shorter time in transit.[23] This similarity suggests that there were perhaps some overriding factors on the voyage, such as climatic and disease zones and the conditions in Africa, not only the specific nature of the shipboard treatment of slaves, that drove up the death rate. While mortality rates for slaves and crew were correlated and possibly interdependent, more must be learned about the possibilities of there being different causes of mortality for slaves and for crew. The high crew mortality, plus the larger size of crews on slave voyages, led to Clarkson's claim that rather than being the "nursery for our seamen," as its defenders proclaimed, it was a "grave," a source of considerably higher mortality than in other trades. The mortality pattern for the crew on British ships was similar to that for French ships in the eighteenth century, exhibiting the same marked differences between African regions apparent in slave mortality. Crews were at sea longer and on the African coast longer, and relative to crews in other trades their mortality was high, though after controlling for time on board, it was below that of slaves.

After the start of the nineteenth century, European governmental regulations for vessels required the collection of information including numbers carried and landed, providing more data on mortality in transoceanic movements.[24] In addition, as with the slave trade, the growth of newspapers, with their more extensive coverage of commercial movements, provided another source of considerable data on ships and their mortality contributing significantly to public opinion and agitation.

The geographic scope of the non-slave voyages in the nineteenth century includes voyages originating in Asia, Africa, and Europe and ending in Australia and the Americas, a geographic range far beyond that of the transatlantic slave trade. These voyages include several climate zones and different nautical conditions. Some voyages, such as those of free immigrants, were transatlantic; other involved sailing in the Atlantic, the Indian Ocean, and the Pacific; the Pacific and the Atlantic; within the Indian Ocean; and within the Pacific Ocean.[25] The non-slave voyages' mortality experiences were influenced not only by distance sailed but also by the impact of climate zones, and time in the tropics, factors that could influence the havoc caused by virulent pathogens introduced at the outset of the voyage, especially in the presence of stormy weather or deadly calm conditions in the tropics, or a combination of both. Sailing vessels predominated during the years of the slave trade. Even in the second half of the nineteenth century when transoceanic steamers became important, many voyages, both short and long distance, were still undertaken by sailing vessels, although steam vessels were faster and tended to have lower mortality rates, overall and per day, than did sailing ships.

Slave ships did have an unusually high population density per ship in terms of persons carried per ton or in terms of space allocated. Slave ships were normally more crowded than any of the other vessels; even eighteenth-century immigrant ships from Europe to the Americas tended to

carry relatively fewer persons per ton. The numbers of slaves carried per ship is a perhaps distinctive characteristic of slave ships relative to non-slave voyages.[26]

Time of voyage for slave ships was similar to that of other ships crossing the Atlantic, at least before the introduction of steamships for immigrant ships, although the voyages to Brazil from Africa were shorter than the other transatlantic sailings. There were similar declines in the nineteenth century in time at sea for vessels sailing similar routes. Immigrant voyages from Europe were similar in sailing time to slave voyages from Africa, but those of contract laborers from India to the West Indies were considerably longer and had higher death rates than emigrant voyages from Europe to the Americas and Australia. Non-slave vessels had a greater degree of official control over who would be permitted to undertake the voyage, as well as considerably more space per person. There were more African ports involved in the slave trade than there were European ports in the non-slave transatlantic voyages, so there was some greater variation in time at sea for ships in the slave trade.

Slave ships tended to have higher rates of mortality, per voyage and per day at sea, than did other ships. Only in several years of epidemics or of other poor conditions in the country of departure (such as in the years of the Irish Famine) did immigrant ships reach levels of mortality comparable to those in the slave trade. Even then, however, there were often enough low mortality crossings to maintain an average at or below that customary in the slave trade. In all voyages, including slaves, disease was the primary source of mortality. In only a limited number of voyages were deaths due predominantly to violence or to food and water deprivation.

In examining the long-term trend in slave ship mortality, mortality rates were generally lower in the nineteenth century than in the eighteenth, although there were some late increases in the last phase of the illegal slave trade of the nineteenth century. This pattern was true for most of the national carriers and most of the ports of departure. Declines in mortality over time characterized all other types of voyages, and in many cases the declines were even sharper than they had been on slave ships. As with slave ships, there was a wide dispersion of mortality rates in any period of time. Also, mortality rates on most, if not all, routes tended to be higher for infants and very young children and lower for women than for adult men, with the higher mortality for women on British voyages to Australia being an important exception.

