

Indigenous Health 2

Indigenous health in Latin America and the Caribbean

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This review is the second in a series on Indigenous health, covering different regions and issues. We look briefly at the current state of Indigenous health in Latin America and the Caribbean, a region with over 400 different indigenous groups and a total population of 45 to 48 million people. We describe the complex history and current reality of Indigenous peoples' situation within the American continent. We discuss the importance of Indigenous health systems and medicines, and look at changing political environments in the region. The paper concludes with a discussion of the changing political and legislative environment in Latin American countries.

Introduction

Latin America and the Caribbean have vibrant and politically active Indigenous populations. Over 400 different Indigenous groups are estimated to live within the region—roughly 10% of the total population.^{1,2} Recent data suggest that Indigenous peoples remain some of the most marginalised in every country in the region.³ We describe the complex history of Indigenous peoples' situation within the American continent and the severe effects of European invasion, which still continue today. However, we cannot cover all 43 Latin American and Caribbean countries and dependencies of the continent. As with the other papers in this series, information was drawn from a range of sources, including peer-reviewed papers, and government and non-governmental sources. We draw on classic anthropological studies and on grey literature from international agencies and Indigenous organisations.

We noted some publication bias of data for this region. Some countries are well represented in the published work (such as Brazil) despite their small Indigenous populations. However, data are scarce for particular groups and particular countries. Although our review includes Caribbean countries, we can present few data for their situation. The political nature of indigeneity also determines availability of data—in many countries indigeneity is a complex sociopolitical form of identity, which might or might not be recognised. Even if indigeneity is measured, data are not always disaggregated by ethnicity.

Indigenous demography in Latin America

Indigeneity is a complex notion with varying definitions. The UN Permanent Forum on Indigenous Issues does not have a universal definition of indigeneity. However, for the purposes of obtaining important data for Indigenous peoples and their wellbeing, a definition does exist, built on a study by Martinez-Cobo.⁴ Indigenous peoples are the original inhabitants of an area, the descendants of the original inhabitants who are colonised, and those who live in an Indigenous way and are accepted by the Indigenous community. Indigenous people could also be those who are successful in maintaining ancestral behaviours over specific territories with or without

traditional lands. Indigeneity in Latin America and the Caribbean is, as in many parts of the world, most clearly defined as those who predated European conquistadores. Despite the huge diversity of peoples and cultures, there also seems to be some societal commonalities in Indigenous communities in the region: these are cultural (shared knowledge, identity, and wellbeing strategies), political (self-determination, internal hierarchies, territorialism), spiritual (ideology, belief system, religion), and ecological (use of natural resources, ecological cycles, carrying capacity of ecosystems). Few of these criteria are used practically to define indigeneity—a reality that has great implications for measurement of health and wellbeing in the region.

Indigenous languages in Latin America and the Caribbean are an important means of self-identification and group-identification, and belong to 34 language families and two special language groups.¹ This diversity equates to roughly 400 different Indigenous languages throughout Latin America, and as a World Bank report suggests, “every country has from 7 to 200 languages. Uruguay is the only country in the continent that is Spanish-monolingual.”⁵ Language is fundamentally important to Indigenous health, both in terms of its use as a predictor of all things Indigenous and as a medium for transmission of knowledge within cultures and health systems.

Demographic estimates of Indigenous populations within the region vary, and depend fundamentally on the way in which indigeneity is defined and measured.⁶ Language has been the most common means of defining indigeneity in most census counts.⁶ More sophisticated measures of indigeneity have also been included, most incorporating more subtle indicators of self-definition,

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Search strategy and selection criteria

We searched PubMed for health studies, and JSTOR for political and historical texts. We searched in English, Spanish, and Portuguese with search terms in these languages such as: “Indigenous”, “Indian”, “Caribbean”, “Latin America”, “South America”, and individual country names with “health outcomes”, “demography”, and “history”. We also searched using individual Indigenous community names where possible.

