

# The Demographic Collapse of Native Peoples of the Americas, 1492–1650

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**Summary.** Following an examination of the scale of the demographic collapse that occurred between 1492 and 1650, this paper attempts to explain why some groups were able to survive better than others. It considers the impact of well-known factors such as the systematic killing, enslavement and ill treatment of the Indians, which formed the basis of the Black Legend, and the introduction of Old World diseases to which the Indians had not been previously exposed. It goes on to argue that also significant were the more subtle demographic effects of changes to native economies, societies and beliefs imposed or provoked by colonial rule. The changes they experienced were influenced by the different methods employed to exploit and convert the native population, notably the *encomienda*, missionization and slavery, and by the growth of European commercial enterprises, which, by creating demands for land and labour, undermined the viability of Indian communities and promoted racial mixing. The impact of these processes varied according to the size and character of native societies at the time of contact and the demand for resources in the regions in which they lived.

FOR ALL NEW WORLD PEOPLES 1492 heralded demographic disaster from which many have never recovered. Population losses were significant in themselves, but for those who survived they also signified major cultural transformations. All native groups suffered an initial decline following direct or indirect contact with Europeans, but there were considerable variations in the level of depopulation they suffered and in the degree to which they were able to recover. Losses came first to the Caribbean region, where by the mid-sixteenth century many native groups had become

virtually extinct. In Mexico and Central America heavy losses were followed in the seventeenth century by periods of slow recovery, the precise timing and extent of which varied from place to place. In the Andes, however, the population continued to decline throughout the colonial period (Newson 1985:42–46). Variations in the level of depopulation and demographic trends in different regions reflected not only the dramatic impact of conquest and the introduction of Old World diseases, but also the more subtle demographic effects of changes to native economies, societies and beliefs imposed or provoked by colonial rule. This essay examines the enormity of the demographic collapse and attempts to explain why some groups were able to survive better than others.

## The Scale of the Demographic Disaster

The scale of the demographic disaster suffered in the New World can only be assessed by reference to the size of the native population in 1492. This topic has been one of the most hotly, and on occasions bitterly, debated issues in New World history in recent years. The extent of the controversy is demonstrated by twentieth century estimates ranging from Kroeber's (1939:166) 8.4 million to Dobyns's (1966:415) 90 to 112.5 million. Many factors contribute to the controversy. The inadequacy of archaeological and ethnohistorical sources for the contact period means that methods of estimation have to be employed, many of which incorporate, though often not explicitly, cultural and political biases (Daniels 1992:317–18; Johansson 1982:137). Population estimates may be influenced by comparisons with the size of societies in Europe and Asia in 1492, or with their numbers today, and are based on assumptions concerning the correlation of population size with cultural complexity and human progress (Borah 1992a:18–22; Dunnell 1991:561–64). Other biases derive from differing attitudes towards the relative contributions of colonial rule and of native societies to the formation and identity of modern nation states. Indeed biases may be so great as to reflect "more academic fashion than objective presentation of data" (Uberlaker 1976:663).

Another area of debate which has significantly influenced aboriginal population estimates surrounds the possible impact of Old World epidemics prior to direct European contact. Although there are some well-documented cases where Old World diseases ran ahead of the invaders, e.g. the spread of smallpox to the Andean region before the arrival of Pizarro's troops (Dobyns 1963:496; Newson 1992:88–91), there is debate about variations in native population estimates for areas remote from the

initial and primary centres of European settlement, where several decades if not centuries lapsed before direct contact with Europeans (Borah 1992b:15). It is a matter of considerable dispute affecting population estimates for North America and Amazonia (Dobyns 1983:270–71, 291–95; Myers 1988:61–81; Pertulla 1991:502; Ramenofksy 1987:173–76; Roberts 1989:1247; Snow and Lanphear 1988:15–33; Thornton 1987:25–32).

Viewed in chronological perspective, mid-range estimates for the hemisphere in the 1920s were followed by conservative estimates in the 1930s and 1940s, after which figures gradually rose to a peak in the 1960s and 1970s. Since that time, detailed regional research has led to a downward revision of some of the highest estimates (Borah 1992a:14; Denevan 1992a:xxviii, 2–4; Jacobs 1974:123–28; Uberlaker 1976:661–63, 1988:289–90). In the 1920s estimates by scholars familiar with the civilizations of Middle America and the Andes suggested that the population of the continent may have reached, or even exceeded, 50 million (Sapper 1924:100; Spinden 1928:660). These estimates were challenged by a number of scholars, initially by those with experience of North America, such as Mooney (1928) and Kroeber (1939), who minimized the impact of epidemic disease and who dismissed early contemporary accounts as exaggerated, although generally without any critical evaluation of the evidence (Dobyns 1966:398). This so-called “skeptical” group produced the most conservative estimates for the hemisphere of 8.4 million (Kroeber 1939:166), 13.38 million (Rosenblat 1954:102) and 15.59 million (Steward 1949:656).

Subsequent challenges to these estimates came from two directions. Early dissent by Sauer (Denevan 1989; Dobyns 1966:398) found fuller expression in the pioneering works of his colleagues Borah and Cook. Their exhaustive analysis of documentary sources, particularly tribute records, produced a pre-conquest population estimate of 25.2 million for Central Mexico alone, suggesting that there may have been over 100 million in the continent as a whole (Borah 1964:381; Borah and Cook 1963:88, 157). Meanwhile Dobyns, in his seminal paper in 1966, argued that previous population estimates had generally taken insufficient account of the impact of the introduction of Old World diseases. Using evidence from well-documented accounts of the impact of recent epidemics on non-immune populations, and from the numbers of Indians known to have survived in the Americas, he proposed an estimate of the same order of magnitude, between 90 and 112.5 million (Dobyns 1966:415). While few researchers would accept the high figures proposed by Borah, Cook and Dobyns, their studies provoked major debates not only about the size of the aboriginal population and hence the scale of depopulation, but also

about its causes. All of these authors stressed that the validity of their estimates, which were based to a greater or lesser extent on projections from one study area or time period to another, could only be assessed in the light of more detailed regional studies. Many scholars, too numerous to mention, have taken up the challenge. Indeed the historical demography of the contact period has now become one of the most productive research fields in New World history, drawing scholars from an ever-widening range of disciplines.

Denevan has recently reviewed the detailed regional research conducted since the mid-1970s (Denevan 1992a:xvii–xxviii) and proposed an aboriginal population for the hemisphere of 53.9 million, a slight downward revision of his 1976 estimate of 57.3 million (Table 1). Since this mid-range estimate is based on the labours of numerous scholars, rather than on projections from a restricted study area to the hemisphere as a whole, it would probably command greater support. Nevertheless, the figures for many areas are still disputed and little is known about large parts of the continent. There have been few detailed demographic studies of Argentina, Chile, Venezuela, Panama, Uruguay, and several areas of Colombia and Brazil, and work is only just appearing on Ecuador (Alchon 1991; Newson 1993). Nevertheless, most researchers would now accept that Old World diseases had a significant impact on native populations and that the low estimates of the “skeptical” school are untenable, even though many would not go as far as accepting estimates as high as those of Borah, Cook and Dobyns.

The size of the native population in 1492 is not merely an academic quibble. Population size is a reflection of environmental conditions and biological and cultural processes, and, as such, a barometer by which the significance of post-Columbian changes can be measured. Even though it would be futile to seek exact figures for aboriginal populations, there is considerable room for refining present estimates and for narrowing the range of probabilities. Despite the research efforts of recent years it is fair to say that for most regions the work is just beginning. The most obvious archival sources have often been tapped, though not to the degree that might sometimes be imagined, and there is considerable scope for the imaginative use of less obvious types of documentary evidence. Local and regional archives have scarcely been explored, and the Vatican and the archives of the religious orders in Rome, even if they are short on numerical data, contain important evidence for the impact of epidemic disease and on the nature of the general processes underlying demographic trends. There is scope not only for tapping new sources, but for developing new analytical techniques, such as more sophisticated computer simulation models (Whitmore 1991).