Two cases of unusually high mortality rates occurred in the nineteenth century. Voyages from Liverpool and from Irish ports (particularly the former) during the Irish Famine, especially in the years when the cholera threat was high, became the source of considerable attention and concern.[27] Second was the sailing of contract laborers from China to Cuba in the mid-nineteenth century (but curiously, not those from China to the British West Indies). Vessels from China to Cuba had death rates per voyage that even averaged above those of the earlier slave trade, but, given the longer voyage, they had a lower mortality per day at sea than had those slave voyages.[28]

Some characteristics of the internal migration to reach ports for sailing from Europe to America resemble those on slave ships. Immigrants often traveled several hundred miles to ports, and waited a long time prior to shipment. These waits also characterized indentured laborers, particularly those in India. And, resembling the systematic differences by ports from Africa, there were persistent variations in mortality rates by port of departure from Europe, rates that exceeded

those of the typical mortality in the European cities of departure. Indian indentured laborers suffered mortality rates that differed depending on whether they originated from Madras or Calcutta.[29] Thus the importance of events that went on before sailing must be considered for non-slave ships as well as for slave ships.

Although slave ships had higher mortality rates than all other vessels, the comparisons are inexact because few passenger-carrying voyages replicated the routes taken by slaves in crossing the Atlantic. One exception is the traffic of African laborers to the British West Indies in the 1850s and 1860s. Overall, these mid-nineteenth-century voyages carrying African laborers to the Americas had, after the initial years, markedly lower mortality rates than did the slave ships in earlier decades, and they also carried fewer persons per ton.[30]

Mortality rates for British troops carried to mainland North America and the British West Indies before the Revolutionary War were relatively high by later, non-slave ship standards. They were, however, lower than those for slaves carried to those locations. Mortality rates for convicts from Britain to the thirteen colonies were also below those on slave ships. These vessels sailed in northern temperate zones, not tropical areas as did the slave ships. Moreover, they carried fewer persons per ton than did the slave ships. The convict ships to North America before the Revolutionary War averaged about sixty convicts per hundred tons, whereas slave ships usually carried around two hundred slaves per hundred tons. Mortality rates on ships carrying indentured servants and free immigrants also were below those on slave ships in the nineteenth century, even with some similarities in sailing times. There were occasional non-slave voyages with relatively high mortality due to outbreaks of infectious diseases, which attracted considerable attention, then and now, but these were unusual episodes, and the attention given to them led to an overstatement of the average mortality experience of the time.

In the nineteenth century, shipping of immigrants, convicts, and contract laborers was usually regulated.[31] Regulations often extended to the initial signing of contract laborers and the time period between agreement to sail and actual sailing, as well as employment conditions after arrival. In all cases not only were mortality rates lower than on slave vessels, but these rates also declined over time. Similarly, sailing times declined over time, but these declines were not as dramatic as the declines in mortality rates. The relative contributions of advances in medical knowledge, improved ship design, better health practices on voyages, better controls as to who would be permitted to sail, regulations concerning numbers to be carried on board, and the changing nature of incentives to lower mortality remain uncertain, but large declines in mortality did occur without dramatic therapeutic advances.[32] The improvement in the mortality experience on slave ships was among the first important triumphs of modern measures of public health.[33]

The mortality experienced in the Middle Passage was, on average, higher than for other ocean voyages, and the space allocated for passengers was less on slave ships than on other seaborne vessels. Nevertheless, when trying to account both for the high level of mortality and its decline over time, some puzzling patterns remain. The specific African port of departure had a pronounced impact on average mortality for long time periods, while the wide range of mortality rates from given ports indicates that the trade was characterized by many random and unexpected factors. Focusing on average rates answers some important questions, but the more detailed study of patterns of variations should add considerably to our knowledge of the specific impacts of a

number of factors and thus contribute to our understanding of African, European, and American history.

There are many new issues generated as well as new ways of looking at issues that have arisen because of the great increase in data now available. What is striking is how little can be answered from European and maritime sources, requiring new focus on African societies and economies in order to understand the nature of the transatlantic slave trade. While we are learning more about the mechanics of the acquisition and movements of captives in Africa, key characteristics of these land-based processes remain harder to discern than for the Middle Passage itself. Matters such as the time and duration of the journey, mortality in transit, and climate and disease characteristics of the area over which the movement from inland to arrival at the coast remain to be understood before we can more fully understand the slave trade and its impact.

TABLE XI
DEATHS OF SLAVES AND CREW ON THE SAME VOYAGE DURING THE MIDDLE PASSAGE IN THE FRENCH SLAVE TRADE, 1711–1793.

Slave Deaths	*Voyages*	*Mean Crew Deaths*
0-9	189	0.9
10-19	164	1.2
20-29	98	1.4
30-39	63	1.9
40-49	65	2.2
50-59	62	2.2
60-69	32	2.3
70-79	31	2.6
80-89	23	2.7
90-99	24	3.4
100 or more	76	3.9
Total	827	1.8

TABLE I
DEATHS OF SLAVES DURING COASTING PERIOD.