such as ethnic self-identification, evidence of an Indigenous language spoken, and even, as in Guatemala, the use of cultural clothing (in this case Mayan). These variations in measurement have a great effect on estimates of population size.⁷ Mexico has used language to define Indigenous populations in many of its census counts. Schmal⁸ reports that in 1895, 27% of people aged 5 years or older in the Mexican Republic spoke Indigenous languages. By 2001, this figure had dropped to 7·1%. By this measure, Indigenous populations would disappear when their language does, and in fact population estimates in 1990 matched estimates of Indigenous language speakers.⁶ In 2000, Mexico used three criteria: language, living in an Indigenous household, and “Persons who consider themselves Indian but do not speak an Indigenous language”.⁶

The proportion and distribution of Indigenous peoples vary widely in every country in the region and across the continent (table 1, figure 1). Although only 14% of Mexico’s population is Indigenous, the country still has the largest number of Indigenous people—more than 13 million. 89% of Indigenous peoples in Latin America and the Caribbean live in only five countries: Bolivia, Guatemala, Peru, Ecuador, and Mexico, all of which have between 5 and 13 million Indigenous citizens.

Different definitions of indigeneity in different countries determine the estimates of Indigenous populations (table 1), although to what extent is not known. Self-definition as Indigenous can have social and cultural ramifications. At various times in Mexico, some people did not want to report their languages or self-identify as Indigenous.⁸ A recent Brazilian study analysed different estimates of Indigenous populations living in the Amazon, which varied by up to 21 000 between data from the census, the national Indigenous organisation of the government (FUNAI), and a national non-governmental source.¹⁹ The investigators suspected that one discrepancy was due to the self-identification as Indigenous of urban peoples, who feature in the census but not in other databases.²⁰ To understand current distributions of Indigenous peoples in the region, we need to understand the demographic history.

History of Latin American Indigenous health

In Latin America, there are two clearly defined periods: crudely, before and after the European invasion of the late 15th and early 16th centuries. The region had previously been a mosaic of Indigenous groups and territories produced by thousands of years of competition among different cultures. The more complex cultures were developed in mountain and rainforest ecosystems. Imperial groups such as the Inca, Maya, or Aztec had growing territories, with huge urban populations and notorious political and military influence. Simultaneously, hunter and gatherer communities maintained more or less permanent territories in smaller populations. Sometimes hunters and gatherers also increased their influence, as did the Guaraní in southern parts of Latin America.²¹

The estimated total population of Indigenous peoples before the European invasion ranged from 52·9 to 150 million.^{22,23} Indigenous peoples’ territories were neither static nor peaceful. Different groups increased and decreased their territories, and developed different weapons, war systems, and food strategies. Health and wellbeing throughout this period was closely related to a sophisticated knowledge and use of local ecosystems, built on centuries of accumulated understanding.

Rapidly, European invasions drastically changed the pre-Columbus mix of peoples, cultures, territories, and populations, and their inter-ethnic and ecological relationships. More exposed populations, such as those of coastal areas, suffered the greatest effects. The

	Total population	Indigenous population	% Indigenous
Bolivia†	7 960 000	5 652 000	71%
Guatemala	10 801 000	7 129 000	66%
Peru	24 797 000	11 655 000	47%
Ecuador‡	12 175 000	5 235 000	42·99%
Belize§	230 000	44 000	19·13%
Honduras	6 147 000	922 000	14·99%
Mexico	95 831 000	13 416 000	13·99%
Chile	14 824 000	1 186 000	8%
El Salvador	6 032 000	422 000	6·99%
Suriname ¶	414 000	25 000	6·03%
Guyana	850 000	51 000	6%
Panama	2 200 000	132 000	6%
Nicaragua	4 807 000	240 000	4·99%
French Guyana **	100 000	4 000	4%
Paraguay	5 222 000	157 000	3%
Trinidad Tobago	1 283 000	26 000	2·02%
Colombia	40 803 000	816 000	2%
Venezuela ††	23 242 000	465 000	2%
Jamaica	2 538 000	51 000	2%
Puerto Rico	3 600 000	72 000	2%
Dominica	2 700 000	54 000	2%
Barbados	268 000	3 000	1·11%
Guadalupe	280 000	3 000	1·07%
Martinique	73 000	1 000	1·01%
Bahamas	296 000	3 000	1%
Argentina †††	36 123 000	361 000	0·99%
Costa Rica	3 841 000	38 000	0·98%
Brazil §§	165 851 000	332 000	0·20%
Uruguay	3 289 000	1 000	0·03%
Total	476 577 000	48 496 000	10·17%