**Table 1.** Selected hemispheric estimates for the size of the native population in 1492.

Region	Steward 1949	Rosenblat 1954	Dobyns 1966	Denevan 1992	Denevan 1992 % of total
North America	1,000,880	1,000,000	9,800,000– 12,250,000	3,790,000	7.0
Mexico	4,500,000	4,500,000	30,000,000– 37,500,000	17,174,000	31.9
Central America	736,000	800,000	10,800,000– 13,500,000	5,625,000	10.4
Caribbean	225,000	300,000	443,000– 553,750	3,000,000	5.6
Andes <sup>a</sup>	6,131,000	4,500,000	30,000,000– 37,500,000	15,696,000	29.1
Amazonia	} 2,898,000	} 2,285,000	} 9,000,000– 11,250,000	5,664,000 <sup>b</sup>	10.5
Chile and Argentina				1,900,000	3.5
Paraguay, Uruguay and S. Brazil				1,055,000	2.0
Total	15,590,880	13,385,000	90,043,000– 112,553,750	53,904,000	100.0

<sup>a</sup> Highlands and coasts of Venezuela, Colombia, Ecuador, Peru and Bolivia.

<sup>b</sup> Includes tropical lowlands along the southern and eastern flanks of the Andes.

Sources: Steward 1949:656; Rosenblat 1954:102; Dobyns 1966:415; Denevan 1992a:xxix.

For areas where ethnohistorical records are scant, the question of the level of demographic collapse will depend on archaeological investigations and on the development of more sophisticated models of the spread of disease based on advances in medical research. As Roosevelt's (1991) archaeological investigations at Marajó at the mouth of the Amazon have shown, even localized surveys may lead to a substantial revision of traditional views about aboriginal population densities. On a broader scale, recent revelations of the extent of drained field cultivation in the northern Andes have suggested much higher population densities than previously thought (Denevan 1970a; Knapp 1988:129–48, 164–67; Parsons and Bowen 1966). Skeletal remains may inform on life expectancy, age and sex ratios and health conditions across the contact period, even if the cause of death cannot be associated with a particular disease except where human tissue has survived (Brothwell in this volume). Nevertheless archaeological evidence for settlement patterns, diets and trade routes can provide clues as to the possible spread of infections (Larsen et al. 1990; Walker et al. 1989). Broader temporal and spatial analyses of archaeological sites, such as that conducted of grave counts and settlement patterns in North America by Ramenofsky (1987), may also inform on the timing, extent and magnitude of the demographic collapse in the post-conquest period. Meanwhile advances in genetics research are suggesting that lack of genetic diversity, particularly in the immune system, exhibited by New World populations may adversely affect disease susceptibility and provide a partial explanation for the exceptionally high levels of mortality associated with the initial introduction of Old World diseases (Black 1990:57–74; Black 1992).

While the controversy over the size of the aboriginal population in 1492 continues unabated, regional studies are revealing clear evidence of significant differences in the timing and extent of depopulation, and in some cases of recovery. Dobyns (1966:415) estimated that, from the time of European contact to their nadirs (which many groups reached in the seventeenth century), aboriginal populations had declined by a ratio of 20:1 or 25:1. Subsequent research has revealed much greater diversity in levels of depopulation. In the Caribbean the population became virtually extinct within a generation, and for Amazonian societies Denevan (1966:429, 1970b:252–53) has argued for a higher level of depopulation of 35:1. On the other hand Smith (1970:459) has shown that in the central Andean sierra for the period up to 1571 losses were much lower, in the order of only 3.4:1, though much higher in the adjacent coastal areas where the level of depopulation was a staggering 58:1. A similar difference in demographic trends between the highlands and coast has been documented for neighbouring Ecuador where between contact and 1600 the

ratios were about 5.1:1 and 21.1:1 respectively (Newson 1993:1188). These altitudinal differences are paralleled in Central Mexico where Cook and Borah found that between 1532 and 1608 Indian populations on the coast declined by 26.02:1, whereas on the plateau the losses were of the order of 13.18:1 (Cook and Borah 1971:82). Although the precise ratios may be disputed, in all cases the marked difference in levels of depopulation in the highlands and lowlands remains unchallenged, as does the more rapid decline of Indian populations on the Mexican plateau compared with the central Andean sierra. Factors which might account for such geographical variations in population losses will be examined below.

Apart from differences in the level of depopulation, there were also differences in demographic trends. The decline in the Indian population appears to have been halted first in Ecuador, where there are indications that it began to increase from the 1590s. However, there is a debate as to whether the increase was real or whether it reflected more effective registration of Indian tribute payers, or migration, or perhaps a combination of all three (Alchon 1991:16–79; Powers 1987:106–107). In Mexico signs of demographic recovery appear in the 1620s and 1630s when the bishoprics of Mexico, Puebla and Michoacán registered increases of 20% during the second half of the century (Miranda 1963:184–85; Rabell 1990:70). In Central America, with perhaps the exception of Chiapas, recovery was to come several decades later (Lovell 1981:240; Newson 1985:45, 1986:331–33, 1987:339; Veblen 1977:497–99), but it did not begin in Peru until the second half of the eighteenth century (Cook 1965:93). These observations raise the question as to why some native populations were able to recover, and some of these sooner than others, while many others continued to decline.

Despite continuing debates, several conclusions may be drawn concerning demographic trends during the early colonial period. First, whatever the precise size of the aboriginal population it was certainly higher than previously envisaged and, given a collapse to about 5.6 million in 1650 (Dobyns 1966:415, Uberlaker 1988:292), the demographic disaster has no known parallel in world history. In Peru the population fell from about 9 million to 600,000 in 1620 (Cook 1981:114) and in Central Mexico it collapsed from a disputed range of 10 to 25 million to about 1 million (Borah and Cook 1969:180; Denevan 1992a:xxi–xxii). By 1650 Indians still existed in large numbers in the highlands, but in the tropical coastal lowlands and Caribbean islands they had disappeared and had been replaced as a source of labour supply by Black slaves. In areas remote from European control, such as North America, southern Chile and Argentina, the Amazon Basin and other tropical forested lowlands, the full impact of colonial rule was yet to be felt, although probably most native societies

had failed to escape the ravages of Old World diseases. Even within these broad areas there were regional and local differences in the level of Indian survival.

## Explaining Regional Differences in Depopulation and Recovery

The decline of native populations in the New World is generally attributed to one of two major causes: the systematic killing, enslavement and ill treatment of the Indians, which formed the basis of the Black Legend later propagated by critics of Spanish colonial rule, and the introduction of Old World diseases to which the Indians had not been previously exposed. Studies of the impact of colonial rule on native societies have often stressed one factor to the exclusion of the other. Sometimes the importance of disease has been minimized in order to condemn colonial domination, while in other cases there has been a reluctance to look beyond it for a deeper understanding of the causes of Indian depopulation (Joralemon 1982:109; Lovell 1992:438). Equally significantly many studies have overlooked or paid only passing attention to the more subtle demographic effects of changes to native economies, societies and beliefs imposed or provoked by colonial rule. Some of these changes stemmed from the desire to "civilize" native peoples and convert them to Christianity, while others were associated with the growth of European commercial enterprises, which, by creating demands for land and labour, undermined the viability of Indian communities and forced Indians into more sustained contact with other racial groups. Other cultural changes emanated from population losses themselves, and these further affected demographic trends. Such processes have been neglected probably because they are less quantifiable and dramatic, and therefore possibly less interesting, and because the increased size of recent aboriginal population estimates has demanded catastrophic explanations of their subsequent decline (Johansson 1982:140–41).