Period of Purchase	*Voyages*	*Mean Deaths*	*Mean Number Purchased*	*Mean Coasting Period (days)*
1701–1725	23	38	361	96
1726–1750	19	53	367	140
1751–1775	60	33	341	212
1776–1800	311	38	355	120
1801–1825	4	11	274	98
Total	417			

Includes a few vessels captured in the post-1807, illegal phase of the slave trade. When information on year of purchase is not available, year of departure from Africa is used. The information on average number of deaths is based on 417 voyages, average number of slaves purchased on 416 voyages, and average length of coasting period on 345 voyages. Of the 417 voyages represented in this table, 275 were British voyages of the 1790s.

TABLE II
DEATHS OF SLAVES AFTER ARRIVAL BUT BEFORE DISEMBARKATION OR SALE.

Period of Arrival	*Voyages*	*Mean Deaths*	*Mean Number Arrived*	*Mean Loss Rate (%)*
1674–1700	91	14.9	272.4	8.6
1701–1725	86	14.8	217.9	9.5
1726–1750	29	10.6	270.2	6.7
1751–1775	48	9.9	305.9	3.6
1776–1800	100	4.0	375.5	1.3
1801–1825	162	2.6	450.5	0.6
1826–1841	2	27.0	365.0	7.3
Totals	518	8.3	342.3	4.3

TABLE III
CRUDE DEATH RATES (CDR) ON NON-SLAVE OCEAN VOYAGES, 1719–1917.

Passengers	*Period*	*Voyages*	*Mean Length of Voyage (days)*	*CDR per Month per 1,000*	*Loss Ratio (CDR per voyage per 100)*
British Convicts to	1719–1736	38	60	56.5	11.3
North America	1768–1775	12	60	12.5	2.5
British Convicts to	1788–1814	68	174	11.3	6.6
Australia	1815–1868	693	122	2.4	1.0
German Emigrants to Philadelphia	1727–1805	14	68	15.0	3.4
European Emigrants to:					
New York	1836–1853	1077	45	10.0	1.5
Australia	1836–1853	258	109	7.4	2.7
	1854-1892	934	92	3.4	1.0
South Africa	1847–1864	66	75	4.8	1.2
African Indentured Labor	1848–1850	54	29	48.7	4.7
to West Indies	1851–1865	54	29	12.3	1.2
Indian Indentured Labor to Mauritius, Natal, West Indies and Fiji from:					
Calcutta	1850–1872	382	88	19.9	5.8
	1873–1917	876	65	7.1	1.5
Madras	1855–1866	56	62	5.6	1.2
Chinese Indentured Labor to Americas	1847–1874	343	116	25.5	9.9
Pacific Islander Indentured Labor to:					
Fiji	1882–1911	112	117	3.6	1.4
Queensland	1873–1894	558	111	3.0	1.1

Source: For detail, see Robin Haines, Ralph Shlomowitz, and Lance Brennan, "Maritime Mortality Revisited." *International Journal of Maritime History*, 8 (1996), 133–72, Table 1.

TABLE IV
MEAN DEATH RATES (DR) OF SLAVES PER MONTH BY LENGTH OF VOYAGE (RATES PER 1,000).

	1676–1700		*1701–1725*		*1726–1750*		*1751–1775*		*1776–1800*		*1801–1825*		*1826–1850*		*All Years*	
Voyage Length (days)	*Voyages*	*DR*	*Voyages*	*DR*	*Voyages*	*DR*	*Voyages*	*DR*	*Voyages*	*DR*	*Voyages*	*DR*	*Voyages*	*DR*	*Voyages*	*DR*
16–29	5	93.1	7	43.6	7	64.6	5	223.9	22	111.6	28	48.0	111	53.5	188	69.9
30–39	10	111.6	15	47.4	16	59.7	18	107.3	58	38.0	55	66.3	210	61.8	387	61.9
40–49	11	94.4	25	86.2	20	49.4	33	52.8	136	42.1	35	40.9	65	58.1	330	53.6
50–59	10	57.6	42	64.4	18	49.9	73	52.0	132	41.2	35	71.1	47	58.6	360	53.1
60–69	9	82.6	57	83.7	20	43.1	76	44.3	122	39.3	19	94.0	27	64.4	332	57.1
70–79	18	67.9	49	60.9	18	97.5	56	41.5	89	39.5	9	117.2	18	85.1	257	56.0
80–89	11	125.3	24	74.1	8	43.2	35	50.2	30	39.0	5	218.5	8	89.4	122	68.7
90–99	17	101.8	24	81.0	24	51.2	34	56.9	22	61.0	6	109.7	4	36.2	133	69.0
100–09	5	131.5	19	74.4	18	35.5	28	40.9	16	71.7	1	32.7	1	127.0	89	59.1
110 or more	9	147.1	24	83.6	48	62.9	92	47.6	23	90.6	2	165.6			198	66.4
Totals	105	97.6	286	72.6	197	56.6	450	52.2	650	46.0	195	71.1	491	60.5	2,396	59.8

The "All Years" category includes 2 voyages that sailed before 1676 and 20 that sailed after 1850.

TABLE V
MEAN LOSS RATES (LR) OF SLAVES BY FLAG CARRIER (RATES PER 100).