Another feature of explanations given for the demographic collapse of native peoples is that they focus on raised mortality rates and pay little attention to the contribution of falling fertility rates (Thornton et al. 1991:29). Commentators have sometimes wondered why for the most part native American populations were unable to bounce back after wars and epidemics as did Europeans. Part of the answer lies in the significantly higher mortality rates associated with the introduction of Old World diseases due to the Indians' lack of previous exposure, and the fact that they were afflicted not once but repeatedly (Dobyns 1983:286). Moreover, they simultaneously experienced major economic, social and psychological



upheavals as a result of conquest and the imposition of colonial rule. Another reason is that epidemics claimed the lives of many adults as well as children, which adversely affected fertility rates. In pre-industrial societies high fertility levels are required to maintain the population in the face of high levels of infant mortality and low life expectancy. As such, even the smallest reduction in reproductive capacity might severely affect a population's ability to recover. High levels of adult mortality associated with the initial impact of Old World epidemics not only resulted in a direct loss of females of child-bearing age, but sometimes induced subfecundity (McFalls and McFalls 1984:60–61, 130, 533; Stannard 1990: 336–47), and also meant a loss of valuable reproductive years as new partners were sought (Sweet 1968:141). In small communities adult losses would have been particularly difficult to accommodate since the choice of partners would have been more limited, in addition to which there were often cultural restrictions on remarriage and on the suitability of spouses (Newson 1992:109–10). Furthermore, the dramatic events of conquest, the devastation wrought by epidemics and the reality of colonial rule often fostered a lack of "will to survive" (Stannard 1991:529) (Figure 1). There is ample documentary evidence from the early colonial period for increased abstinence from sexual intercourse and for higher levels of infanticide and abortion (Newson 1987:122; Sánchez-Albornoz 1984:11–12), added to which would have been the unconscious effects of stress-induced amenorrhea. While psychological influences on mortality and fertility levels remain intangible and unquantifiable, there seems little doubt that they had a potent effect. Whether due to raised mortality rates or falling fertility rates, or most commonly both, it is worth noting that only a 1% decline in the population per year would result in its reduction by half in 70 years (Johansson 1982:140).

While Old World epidemics are essential to any explanation of the demographic collapse of native populations, the process was much more complex than is often recognized. In order to understand its complexity and explain why the native population collapsed more significantly in some areas than others, several factors which are known to have affected demographic trends will be examined: the introduction of Old World diseases; the Black Legend; and the methods used by the Iberian powers to control and exploit native peoples, as well as the intensity of European settlement and the types of commercial economic activities with which it was associated. The impact of these agents of change, including the introduction of Old World diseases, was influenced to a considerable degree by differences in the size and character of indian populations in 1492 and by the types of resources to be found in the areas where they lived. Hence, in 1650 the pattern of Indian survival was a distorted reflection of the size and distribution of pre-Columbian populations.



**Figure 1** Spanish oppression drives Indians in Hispaniola to suicide and infanticide. Theodor de Bry, *Americae Pars Sexta*, 1596.

## The Impact of Old World Diseases

Most researchers agree that a major cause of the rapid decline of Indian populations in the New World was the introduction of Old World diseases to which the Indians, due to millennia of isolation, had acquired no immunity (Figure 2). Among the most notable killers were smallpox, measles, typhus, plague and influenza. It was not uncommon for a single epidemic to carry off one-third, or even one-half, of the population of an area, and in the early colonial period native populations were ravaged by epidemics at almost regular ten-year intervals. Indian populations could be rapidly hammered down to fractions of their original size. Cook (1981:70) has shown how the six major epidemics that afflicted Peru between 1524 and 1615 could have reduced the Indian population there by between 79.3% to 91.7%. This chronicle could be repeated for a significant proportion of the Americas, for epidemics often ran ahead of



**Figure 2** Epidemic disease afflicts the Tupinambá of coastal Brazil. Theodor de Bry, *Americae Tertia Pars*, 1592.

the invaders, ravaging even remote populations and weakening their resistance (Dobyns 1983:292–93). Since the nature and impact of old World diseases are considered in greater detail by Brothwell (this volume), comments here will be confined to identifying and attempting to explain geographical variations in their impact.

Many researchers concerned with the impact of Old World epidemics, and especially the proponents of high aboriginal population estimates, assume that, once introduced to the New World, the diseases spread unhindered and their impact was uniform (Dobyns 1983:293; Roberts 1989:1246). This is particularly true for regions such as North America and the Amazon Basin where Old World diseases may have preceded direct contact. Documentary sources suggest that during the sixteenth century pandemics of smallpox, measles and typhus or plague probably touched the greater part of the continent (Cook 1981:60–62; Cook and Lovell 1992:222–27; Dobyns 1983:8–32, 270, 285; Newson 1992:88–101, 111; Prem 1992a:22–48). It is important to recognize, however, that the

opportunities for infection depend on the interplay of three main factors—the host, the parasite (and in some cases a vector for its transmission) and the environment—so that inevitably they are affected by differences in culture as well as physical geography. Environmental influences on the spread of disease have been recognized more often than cultural factors, most notably the effect of topographic and climatic barriers (Shea 1992:161; Upham 1986:122), and in particular the confinement of malaria and yellow fever to tropical climates. Cultural factors such as settlement patterns, population densities, trade, warfare, diet and sanitation, many of which were interrelated, are also likely to have influenced the spread of infections. Such conditions were highly variable, making it extremely unlikely that every community was afflicted by every disease and to equal degrees. Although these influences have been recognised by a few (Milner 1980:46–47; Newson 1985:48, 1992b), research energies have focussed on the magnitude rather than variability of disease mortality.

The introduction and spread of infection depended in part on the intensity of European and African settlement and the size and distribution of native populations. Europeans and Africans settled in largest numbers in areas where gold and silver were to be found and where there were large sedentary native populations which could be exploited as sources of tribute and labour. Apart from the Caribbean and Colombia, which possessed alluvial gold deposits, these regions comprised the highlands of Middle America and the Andes. The movement of peoples and goods between these areas, and between Europe and Africa, ensured frequent re-infection, and the ports, such as Portobelo and Veracruz, earned early reputations as pestholes. Meanwhile, the tropical lowlands were inhabited primarily by tribal peoples and hunter-gatherers who offered few opportunities for Spanish and Portuguese wealth-creation, and therefore came into less frequent contact with European missionaries, soldiers and enslavers. The chances of a disease being introduced were more limited, especially in physically remote areas such as the Amazon Basin, Argentina and Chile.

Once introduced, the incidence of infection would have been partially dependent on the population density and the character of the settlement pattern. It is generally recognized that large permanent nucleated settlements foster unhealthy conditions by encouraging the concentration of wastes and parasites. They also facilitate the spread of directly transmitted infectious diseases by enabling frequent contacts between individuals (Polunin 1977:8–13). Where groups are dispersed and have a nomadic or semi-nomadic existence the build up of parasites is more limited and contacts are less intense. The influence of settlement pattern on the spread of disease was even noted by contemporary observers in Ecuador in the

sixteenth century who saw the benefits of dispersed settlements and of nuclear rather than extended family residence (Newson 1992:109). Hence, the massive colonial resettlement programmes (designed to facilitate the administration of native peoples by congregating declining populations into larger settlements), which were undertaken in the 1570s in the Andean region and conducted in Mexico from the 1590s, are likely to have had adverse effects on disease mortality. At the same time the spread of disease was encouraged by the institution of systems of forced labour, which drew Indians from widely scattered communities, to which they normally returned when their tours of duty had ended. Similar effects derived from the establishment of missions among tribal and hunter-gatherer groups. Not only did it result in the formation of larger and more permanent settlements, but by bringing in new converts the missionaries continuously expanded and replenished the pool of susceptibles.

Settlement distribution as well as size influenced the spread of infections, though the former was related as much to physical geography as to cultural preference. Shea (1992) has postulated that the greater impact of Old World diseases in Central Mexico was a function of their ability to diffuse in a radial fashion, whereas their impact was moderated in the Andes where the rugged terrain acted as a barrier to their spread. More generally, Ramenofsky (1990:41–42) has proposed a model relating the impact of disease to settlement location, duration and form. She hypothesizes that nucleated settlements, whether sedentary or mobile, located along primary drainage systems had the lowest probability of persistence because they enabled frequent contact, whereas contacts would have been irregular among dispersed mobile populations. One might build on these suggestions by considering settlements not only in terms of their size and distribution, but also their social relationships. Hostile relations irrespective of location would have discouraged contacts and the transmission of infections, even though this might have occurred through raiding. The existence of uninhabited buffer zones between hostile tribal groups is also likely to have impeded the spread of disease in the Amazon Basin and North America (DeBoer 1981:17). On the other hand friendly contacts, manifest in trading, feasting, visiting the sick, or the acceptance of groups fleeing from epidemics and enslaving raids, are likely to have been more sustained and to have facilitated the spread of disease (Dobyns 1983:16; Ramenofsky 1990:37).

Population size also influences patterns of disease mortality in another way, since it determines whether or not a disease becomes endemic. In order for a pathogen to survive it requires new hosts to infect, but most acute infections have a short period of communicability, generally less than two weeks. A large population can produce a sufficiently large pool of new

susceptibles in the form of children to maintain acute infections, which as a consequence become endemic and diseases of childhood. Bartlett (1957:48–70) has estimated that for measles to become endemic a population of 7,000 susceptibles out of a total population of between 200,000 and 300,000 is required, though Black (1975:515–18) would raise the latter figure to 500,000. Where settlements are small and dispersed, as among tribal groups, the spread of disease is slow and “fade outs” are common (Cliff and Haggett 1989:245–46; Neel 1977:170). In such circumstances the only diseases which become endemic are chronic infections, such as amebiasis and giardiasis, and treponemal infections such as yaws, pinta and non-venereal syphilis. Small communities may remain disease-free for relatively long periods, but their lack of exposure to infection leads to a build up of susceptibles so that when a disease is re-introduced from outside it is associated with higher levels of mortality involving many adults as well as children. As already indicated, losses among the adult population may have significant knock-on effects on the fertility rate and undermine the ability of communities to recover, particularly where populations are small.

This general discussion suggests that initially mortality levels associated with the introduction of Old World diseases were positively correlated with the size of the Indian society, the degree of nucleation and permanence of its settlement pattern, and also with proximity to sources of infection. In the longer term, however, impact was moderated where sufficiently large populations remained to sustain diseases in endemic form, whereas in small communities these continued to take an elevated toll. Broad differences in the pattern of infection may *partially* account for the continued decline of tribal peoples in lowland areas throughout the colonial period, while, as already noted, the earliest recovery was to be found in some former chiefdom and state societies, though not in all. It is important to stress, however, that such trends reflect changes in fertility rates as well as the impact of other factors on mortality levels, and cannot be attributed solely to differences in the pattern of infection. Furthermore, although it may be hypothesized that differences in demographic trends may be related to differences in the pattern of infection, it is impossible to generalize about differences in their aggregate impact for it would depend in part on the frequency of re-infection among small populations (Newson 1993:1192).

Variations in the spread of infections may have also been influenced by diet. Poor nutrition is generally thought to contribute to increased susceptibility to infection (McKeown 1988:52–55), so that differences in subsistence patterns may be important in understanding patterns of disease mortality. However, the direct relationship between disease and nutrition is now thought to be less clear, and certainly more complex, than

previously envisaged, and the link stronger for some diseases than others (Livi-Bacci 1991:35–39; Rotberg and Rabb 1983:305–308). Measles and most respiratory and intestinal infections appear to be affected by nutritional status, whereas smallpox, plague, yellow fever and malaria appear relatively unaffected. Before proceeding, it is important to note that nutritional levels probably had little influence on the initial impact of Old World diseases or toxic pathogens on non-immune populations, but, as micro-organisms became endemic, malnutrition may well have had more significant effects on mortality from disease, particularly infant and child mortality (Harpending et al. 1990:257–58). The adequacy or not of native diets under colonial rule will be discussed more fully later.

Finally, in discussing regional variability in the impact of disease, it is important to comment on the assertion that the greater depopulation of the tropical lowlands was due to the greater impact of disease, in particular due to the presence of yellow fever and malaria, which only thrive in climates with a mean monthly temperature exceeding 20 degrees centigrade, and perhaps also to the greater virulence of other diseases in tropical climates (Borah and Cook 1969:181; Cook and Borah 1974:176–79; Friedlander 1969:217).

Malaria and yellow fever are both generally considered to have originated in the Old World. Yellow fever was a more deadly killer than malaria, but since the first definitely identifiable epidemic in the New World probably occurred in 1647–1648 (Brown 1977:290; Kiple 1984:17–20), it cannot be held responsible for the early decline in lowland populations. Even after the middle of the seventeenth century, outbreaks were confined to the urban populations capable of sustaining the disease.

Malaria probably influenced demographic trends at an earlier date. Anopheline mosquitoes suitable for the propagation of malaria were present in the Americas, and theoretically all that was required to begin cycles of infection was a source of infected blood. Since the malaria parasite remains in the blood once it has infected and conferred immunity on an individual, it was probably carried to the New World by apparently healthy persons (Kiple 1984:17). Spaniards may have introduced the benign form of malaria, *Plasmodium vivax*, direct from Europe, whereas the more acute form, *Plasmodium falciparum*, probably entered with Black slaves, though both parasites might have been carried to the region from other parts of the New World where they had already become established. To ensure the transmission of the parasite to awaiting vectors, a large number of carriers would have been necessary. For this reason, malaria is likely to have spread more rapidly as the traffic in Black slaves increased. Since the slave trade emerged to meet labour shortages in the Caribbean islands and on the Middle American mainland, where in many

cases substantial native populations had existed, the conclusion must be that Indian population decline preceded the spread of malaria. Once established, its spread would have been dependent on the density of insect vectors, which would have been strongly influenced by climate, and by the size of human populations (Manson-Bahr 1941:889–90; Molineaux 1988:941–42; Rafatjah 1988:1152–53). The chain of infection must have broken down on many occasions. It is noteworthy that even today the sparse population of some tropical lowlands, such as the greater part of the eastern lowlands of Ecuador (Ayala Mora 1957:58–59, 65; Kroeger et al. 1977:161), serves to maintain them free of malaria. In conclusion it seems that, although the spread of malaria was confined to tropical lowlands, its spread was slower, and its impact possibly more localized, than those of directly transmitted diseases. It is doubtful, therefore, that malaria can account for the significantly higher levels of depopulation in those regions during the early colonial period.

## Conquest and the Black Legend

Conquest itself led to conflict and casualties, but compared to the ravages wrought by epidemic disease its demographic consequences were relatively minor. In the case of the Inca and Aztec empires epidemic disease, native political discontent and superior Spanish weaponry and tactics conspired to bring swift defeat and to minimize battle casualties (Guilmartin 1991:60; McAlister 1984:106–107; Wachtel 1984:210–11). Casualties were undoubtedly greater in Peru where pacification was prolonged by native allegiance to the Inca cause and by civil wars between the supporters of Francisco Pizarro and Diego de Almagro, into which the Indians were drawn as auxiliaries. Similarly, in Central America conflicts between rival conquistadors served to prolong conquest and raise mortality rates (MacLeod 1973:41–44; Newson 1986:96, 1987:92). Yet the number of casualties remained proportionately, if not numerically, smaller than among many tribal and hunter-gatherer groups who were subject to missionary expeditions and enslaving raids where conflict was prolonged for decades and sometimes centuries (Cook 1943a:11; Jara 1961:142–49; Korth 1968:22; Powell 1952:32).

Once pacified, the enslavement, ill treatment and overwork of native peoples became significant factors in the decline of New World populations (Figure 3). In the early colonial period *encomiendas* awarded by the Spanish Crown gave individuals the exclusive right to exact tribute and labour from Indians in their charge. Indian labour under the *encomienda* was largely unregulated and, since *encomiendas* were granted for a few





**Figure 3** Alluvial gold mining in Hispaniola. Theodor de Bry, *Americae Pars Sexta*, 1596.

lifetimes only, little attention was paid to the preservation of the labour supply, which, initially at least, was considered to be inexhaustible. The result was that Indians were worked literally to death. The population of Hispaniola fell from about 1 million in 1492 to 250 in 1540 (Cook and Borah 1971:401; Zambardino 1978:707). The pattern was repeated in Puerto Rico, Cuba and Jamaica (Sauer 1966:196–204). Declining populations in the Greater Antilles were boosted by enslaving raids on the Bahamas, Lesser Antilles and the fringing mainland, notably the Gulf Coast, Honduras and Venezuela, leaving the populations of these regions severely depleted (Newson 1976:76–80, 1986:107–111; Sauer, 1966:159–60, 193–94; Sherman 1979:39–53; Watts 1987:105–109). Huastec Indians from the Gulf Coast of Mexico were shipped to the Caribbean islands, contributing to the region's massive population decline from about 1 million at the time of Spanish conquest to only 5,140 tributary natives in 1570 (Gerhard 1972:214). Meanwhile between 200,000 and 500,000 Indian slaves were shipped from Nicaragua, and to a lesser extent Honduras, initially to meet labour shortages in Panama and later to further the

conquest and colonization of Peru (Newson 1982:270–75, 1987:101–106; Radell 1992:75).