Period	Portuguese		Spanish		Dutch		French		British		Other		Unknown		All	
	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR
1597–1700	66	25.6			1	61.6	5	14.0	186	21.7	7	19.8			265	22.6
1701–1750	1	8.0			4	11.2	412	15.7	184	15.9	29	14.4	2	11.3	632	15.6
1751–1800	143	8.8	7	12.3	42	10.0	627	11.8	848	9.8	207	16.5	6	30.0	1,880	11.2
1801–1820	633	8.2	7	15.3	1	5.9	10	8.9	9	2.5	119	16.8	5	19.0	784	9.6
1821–1864	883	8.8	56	15.7			20	15.1	1	7.2	32	20.7	59	17.0	1,051	10.1
Totals	1,726	9.2	70	15.3	48	11.1	1,074	13.3	1,228	12.5	394	16.9	72	18.1	4,612	11.9

Loss rate refers to the percentage of slaves embarked who died on the voyage. Portuguese includes Brazilian (479 voyages).

TABLE VI (a)
MEAN LOSS RATES (LR) OF SLAVES BY REGION OF DEPARTURE (RATES PER 100).

African Region	1597–1700		1701–1750		1751–1800		1801–1820		1821–1864		All Years	
	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR
Senegambia	26	11.6	94	10.7	136	13.6	15	10.6	8	7.6	279	12.1
Sierra Leone	11	14.4	6	8.3	126	6.7	11	10.1	19	13.3	173	8.2
Gold Coast	63	23.9	123	14.7	371	10.8	87	6.2	2	2.7	646	12.2
Bight of Benin	38	21.6	250	16.9	207	11.7	20	2.8	52	9.1	567	14.1
Bight of Biafra	33	31.8	29	36.8	321	15.7	26	10.1	35	19.5	444	18.3
West Central	68	24.7	84	12.3	523	8.0	487	7.8	689	6.9	1,851	8.3
Southeast			2	15.9	14	24.1	59	20.8	200	17.1	275	18.2
Windward Coast			3	19.9	37	9.6	1	0	4	11.0	45	10.2
Unknown	26	18.6	41	14.6	145	14.6	78	17.6	42	21.1	332	16.4
Totals	265	22.6	632	15.6	1,880	11.2	784	9.6	1,051	10.1	4,612	11.9

TABLE VI (b)
MEAN LOSS RATES (LR) OF SLAVES BY AFRICAN PORT OF DEPARTURE (RATES PER 100).

Port	1597–1700		1701–1750		1751–1800		1801–1820		1821–1864		All Years	
	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR	Voyages	LR
Gambia River	24	12.0	22	20.9	54	14.8	2	5.6			102	15.3
Cape Coast Castle	7	19.6	33	12.5	91	12.8	2	23.1			133	13.2
Anomabu			18	18.3	96	7.4					115	9.0
Whydah	35	21.4	184	15.2	84	11.5	7	9.4	20	11.5	330	14.4
Bonny	2	47.5	5	48.7	128	13.3	8	10.4	14	20.5	157	15.4
Old Calabar	17	32.8	15	41.1	86	19.4	7	9.5	5	21.3	130	23.1
Cabinda	1	5.2	35	8.6	56	6.1	126	5.9	170	4.6	388	5.6
Loango			18	19.5	73	10.4	3	9.3	5	22.5	99	12.4
Malembo			5	4.3	55	7.4			58	4.1	118	5.6
Ambriz					22	2.3	1	1.0	82	4.4	105	3.9
Benguela					65	7.7	146	7.1	108	8.6	319	7.7
Mozambique					11	21.0	50	22.6	95	18.9	156	20.2
Totals	86	21.2	333	16.5	821	11.3	352	8.9	558	8.7	2,152	11.4

TABLE VII
MEAN LOSS RATES OF SLAVES BY AGE (RATES PER 100).

Period	*Voyages*	*Adult Loss Rate*	*Child Loss Rate*
1651–1675	1	57.0	44.4
1676–1700	5	7.8	7.6
1701–1725	24	11.1	24.1
1726–1750	11	12.0	6.9
1751–1775	6	22.4	16.2
1776–1800	151	4.6	4.8
1801–1825	1	8.3	1.2
Total	199	6.7	7.9

TABLE VIII
MEAN LOSS RATES OF SLAVES BY SEX (RATES PER 100).

Period	*Voyages*	*Male Loss Rate*	*Female Loss Rate*
1651–1675	1	74.7	46.3
1676–1700	17	19.6	18.6
1701–1725	31	11.8	10.0
1726–1750	13	10.9	7.5
1751–1775	21	15.7	13.1
1776–1800	261	6.5	5.8
1801–1825	1	7.3	1.1
Total	345	8.6	7.4

TABLE IX
DEATHS OF SLAVES DURING THE COASTING PERIOD AND THE MIDDLE PASSAGE ON THE SAME VOYAGES, 1701–1852.