Humanitarian attitudes, given voice by the Dominicans Bartolomé de Las Casas and Antonio de Montesinos, coupled with practical concerns about the diminishing supply of labour, gradually persuaded the Crown to introduce legislation aimed at eliminating the worst abuses. This growing body of legislation culminated in the issuing of the New Laws in 1542 which among other things banned Indian slavery, introduced official tribute assessments and regulated the use of Indian labour. Although these laws and others were often infringed, they provided the Indians with a degree of protection that had not been enjoyed by previous generations. Hence, Indian communities in regions colonized at a later date did not suffer a demographic disaster of the same magnitude that occurred in the Caribbean and to a lesser extent Middle America.

While these early changes in Crown policy can partially account for differences in levels of depopulation between the Caribbean and the greater part of the mainland, differences in colonial policy cannot adequately explain most regional variations in Indian survival, since laws and institutions formulated in Spain were to be applied uniformly. Colonial practice often departed from theory, so that individual interpretations, and even neglect, of the law might result in short-term actions with significant demographic effects (Sempat Assadourian 1990:262–63). However, colonial officials held office for three or five years only, after which they were transferred to another region. It is unlikely that successive officials in different regions pursued policies so consistently that these might explain long-term differences in demographic trends. In as much as regional variations in the treatment of Indians emerge, they are best viewed as reactions to different local conditions, and in particular to the presence of particular types of Indian societies or natural resources, rather than as the product of different colonial policies or the way that these were interpreted. Even though it has been suggested that in remote regions officials were less competent, enlightened and incorruptible (Butzer 1992:354), the status of frontier regions generally derived from local conditions.

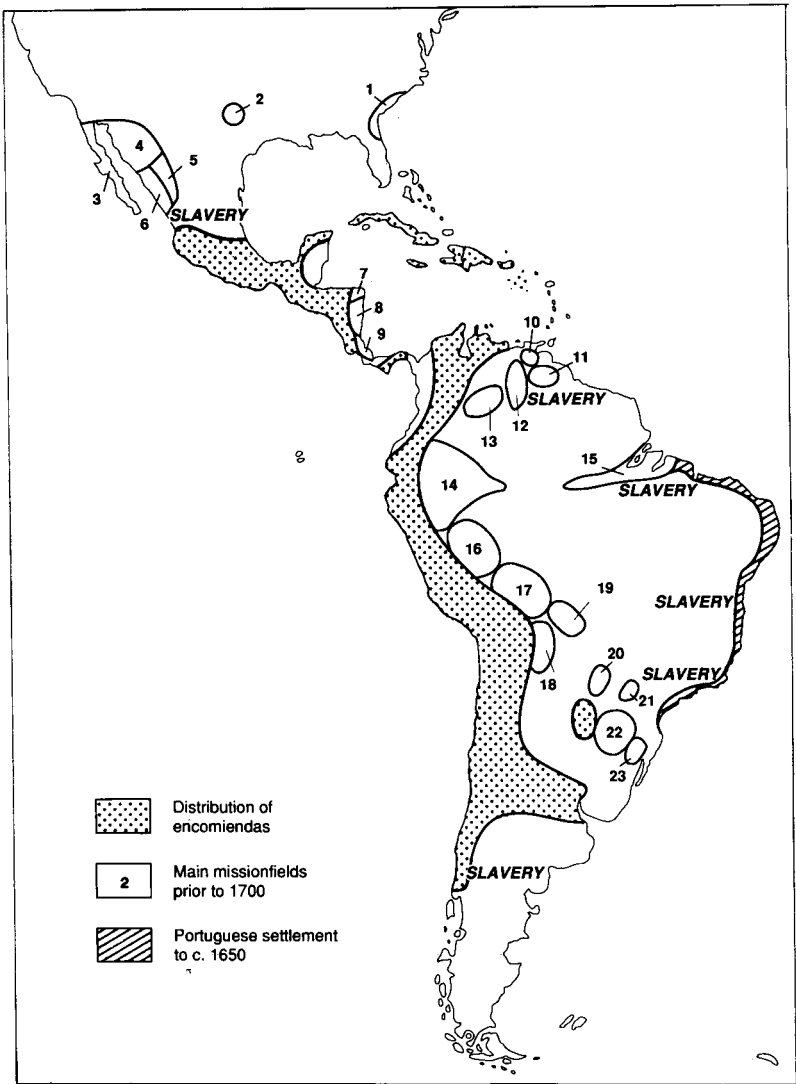
## Colonial Policies and Native Societies

The continued operation of a robber economy and the desolation of native peoples was constrained by obligations placed on the Iberian monarchs by the Pope to convert the newly acquired subjects to Christianity. It was also restricted by the need to maintain a subordinate labour force to generate

wealth and to underpin the establishment of a hierarchical social structure which rewarded colonists and ensured the perpetuation of the empire. While colonial policies aimed at achieving these contradictory objectives did not vary from region to region, in Spanish America different institutions were employed to put them into effect—the *encomienda*, the mission and slavery—the application of which depended on the character and size of the Indian societies encountered (Harris 1964:10–24; Service 1955:416–19).

In areas where populous states and chiefdoms existed, native peoples could be controlled and exploited through the *encomienda* and systems of forced labour (Figure 4). In pre-Columbian times commoners in these socially stratified societies had paid tribute and provided labour for extra-communal purposes. The Spanish could therefore effectively exploit the Indians by modifying the existing forms of exaction, and in addition could control the work force relatively easily through alliances with native leaders. These societies were in effect economically and politically pre-conditioned to accommodate colonial rule (Carmack 1991:406). In such circumstances a more direct form of control and exploitation, such as slavery, was unnecessary. The *encomienda* and forced labour systems were not appropriate for exploiting tribal or hunter-gatherer groups, however, since no organizational structures existed for the exaction of tribute and labour. Furthermore the lack of effective native leadership (and in some cases the nomadic way of life) made the Indians more difficult to control. Since these societies produced small surpluses, if any, and constituted only small sources of labour, the establishment of administrative and institutional structures to incorporate them fully into the empire was not generally considered worthwhile. Where they were subject to the *encomienda*, as in Paraguay, Venezuela and Chile, its persistence depended on closer economic and social relationships between *encomenderos* and native peoples, which in some cases extended to intermarriage (Service 1951:230–52).

For the most part the initial conversion and “civilization” of many tribal and some hunter-gatherer groups was left to the missionary orders who could supply the closer form of supervision required (Figure 4). The Jesuits, Franciscans and Dominicans among others operated on the economic peripheries of the empire, gradually extending and consolidating Spanish and Portuguese dominion in the New World. In Spanish America little effort was expended in bringing nomadic hunter-gatherer groups under effective administration, since they represented even less in terms of tribute or labour and were often exceptionally difficult to control. Only where they presented an obstacle to the exploitation of mineral resources, as in northern Mexico, or where there was an extreme shortage of labour, as in central Chile, were attempts made to control these intractable groups



**Figure 4** *Encomiendas*, missions and slavery in early colonial Latin America.

- |   |   |
|---|---|
| 1 Florida 1565 Jesuits  | 14 Mainas 1630s Jesuits and Franciscans                       |
| 2 Santa Fé 1608 Franciscans                                       | 15 Lower Amazon 1652 Franciscans and Jesuits, 1690 Carmelites |
| 3 Baja California 1697 Jesuits                                    | 16 Charcas 1628 Franciscans                                   |
| 4 Sonora 1614 Jesuits   | 17 Mojos 1668 Jesuits   |
| 5 Chínipas and Tarahumara 1607 Jesuits                            | 18 Chiriguano 1641 Jesuits                                    |
| 6 Sinaloa 1591 Jesuits  | 19 Chiquitos 1690 Jesuits                                     |
| 7 Taguzgalpa 1608 Franciscans                                     | 20 Itatín 1631 Jesuits  |
| 8 Tologalpa 1674 Franciscans                                      | 21 Guairá 1610 Jesuits  |
| 9 Talamanca 1689 Franciscans                                      | 22 Paraguay 1609 Jesuits                                      |
| 10 Cumaná 1659 Capuchins  | 23 Tape 1632 Jesuits  |
| 11 Guayana 1664 Jesuits, 1681 Capuchins                           |   |
| 12 Llanos south of Caracas 1658 Capuchins                         |   |
| 13 Casanare-Meta 1585 Augustinians, 1620 Dominicans, 1625 Jesuits |   |

through enslavement. Although the correlation is by no means perfect, there was a broad correspondence between the size and character of an Indian society and the methods employed by the Spanish to control and exploit it.

In essence Portugal's Indian policy did not differ significantly from that of Spain. In Brazil the Portuguese failed to encounter large sedentary socially stratified populations that might have required the introduction of an institution similar to the *encomienda*. Instead, the "civilization" and conversion of native peoples was sought through slavery and missionization. Although Indian slavery, except in "just war", was banned in 1570, and the ban reiterated in 1595 and 1609 (Hemming 1978:146-52; Kiemen 1954:5-8), the existence of loopholes and ineffective enforcement combined to produce a struggle between the missionary orders and Indian enslavers for the control of native peoples which continued throughout the colonial period. Faced with Jesuit opposition, Indian resistance and declining numbers, employers sought alternative sources of labour in the form of African slaves. By 1600 the number of Tupinambá on the Brazilian coast had fallen from 103,000 to 7,000 (Dean 1985:42, 47) and Black slaves had effectively replaced Indian labour. However, slavery continued to characterize economically marginal areas of Brazil, such as the area around São Paulo and in the Amazon Basin.

These different methods of controlling and exploiting native peoples affected their way of life to different degrees, and as a result had different demographic consequences. In very general terms those Indian communities subject to the *encomienda* and to systems of forced labour were able to survive to a greater degree than those subject to missionary and enslaving expeditions. However, within the broad areas in which the *encomienda* was operative there were variations in demographic trends which were related to the intensity of European settlement and the establishment of commercial enterprises with which it was associated. A full discussion of the processes of cultural change experienced by different Indian societies up to 1650 would require several volumes. What follows is an outline of the major cultural changes experienced by Indian groups subject to different institutions which had particular implications for demographic trends.

### **Indian societies under effective colonial administration**

Those Indian communities that came under effective Spanish administration were required to pay tribute and provide labour. In the early colonial period the exaction of tribute and labour under the *encomienda* was largely unregulated and conditions varied widely, though in general little

attention was paid to the preservation of the labour force which initially was considered to be inexhaustible. As the population declined, and official attempts at regulation proved unsuccessful, in 1549 the right of *encomenderos* to dispose of Indian labour was withdrawn. Subsequently state-sponsored systems of forced labour were introduced which required Indian communities to provide a quota of their adult members to work in rotation on approved tasks for specified periods and fixed wages. Even though legislation banned Indian employment in the most arduous tasks, such as working as porters or in sugar mills, indigo *obrajes*, pearl fisheries, or operating hand pumps to drain the mines, the work was hard, poorly paid and often required extended periods away from home.

The most notorious system of forced labour, known as the *mita*, was established in the 1570s by Viceroy Francisco de Toledo to supply workers to the silver mines of Potosí. At the end of the sixteenth century the Potosí *mita* involved the annual mobilization of about 13,500 workers from communities drawn from a region extending 800 miles from Cuzco in the north to Tarija in the south, who were each to supply one-seventh of their tributary populations for a year's service. Apart from arduous underground work in poorly lit and inadequately ventilated conditions, *mitayos* at Potosí were required to carry back-breaking loads of ore up poorly constructed tiers of ladders, which negotiated depths of several hundred feet. Accidents occurred frequently and deaths from mining accidents amounted to several hundred a year (Bakewell 1984:146). In addition, temperature differences between underground shafts and the surface were often so marked that workers emerged from hot and damp conditions into the dry and freezing climate of the *altiplano*. Respiratory diseases, such as pneumonia and tuberculosis, often exacerbated by silicosis, were common, while those working above ground in the refineries sometimes died of mercury poisoning (Bakewell 1984:149–51; 1987:224, 228; Cole 1985:23–24). Working conditions appear to have been worse in the Huancavelica mercury mine where the rock was unstable and prone to collapse, and the Indians were subject to toxic vapours. In a study of Aymaya in Upper Peru Evans has revealed higher mortality levels for able-bodied males than for other groups in the 1580s, which he suggests was probably associated with *mita* service and higher levels of tuberculosis (Evans 1992:151). Harsh as conditions were in the mines, probably their greatest demographic impact was felt through migration and fugitivism to evade the *mita*, which weakened family ties, depressed fertility levels and encouraged racial mixing (Bakewell 1984:111–13; Cole 1985:27). Indeed the demographic impact of forced labour systems in general appears to have been largely indirect and positively related to length of the period of absence and the distance of the workplace from the place of residence. As

these increased, family ties were weakened and subsistence production undermined. The impact of the labour system, as opposed to the character of the work undertaken, can be seen by comparing conditions associated with textile production. Even though harsh labour regimes developed in the textile workshops of Ecuador, the *obrajes* were located in Indian communities so that family ties and subsistence production could be maintained. As a consequence, even though the work was more arduous, Indian communities were able to survive to a greater degree than where labour was less harsh but was accompanied by more significant social and spatial dislocations.

Although a distinction has been made between Indian societies subject to different institutions, it is clear that those Indian communities subject to the *encomienda* were not only affected by demands for tribute and labour, but also by changes to patterns of landholding, settlement, social practices and religious beliefs, to name but a few. The extent of these changes was largely influenced by the intensity of European settlement and differences in its associated economic activities.

During conquest Indian lands were overrun and pillaged, and as Spanish settlement proceeded they suffered alienation despite the existence of royal legislation, which in theory, at least initially, confirmed pre-Columbian land-owning rights. The alienation of Indian lands occurred most frequently in areas which could produce tropical crops for export or staples for domestic markets in the towns and mining areas. Particularly disruptive were sugar and cacao production which not only stimulated the rapid acquisition of Indian lands or, more often in the latter case, control over Indian production, but also generated high demands for labour (MacLeod 1983:196–202). The cultivation of these crops was concentrated in the lowlands where labour shortages often necessitated the migration of workers from the highlands. Parallel pressures on Indian lands and labour were exerted at more temperate altitudes by the development of commercial maize and wheat production to supply the urban markets (Prem 1992b:457). Ranching generated smaller demands for labour and was possibly less disruptive to Indian communities. Although it often deprived Indian communities of access to sources of wood, water and game, and sometimes resulted in environmental damage, in many cases ranching occupied grasslands which had been underutilized in pre-Columbian times. Furthermore, livestock were often rapidly adopted by Indian communities, providing them with an alternative source of food and even a modest income (Gade 1992:467–69, 473; Licate 1981:114–15).

Increasingly Indian communities faced with declining populations and mounting tribute debts were forced to sell their lands (Prem 1992b: 455–56). Even where they retained sufficient lands for their needs, they

were often overrun by straying livestock or rendered uncultivable due to resettlement programmes or insufficient labour to maintain them. For example, irrigation systems in coastal Peru fell into disrepair as population decline undermined the bureaucratic structures and labour supply necessary to maintain them (Keith 1976:49). Large expanses of land that had been irrigated, terraced or drained fell into disuse. The extent of land abandonment has become more apparent recently as a result of the availability of aerial photographs (Denevan 1992b:375, 380). More generally, Spanish demands for labour reduced the number of Indians available for subsistence production, while the need to raise cash to pay tribute, church fees and meet unofficial exactions by officials and the clergy forced them into the market economy.