Deaths during Coasting Period	*Voyages*	*Mean Deaths during Middle Passage*
0	71	11.2
1–2	46	12.5
3–4	45	20.4
5–6	40	13.8
7–9	40	21.0
10–19	60	26.9
20–29	35	30.6
30–39	19	42.6
40 or more	73	39.2
Total	429	23.4

TABLE X
DEATHS OF SLAVES DURING THE MIDDLE PASSAGE AND DURING THE PERIOD BETWEEN ARRIVAL AND DISEMBARKATION ON THE SAME VOYAGES, 1764–1841.

Deaths during the Middle Passage	*Voyages*	*Mean Deaths after Arrival*
0–9	47	4.2
10–19	65	9.5
20–29	66	3.0
30–39	40	3.6
40–49	39	10.5
50–59	31	8.6
60–69	18	5.4
70–79	27	5.8
80–89	22	6.4
90–99	13	3.9
100 or more	55	22.4
Total	423	8.3

NOTES:

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[1] Rather than cite all of the exhaustive literature of these subjects, the authors wish to bring attention to the works cited in Robin Haines, Ralph Shlomowitz, and Lance Brennan, "Maritime Mortality Revisited," International Journal of Maritime History, 8 (1996), 133-72; Haines and Shlomowitz, "Mortality and the Transatlantic Slave Trade: A Reevaluation" (unpublished paper, 1998); and Shlomowitz, with Brennan and John McDonald, Mortality and Migration in the Modern World (Aldershot, Eng., 1996). Other important analytical guides to the literature are in Raymond L. Cohn, "Maritime Mortality in the Eighteenth and Nineteenth Centuries: A Survey," International Journal of Maritime History, 1 (1989), 159-91, and Herbert S. Klein, The Atlantic Slave Trade (Cambridge, 1999).

[2] 2 Buxton, The African Slave Trade and Its Remedy (London, 1967; orig. pub. 1839, 1840), 73. For more recent discussions of mortality in the overall African slave trade, see Paul E. Lovejoy, Transformations in Slavery: A History of Slavery in Africa (Cambridge, 1983); Johannes Menne Postma, The Dutch in the Atlantic Slave Trade, 1600-1815 (Cambridge, 1990); and Joseph C. Miller, Way of Death: Merchant Capitalism and the Angolan Slave Trade, 1730-1830 (Madison, 1988).

[3] Buxton, African Slave Trade and Its Remedy, 74. See Thornton, Africa and Africans in the Making of the Atlantic World, 1400-1680 (Cambridge, 1992; 2 d ed., 1998), 72- 97, for discussion of these issues.

[4] For a discussion of changes in coastal loading times, see David Eltis and David Richardson, "Productivity in the Transatlantic Slave Trade," Explorations in Economic History, 32 (1995), 465-84.

[5] For recent analyses of African mortality in the transatlantic slave trade using this dataset, see Klein and Stanley L. Engerman, "Long-Term Trends in African Mortality in the Transatlantic Slave Trade," in Eltis and Richardson, eds., Routes to Slavery: Direction, Ethnicity, and Mortality in the Transatlantic Slave Trade (London, 1997), 36-48; Haines and Shlomowitz "Explaining the Decline in Mortality in the Eighteenth Century British Slave Trade," Economic History Review, 53 (2000), 262-83; and Haines, McDonald, and Shlomowitz, "Mortality and Voyage Length in the Middle Passage Revisited" (unpublished paper, 1999).

[6] Alternatively, and obviously less desired by antislavery advocates, was the claim that without new slave imports the failure of the West Indian slave population to reproduce itself would lead to the disappearance of the slave population, ending slavery.

[7] Ambiguity arises from the determination of whether there would have been any long-distance internal slave trade among Africans, absent a European presence.

[8] Speech of Mr. Wilberforce, Hansard, 28 (1789-1791), (London, 1816), 41-67 (quotation on 47). A similar point was made in one of the most influential of anti-slave trade pamphlets. James Ramsay, Objections to the Abolition of the Slave Trade, with Answers (Miami, 1969; orig. pub. 1788, 2 d ed., 1788), 71, argued that even if shipboard mortality was 5% in ordinary cases, somewhere between 1/10 and 1/2 of all slaves arriving came with diseases, and only 1/3 of these survived seasoning. Thus he attributes 2/3 of seasoning deaths to voyage conditions, meaning that "the loss of one-fourth part, or perhaps a third of the whole, may be charged to the voyage." This would mean, however, that between 1/7 and 2/5 of deaths after boarding ships in Africa occurred on the Middle Passage. Seymour Drescher, in correspondence with the authors, points out estimates made by Thomas Cooper, Supplement to Mr. Cooper's Letter on the Slave Trade (Manchester, 1788), 3, 4, who argued that, for each slave taken, 10 were lost due to warfare in Africa, 1/5 died in passage, and another 1/3 died during seasoning. Using estimates of slaves arrived during the period of the slave trade, the 10 million slaves arrived in the New World meant a cost of 180 million lives. This would mean that Middle Passage deaths were equal to about 2% of all the deaths attributed to the slave trade. In making his estimates in this and in subsequent presentations of the same numbers, Cooper drew on the work of numerous contemporaries, including Thomas Clarkson, An Essay on the Slavery and Commerce of the Human Species, particularly the African (Dublin, 1786).