How far these changes to native subsistence affected demographic trends is difficult to establish. In the early conquest period wars and epidemics disrupted agricultural production and food distribution systems. However, large scale famines were relatively rare and probably few people starved to death, the worst affected being weaned infants and children. Rather the demographic impact of food shortages was felt through the increased susceptibility of poorly nourished individuals to disease and possibly through reduced fertility. It has been suggested that poor nutrition may shorten child-bearing years, extend amenorrhoea following childbirth and increase the frequency of anovulatory cycles (Frisch 1978:312–20; McKeown 1985:29–49). On the other hand some argue that fertility declines noted during famines may be due to stress-induced amenorrhoea or derive from social responses to crises, such as migration or birth control (Bongaarts 1980:564–69; Menken et al. 1981:426–41).

After the turbulent years of conquest it is unclear whether nutritional levels declined sufficiently to affect demographic trends. Cook and Borah (1979:176) and Super (1988:28–32, 38, 63, 87–88) have argued that nutritional levels did not decline, and that, even if they did, they generally remained adequate. They attribute this largely to the greater availability of meat, particularly from chickens and cattle, which had the added advantage of being less affected by frosts than were crop plants. Broad generalizations are difficult. Food supplies must have varied widely according to ecological conditions and the degree to which Indian subsistence was undermined by land alienation and demands for labour. There are also likely to have been variations in access to food according to class and between urban and rural areas. Colonial food distribution systems were designed to ensure cheap supplies of food for Europeans who lived in the towns, so that paradoxically urban dwellers may have had better access to food than those who retained control of their lands in rural areas, but lacked the resources to work them.



Even if the availability of food did not decline, it is important to note that nutritional status depends not only on food intake, but also upon energy requirements which were highly variable. In cold climates where arduous work was undertaken and there was a constant threat of disease, higher intakes of food would have been necessary to maintain high nutritional status (Rotberg and Rabb 1983:305–308; Walter and Schofield 1989:17–21). In practice this meant those who lived in closely confined settlements in the highlands and were employed in mining, portage and the textile workshops.

The inability of Indian communities to meet tribute demands and labour quotas encouraged individuals and families to seek temporary or permanent wage labour on local haciendas or more distant towns and mining areas. Depopulation and migration led to marriage breakdown, reduced birthrates and resulted in the crumbling of cultural and ethnic barriers to intermarriage. Gradually the Indian population lost ground as the number of persons of mixed race increased. Racial mixing made only a minor contribution to native population decline during the sixteenth century, particularly compared to other factors, but its significance increased during the colonial period as the process gathered momentum. The predominance of men among the first Europeans and Africans to arrive in Latin America, meant that racial mixing characterized colonial society from the early conquest years, but the numbers of non-Indians were relatively small and racial residential segregation policies served to moderate Indian population losses from racial mixing (Mörner 1967:45–46). By 1650 maybe half a million Whites were present in Spanish America, many of whom were actually *Mestizos*, and there were another 70,000 in Brazil. Meanwhile about half a million Blacks had crossed the Atlantic (McAlister 1984:344; Sánchez-Albornoz 1974:74, 1984:18). Despite their relatively small numbers they were highly concentrated in certain areas, most notably in the towns, especially Mexico City and Lima, mining districts and sugar-producing areas, which all emerged as racial melting pots.

Attention has already been drawn to the significance of fertility rates in understanding demographic trends in the early colonial period. Although it has already been demonstrated that mortality losses could directly or indirectly cause a decline in fertility, in the early colonial period several factors operated to maximize reproductive capacity. First, age at marriage is considered to have the most significant effect on fertility rates in non-contracepting societies (Marcy 1981:309). Under colonial rule early marriage was encouraged by officials and colonists alike to expand populations as sources of tribute and labour. In the seventeenth century Bishop Diego de Landa observed that in Yucatán Indians were marrying at twelve or thirteen whereas previously they had married at twenty (cited

in Cook and Borah 1974:51–52). This meant that Indian communities were effectively pushed to their reproductive capacity (Newson 1990:294). Less significantly the Catholic Church's insistence on monogamy and suppression of polygamous practices should in theory have encouraged higher fertility (Krzywicki 1934:201–202). Despite monogamy and low age at marriage, however, adult-child ratios remained low and insufficient to counteract the effects of high mortality rates and psychological barriers to reproduction. González and Mellafe (1965:69) have estimated that in Huánuco in Peru the average family size fell from about six before contact to 2.5 in 1560. By the beginning of the seventeenth century many families were childless and the population in many cases was failing to reproduce itself.

Not to belittle the hardships suffered by those who were subject to the *encomienda* and systems of forced labour, the changes they experienced occurred more gradually and did not result in the complete destruction of their culture. This was particularly true in economic peripheries where European influence was less direct and the tempo of change was slower. Missionization and enslavement brought more immediate and fundamental changes to subsistence patterns, settlements, marriage rules and religious beliefs, the demographic consequences of which posed greater threats to survival.

### **The impact of missionization**

The missionary orders, amongst whom the Franciscans, Jesuits and Dominicans were the most active, operated on the peripheries of the Spanish and Portuguese empires, where they not only undertook the preliminary conversion and "civilization" of native peoples, but extended territorial control over areas which were under threat of foreign domination. The major mission fields were located in northern Mexico, along the eastern flanks of the Andes from Venezuela to Bolivia and in the Río de la Plata region (Figure 4). Missionaries were most active here in the eighteenth century when the risk of foreign occupation increased, but most had been working there from the late sixteenth or seventeenth centuries. Missionization brought different types of changes to native communities. Missionaries were often unwitting agents in the spread of Old World diseases. Their introduction not only resulted in direct and massive population losses, but since many tribal groups among whom the missionaries worked attributed sickness and death to sorcery which required revenge, epidemics were often accompanied by increased levels of inter-tribal warfare which raised mortality rates even further. Other direct losses resulted from attempts to congregate and maintain Indians in the missions,

in addition to which the cultural changes (experienced both by those within the missions and in communities from which the converts were drawn) were often so profound as to affect demographic trends significantly.

The process of establishing missions varied with the cultural background of the native groups encountered and the political circumstances in which missionization took place. Dispersed and semi-nomadic or nomadic groups were generally reluctant to settle and remain in the missions. Force was often required to bring reluctant converts and fugitives into the missions and maintain them there. Soldiers and Indian auxiliaries, sometimes drawn from traditionally hostile communities, were often involved in the process which resulted in loss of life and sometimes enhanced intertribal conflict. Although losses might be small in terms of numbers, they were of considerable significance to the communities they affected. Where groups were sedentary, the missionization process was accomplished with smaller losses of life and did not involve such significant spatial and social dislocations (Reff 1991:266-67). Finally, other groups such as the Guaraní in Paraguay and the Omagua in the Amazon Basin, actively sought Jesuit protection from Portuguese slave raiders.

Apart from direct losses from Old World diseases and conflict, the cultural changes required by the missionary orders often had significant indirect demographic effects. Many groups affected by missionization were semi-nomadic and practised swidden cultivation combined to varying degrees with hunting, fishing and gathering. The missionary orders considered a sedentary existence based on permanent cultivation to be more "civilized" than a nomadic one based on the exploitation of wild food resources; it also facilitated control and conversion of the Indians. While these changes to native subsistence patterns were generally insisted upon, generalizations about the economic impact of missionization are not easy, given the variety of local ecological and cultural conditions that prevailed, and the diverse political circumstances in which missionary activities were conducted.

There is evidence from some areas that, despite the introduction of livestock and new crops, food shortages under missionary control were common, and dietary intake declined (Aschmann 1959:209; Cook 1943b:55). In some cases dietary inadequacies derived from the inability of soils surrounding the missions to support the relatively large populations these communities contained (Jouanen 1941 1:403). Although environmental conditions were clearly important, mission success also appears to have been related to the extent to which native groups had been familiar with and dependent upon farming (Ruhl 1990:571). Even if diets remained adequate in terms of calorific intake, there is some evidence that dietary variety declined. Despite the introduction of livestock, protein consumption

sometimes fell as hunting and fishing were suppressed, since they afforded opportunities for fugitivism (Figuerola 1904:73, 83, 369, 377). Some support for the dietary changes noted in historical sources has been found in skeletal remains from missions in California and La Florida. These suggest that, while mission diets may have been nutritionally adequate, they lacked variety, and in some cases Indians suffered from iron-deficiency and growth retardation (Larsen et al. 1990:413–417, 422; Walker et al. 1989:353–55, 361).

The impact of missionization extended beyond those groups gathered into the missions. Missionary expeditions often had dramatic short-term effects on production, while the loss of only a small number of Indians of a particular sex and age, either to the missions or in conflict, might have severely affected the availability of labour for particular subsistence tasks needed to maintain balanced diets (Krech III 1978:717). This problem is likely to have been more acute in regions of marked seasonality or where groups were dependent on a limited range of resources. Missionary activities also encouraged Indian groups to retreat from exposed river banks or other fertile regions to more remote locations, such as interfluvial areas, where the soils were generally less fertile and wild food resources less abundant. While deteriorating nutritional levels may have heightened the impact of disease, epidemics in turn affected nutrition. The severest famines followed in the wake of epidemics, when Indians were unable to cultivate the land, and being largely unfamiliar with methods of storing food, unlike societies based on intensive forms of production, were unable to fall back on accumulated surpluses.

Tribal communities found it difficult to withstand the impact of population losses incurred during the process of missionization and as a result of epidemics. Nevertheless, some groups were able to recover while others continued to decline. Their ability to do so appears to have been strongly influenced by their marriage rules and the manner in which these interacted with population size. It was also affected by the Indians' psychological reaction to missionization and their ability to adapt to changed circumstances both within and outside the missions.

In tribal societies adult losses resulting from epidemics and conflict were particularly difficult to accommodate due to small marriage pools and cultural restrictions on remarriage and the suitability of spouses. Even small losses might severely reduce the reproductive capacity of a group, in some cases below the threshold that would enable it to recover (Harvey 1967:195–96). For groups to survive it was often necessary for them to modify their social attitudes and population policies. The significance of cultural flexibility for survival has been demonstrated by Wagley (1951) for two Tupí tribes. He shows how following European contact the

Tapirapé declined as they adhered to marriage rules and population policies which had functioned to control population growth, while the more flexible marriage rules of the Tenetehara, which facilitated population increase, enabled them to survive. The fact that many native peoples that survive today are exogamous indicates the success of this strategy in overcoming the problem of reduced marriage pools (Dobyns 1983:306, 310–11; Milner 1980:47; Thornton 1986:128–29).

Even though missionization resulted in marriage breakdown and interrupted reproduction, those within the missions were forced to marry early and to adopt Christian marriage practices. This often involved the suppression of polygamy in favour of monogamy which is generally thought to promote higher levels of fertility (Krzywicki 1934:201–202). However, fertility levels were also affected by negative responses to mission life. Colonial observers were often at a loss to explain why, when removed to the missions, previously fertile populations failed to reproduce. One Jesuit missionary in the province of Mainas, Ecuador observed that mission Indians like “wild birds when captured or caged become sterile” (Figueroa 1904:23). The failure to reproduce could be attributed to a number of social or psychological processes such as abstinence from sexual intercourse, higher levels of infanticide and abortion, or stress-induced amenorrhea. Mission populations were therefore often sustained by the addition of new converts rather than by natural increase despite the positive effects that might have derived from the imposition of monogamy. It is clear that declining fertility rates contributed to the failure of many tribal and hunter-gatherer groups to recover; in this respect they contrast with more populous Indian societies that came under effective Spanish administration.

In adapting to changed circumstances and coping with disasters the existence of a stratified social structure and the role played by native leadership in shaping community reactions and organizing practical responses to crises may have been critical to survival (Stannard 1991:531). Among tribal groups the absence of effective native leadership and of organizational structures would have enhanced their vulnerability. A study by Neel and others (1970:428) of a recent measles epidemic among the Yanomama observed that village life completely collapsed, with few members left to provide food or care for the sick, and the concern for well-being seldom extending beyond the immediate family. These authors concluded that mortality rates were raised significantly as a result of the inability to cope with the crisis which engendered demoralization and fatalistic attitudes towards death. Within the missions the role of native leaders was effectively replaced by the missionaries, who were generally spared the ravages of disease, and in epidemics provided practical support

and cared for the sick (Reff 1991:260–63, 278). Even though the medical treatments employed by the missionaries were probably of little intrinsic value, the nursing care they provided may have had a significant impact in reducing mortality levels (Carmichael 1983:59–60; Crosby 1976:294). Again, those inside the missions may have had a marginal survival advantage over those who remained outside.

In general these arguments suggest that not only were tribal communities and hunter-gatherer groups more vulnerable to changes they experienced as a result of missionization, which were usually more fundamental for them than for socially stratified societies, but their ability to respond to them was more limited.

### **The impact of Indian slavery**

Enslavement was ultimately the most destructive agent of change. Although it had been banned in Spanish America in 1542, it continued in remote areas where economic imperatives demanded the control and labour of neighbouring hostile groups such as the Chichimeca, Apache and Meco in northern Mexico (Powell 1952; Zavala 1967:65–67) and the Araucanians of central Chile (Korth 1968:188–208). Enslavement was also permitted on occasions for particularly hostile groups, such as the Carib of Venezuela and the Pijao of Colombia (Góngora 1975:130; Whitehead 1988:174). Unofficial *entradas* in areas remote from official surveillance, e.g. from the Andes into the Amazon headwaters, also sought slaves to supplement dwindling *encomienda* populations. Although Indians in Brazil could be enslaved only in “just war”, the existence of this loophole, coupled with ineffective enforcement, as well as the pressing need for labour, meant that the legislation became largely academic and Indian slavery was a significant feature of Brazilian life (Hemming 1978:150–52).

The process of enslavement itself resulted in casualties, though the fact that it was often motivated by labour shortages, encouraged restraint. Slavery on the frontier was different from that which had prevailed in the Caribbean islands in the early colonial period where few incentives had existed to preserve the labour supply, which at that time was considered to be inexhaustible. Those captured as slaves were transferred, often as individuals or small groups, to alien environments where they were unable to maintain their cultural or racial identity. Araucanian slaves were sold in central Chile and Lima, and Chichimeca were marketed in Mexico City (Góngora 1975:130–31; Jara 1961:163–66; Zavala 1967:81). Meanwhile the communities from which the slaves were drawn suffered in much the same way as those that lost converts to the missions, but in many cases the impact of enslavement was amplified by the smaller size of many

of the communities that it affected. Ultimately slavery was more disruptive to native societies than either the imposition of the *encomienda* or missionization.

## Conclusion

The most recent research suggests that between 1492 and 1650 the native population of the Americas fell from just over 50 million to just over five million. Nevertheless, not all societies suffered equally. Those in the highlands of Middle America and the Andes were able to survive to a greater degree than those in the Caribbean and tropical lowlands. Although most researchers agree that the introduction of Old World diseases was a major factor in the decline, it alone cannot explain such spatial variations in Indian depopulation. Inasmuch as there were differences in the impact of disease, the pattern is likely to be more complex than generally recognized, and related to cultural as well as environmental conditions.

Critical factors in explaining the differential decline of native populations appear to have been the size and character of native societies, which influenced the methods used by the Spanish and Portuguese to control and exploit them, and in part also determined the intensity of European settlement. Indian survival was favoured where native societies were more productive, populous and highly structured, so that they could be controlled and exploited through the *encomienda* and the systems of forced labour. For those communities that survived the devastation of the early conquest years, the changes they experienced occurred more gradually and did not result in the total destruction of their culture. Subsistence patterns were modified with new demands for tribute and labour and as a consequence of the introduction of new patterns of landholding and forms of production. Meanwhile social relations and power structures, weakened by depopulation, gradually adjusted to the new social and political order. However, within the areas that came under effective colonial administration, there were local variations in Indian survival which were related to the intensity of European settlement and the demands it made on Indian lands, labour and production. Elsewhere missionization and enslavement brought more immediate and profound cultural changes to native settlements, subsistence patterns, social relations and beliefs, the demographic consequences of which rendered the chances of survival more problematic.

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