[9] Buxton, African Slave Trade and Its Remedy, 59, 196.

[10] Of the total slave voyages in the dataset, only 20 were by steamship, all between 1845 and 1865. Eleven went to Cuba, 6 to Rio de Janeiro, and 3 to other ports. Although one steamship brought indentured laborers from India to British Guyana in 1873, sailing ships remained dominant in the transport of contract labor until the first decade of the 20th century; Hugh Tinker, A New System of Slavery: The Export of Indian Labour Overseas, 1830-1920 (London, 1974), 146. With the belated entry of steam vessels in the indentured labor trade from India to British Guinea, "the death rate declined rapidly since 1907," according to Dwarka Nath, A History of Indians in British Guiana (London, 1950), 181. Similarly, immigrant voyages from England to Australia were exclusively by sail until 1879, and only after 1890 were all these voyages on steamships; Shlomowitz, with McDonald, "Mortality on Immigrant Voyages to Australia in the 19th Century," in Shlomowitz et al., Mortality and Migration in the Modern World, essay 2, 95. The shift in immigrant vessels to New York was also very sharp. In 1856 "only 3% arrived on steam ships, by 1869 this number had risen to 90%"; Friedrich Kapp, Immigration and the Commissioners of Emigration of the State of New York (New York, 1969; orig. pub. 1870), 38, 241.

[11] Thus the British regulations regarding emigrant ships specified that "the length of the voyage must invariably be computed at seventy days" for a voyage that averaged, in 1853, from Liverpool or London, about 38-39 days; U. S. Congress, Report of the Select Committee of the Senate of the United States on the Sickness and Mortality on Board Emigrant Ships (Washington, D. C., 1854), 33. From North Sea ports the allowance was to be based on 90 days, for a voyage averaging about 45 days. In discussing ships carrying indentured laborers, the Colonial Office commented that ships should victual for "about one-fifth more than the average voyage"; CO 386/90. There were other aspects to the introduction of regulatory acts. Peter Dunkley, "Emigration and the State, 1803 1842: The Nineteenth-Century Revolution in Government Reconsidered," Historical Journal, 23 (1980), 356, in his reconsideration of the Passenger Acts, comments that "the 1803 passenger act was in part designed to reduce the loss of Scottish population from the highlands, chiefly by limiting the number of passengers according to a vessel's tonnage." To the extent that health requirements reduce the flow of immigration, they benefit landowners in the place of emigration and workers in the area of immigration.

[12] See Eltis, Economic Growth and the Ending of the Transatlantic Slave Trade (New York, 1987) 125-44, 265-68. There was also some increase in mortality in the French slave trade in the late 18th century.

[13] Based on the calculations made from the limited and probably atypical data in the 1789 parliamentary hearings on the slave trade, which list deaths by day; Sheila Lambert, ed., House of Commons Sessional Papers of the Eighteenth Century, 145 vols. (Wilmington, Del., 1975), 67:279 83, 387-88. More useful material for this question is in the House of Lords Record Office data used by Richard H. Steckel and Richard A. Jensen, "New Evidence on the Causes of Slave and Crew Mortality in the Atlantic Slave Trade," Journal of Economic History, 46 (1986), 57-77. See also Postma, Dutch in the Atlantic Slave Trade, whose distributions of death on Dutch slave ships show no systematic pattern. The most recent research to address this issue is Haines, McDonald, and Shlomowitz, "Mortality and Voyage Length." See Tables A. 1 A. 3 on the WMQ website http://www.wm.edu/oieahc/WMQ/Jan01/Klein.htm for further information on these points.

[14] Related differences by port are found for indentured laborers leaving India by Calcutta or by Madras, Irish famine immigrants leaving for North America from Liverpool or from Irish ports, and on immigrant ships sailing to the U. S. from various European ports. Kapp, Immigration and the Commissioners of Emigration of the State of New York, 36-37, argues also that ports with larger facilities for transportation attracted more people and thus were more prone to diseases. For the difference in mortality rates between Calcutta and Madras, see Shlomowitz, with McDonald, "Mortality of Indian Labour on Ocean Voyages, 1843-1917," in Shlomowitz et al., Mortality and Migration in the Modern World, essay 9. It was commented in 1869, however, that those from Calcutta had mortality rates after arrival that resembled those of the host population; CO 386/92.

[15] We used a 20% mortality rate as a cutoff point. Eighty-two percent of voyages had a mortality rate below that, only 18% above that. The decline in the right-tail of high mortality voyages helps to explain part of the overall mortality decline. For ships sailing between 1601 and 1700, more than 40% had mortality rates greater than 20% per voyage, while for ships sailing between 1776 and 1850, the figure is 12%. Similarly, in helping to account for variations between parts of Africa, the

proportion of ships with a mortality rate higher than 20% is twice as high for the Bight of Biafra as for the other African ports.

[16] The same puzzling pattern is also found for immigrant ships. Kapp, Immigration and the Commissioners of Immigration, 35-36, notes that (following the 1854 Report of the Select Committee), "even ships which leave the same port simultaneously show a very remarkable difference in the respective health of their passengers. This must be ascribed to the better conditions of the ship and of the passengers in the one case, and the previous poverty and insufficient nourishment in the other." He continues (still based on the 1854 Report of the Select Committee): "These examples might be multiplied almost at pleasure, showing that vessels which left the same port almost at the same time, and reached the same point of destination about the same time, and consequently would be supposed to have been in the same latitudes and subject to the same winds at the same time, suffered in very different degrees. The cases presented show conclusively that the disease on board of these vessels must be attributed to some exciting cause pre-existing within them, which could not be connected with the condition of the atmosphere or the prevalence of certain winds on the ocean."

[17] For the conversion between tonnage and dimensions of British ships, see Charles Garland and Klein, "The Allotment of Space for Slaves aboard Eighteenth-Century British Slave Ships," William and Mary Quarterly, 3 d Ser., 42 (1985), 238-48. As discussed, legislation regulating carrying capacity was based either on slaves per ton or on space allowed per slave; the latter, because of the complications of ship construction, meant tonnage-based measures were often inexact for the purposes intended. According to the 1854 Report of the Select Committee, 14-15, American ships were built more for speed and those of the United Kingdom more for cargo capacity, owing, it is claimed, to the nature of British tonnage duties. Thus differences in space per unit of tonnage existed. Note also that some suggestions were made for differential requirements on the number of passengers depending on whether vessels passed through the tropics.

[18] See Thomas W. Page, "The Transportation of Immigrants and Reception Arrangements in the Nineteenth Century," Journal of Political Economy, 19 (1911), 732-49; Elizabeth Donnan, ed., Documents Illustrative of the History of the Slave Trade in America, 292; 4 vols. (Washington, D. C., 1930-1935); Postma, Dutch in the Atlantic Slave Trade, 292; and, on England, Klein, The Middle Passage: Comparative Studies in the Atlantic Slave Trade (Princeton, 1978), 29. 19

[19] See Edith Abbott, Immigration: Select Documents and Case Records (Chicago, 1924; rpt. 1969), and Henry W. Farnam, Chapters in the History of Social Legislation in the United States to 1860, ed. Clive Day (Washington, D. C., 1938).

[20] See Klein, Middle Passage; Richard B. Sheridan, Doctors and Slaves: A Medical and Demographic History of Slavery in the British West Indies, 1680-1834 (Cambridge, 1985); and Haines and Shlomowitz, "Explaining the Decline in Mortality in the Eighteenth-Century British Slave Trade," on the role of surgeons. See also David Northrup, "African Mortality in the Suppression of the Slave Trade: The Case of the Bight of Biafra," Journal of Interdisciplinary History, 9 (1978), 47-64, on the high mortality on captured vessels.

[21] See John D. Unruh Jr., The Plains Across: The Overland Emigrants and the Trans-Mississippi West, 1840-60 (Urbana, 1979). Of the deaths, about 9/10 were due to disease and most of the rest were attributed to accidents. It is estimated that only 4% (400 emigrants) occurred at the hands of American Indians.

[22] See Curtin, Death by Migration: Europe's Encounter with the Tropical World in the Nineteenth Century (Cambridge, 1989). The deaths when moving from temperate climates to the tropics seem to exceed those of moving from tropical climates to the temperate one. Another comparison, of convicts held captive in British hulks in the Thames, indicates the "average annual death rates suffered by hulk and seaborne [to Australia] convict populations were similar"; Shlomowitz, with McDonald, "Mortality on Convict Voyages to Australia, 1788-1868," in Shlomowitz et al., Mortality and Migration in the Modern World, essay 1.

[23] See Stephen D. Behrendt, "Crew Mortality in the Transatlantic Slave Trade in the Eighteenth Century," in Eltis and Richardson, eds., Routes to Slavery, 49 71, for more information on crews on British and French slave ships in the 18th and early 19th centuries. Deaths were considerably higher on the African coast than on all the other legs of the voyage together, and time spent on the coast was about 4 times longer than was the Middle Passage. For Clarkson, see Lambert, ed., House of Commons Sessional Papers, 69:144-55.

[24] The first nations to regulate non-slave voyages were the U. K. in 1803, followed by the U. S. in 1819, Holland 1837, Belgium 1843, France 1855, and Spain 1860. In many cases, there were frequent changes in the legislation, but the basic format, similar to that of the earlier regulations of the slave trade, covered appropriate carrying capacity (based on tonnage or on space), food and water requirements, general aspects of ship design, appropriate passenger care, and the role of doctors. See Page, "Transportation of Immigrants," and Report of the Select Committee, 31-147.

[25] Much of the traffic in indentured labor in the second half of the 19th century was controlled by the British. Regulations governed the conditions at the port of departure, the arrival at the port of the colony where labor was to be undertaken, and the conditions of labor during the period of employment. Similar detailed record keeping was also undertaken for the sailing of convicts to Australia after 1788, as well as many other oceanic voyages, including those of immigrant ships between Europe and the United States; contract labor voyages from China to Cuba; Polynesia and China to Peru; the Pacific Islands to Australia; and various locations to the British and French West Indies.

[26] For example, in the late 18th century the slaves per ton on British slavers was more than two before the controls introduced by Dolben's Act, whereas that on other transatlantic migrant ships was probably about or under one. See the discussion below.

[27] See the comparison summarized in Carl Wittke, We Who Built America: The Saga of the Immigrant, rev. ed. (Cleveland, 1964; orig. pub. 1940), and Kapp, Immigration and the Commissioners of Immigration.

[28] See Shlomowitz, with McDonald, "Mortality on Chinese and Indian Voyages to the West Indies and South America, 1847-1874," in Shlomowitz et al., Mortality and Migration in the Modern World, essay 14, and Duvon C. Corbitt, A Study of the Chinese in Cuba, 1847-1947 (Wilmore, Ky., 1971). It has been suggested that the higher rates of mortality in the earlier voyages from China were owing to violence by organized criminals. The rates to the British West Indies from China were considerably below those from China to Cuba and Peru, although all did decline over time. The trade from China to Cuba included many different national carriers and had a range of percentage of deaths per ship for the major carriers smaller than the range of difference between arrivals in Cuba and arrivals in the British West Indies. See Arnold J. Meagher, "The Introduction of Chinese Laborers to Latin America: The Coolie Trade, 1847-1874" (Ph. D. diss., University of California, Davis, 1975); Walton Look Lai, Indentured Labor, Caribbean Sugar: Chinese and Indian Migrants to the British West Indies, 1838-1918 (Baltimore, 1993); and the materials in Colonial Office Papers: 386/90, 386/91, 386/92, 386/162, 386/188, Public Record Office, Kew. A voyage rate comparable to that from China to Cuba (about 10%) was seen in the trade in contract laborers from Polynesia to Peru in 1862-1863. These voyages, however, lasted only about one month. See H. E. Maude, Slavers in Paradise: The Peruvian Slave Trade in Polynesia, 1862 1864 (Stanford, Calif., 1981).

[29] See Report of the Select Committee, 27-30; Wittke, We Who Built America; and Shlomowitz, with McDonald, "Mortality of Indian Labour on Ocean Voyages."

[30] See Monica Schuler, "Alas, Alas, Kongo": A Social History of Indentured African Immigration into Jamaica, 1841-1865 (Baltimore, 1980), and Shlomowitz, "Mortality and Voyages of Liberated Africans to the West Indies," in Shlomowitz et al., Mortality and Migration in the Modern World, essay 10.

[31] These regulations often included either bonuses for low mortality or penalties for number dying. Also important was whether payments were based on numbers of slaves carried or numbers landed. For bonuses for live slave arrivals paid to surgeons, captains, and/or crews by the French, Spanish, and Dutch, in addition to those by the British under Dolben's Act, see Lambert, ed., House of Commons Sessional Papers, 70:345-82; Postma, Dutch in the Atlantic Slave Trade; and Robert Louis Stein, The French Slave Trade in the Eighteenth Century: An Old Regime Business (Madison, 1979). French bonuses began for rates below 20%.

[32] See Shlomowitz, with MacDonald, "Mortality on Immigrant Voyages to Australia," who argue for the effectiveness of regulation on the movements to Australia in the 19th century. Several of the tables prepared by Robin Haines and Ralph Shlomowitz were not used in this article but are available from them. These include: average death rate by month of departure, voyages making one or more New World stops prior to disembarkation of slaves, deaths of slaves on captured vessels, slave-per-ton ratios in the British slave trade, average death rates by flag carrier by decade, average death rates of French ships by region of departure, number of deaths on British voyages, average death rates on British ships by region of departure, average death rates of British ships, 1788 1804, average death rates of British ships by region of departure, 1788 1798, number of deaths on British voyages, 1789 1807, average length of the period of coasting in the British slave trade, and the number of voyages reporting deaths as well as numbers embarked and disembarked.

[33] On this see Haines and Shlomowitz, "Explaining the Modern Mortality Decline: What Can We Learn from Sea Voyages?" Social History of Medicine, 11 (1998), 15-48.