Data are drawn from several sources,^{24,25} and compared with local estimates when possible. *Latin America and the Caribbean have 43 countries (South America 13; Central America and Mexico 8; and the Caribbean 22). Data available for 29 countries where Indigenous populations are substantial (end 1990s–beginning 2000s). Other estimates of populations based on different methodologies, definitions of indigeneity, and censuses are the following: †5 800 000 indigenous people in 1994.^{11,22} ‡910 146 indigenous people in a total population of 10 600 000 in 1990 (24·85%)²³ while another source estimates the indigenous population at between 40% and 45% of the total population.¹⁴ §38 562 in 2002–03.¹⁵ ¶22 000–25 000 people in 2005.¹⁶ ||60 000–70 000 people in 2002–03.¹⁵ **15 000 people in 2002–03.¹⁵ ††534 816 individuals representing 2·14% of total population.¹⁷ †††318 683 Indigenous people in 2004, slightly fewer than indicated here.¹⁸ §§370 000 people in 2006 representing 0·20% of total population.¹⁹

Table 1: Indigenous populations in Latin America and the Caribbean by country*

Indigenous peoples living in quite isolated environments or difficult climates for the invaders survived for some time without external influences. The Darien areas in Colombia and Panama, and the deep rainforest in Amazonia, are good examples of protective environments. Unfortunately for the Indigenous peoples who developed mining technologies, the gold and silver they used were of great value to the Europeans. To extract this mineral wealth as much as possible, the invaders ruthlessly subjugated the Indigenous population.²⁴

Indigenous peoples faced an even greater threat than armed invasion—disease. Within 100 years, the estimated total Indigenous populations dropped from up to 150 million (before European invasion in 1492) to 11 million.^{22,23,25,26} This massive demographic collapse was mainly due to foreign bacterial and viral diseases introduced by Europeans. Smallpox and measles were among the most deadly diseases introduced,²⁷ but influenza, yellow fever, and typhus also arrived during this time.²⁸ The effect of these diseases was enormous. Denevan²⁹ estimates that, in many regions, particularly the tropical lowlands, populations fell by 90% or more in the first century after contact. One of the first regions to be contacted by the Spanish in 1492 was the Caribbean, and mortality rates in the Indigenous communities were as high as 900 per 1000 people.³⁰ In tropical lowlands, Indigenous populations fell by more than 99%,²⁹ in Peru from 9 million in 1520 to 670 000 (92%) in 1620,⁶ and in the Basin of Mexico from 1.6 million in 1519 to 180 000 (89%) in 1607. At the time of the Spanish invasion of Nicaragua in the 1520s, there were 600 000 Indigenous people—in 1550 there were only 45 000.^{22,29,31} At the end of the 16th century, Brazil had 1000 different Indigenous groups with 2–4 million people.¹⁹ Four centuries later the total Indigenous population had diminished to 220 000 individuals.³²

According to Chaunu,³³ by the time that Indigenous people in Latin America were contacted by the Europeans in the late 15th century, they represented 20% of the population worldwide. A century later both Indigenous peoples and immigrants represented 3% of total population. In the 18th century, Indigenous populations from Latin America and the Caribbean represented merely 1.6% of total population.²⁵ However, some demographic recovery seems to have taken place: in 1960, the total Indigenous population of Latin America and the Caribbean was estimated as 14.1 million; by 2003 it was more than 48.4 million. Importantly, although the total Indigenous population seems to have been recovering, there currently are fewer different groups. In Brazil, the total number of Indigenous groups diminished from 1000 (in the 17th century) to 222 groups.^{19,32,34}

Figure 2 shows the rise and fall—and recovery—of Indigenous populations in Latin America and the Caribbean. Data are based on four different periods, each addressing analyses of different periods.^{2,9,23,35} Each analysis is drawn from various sources, and the figures

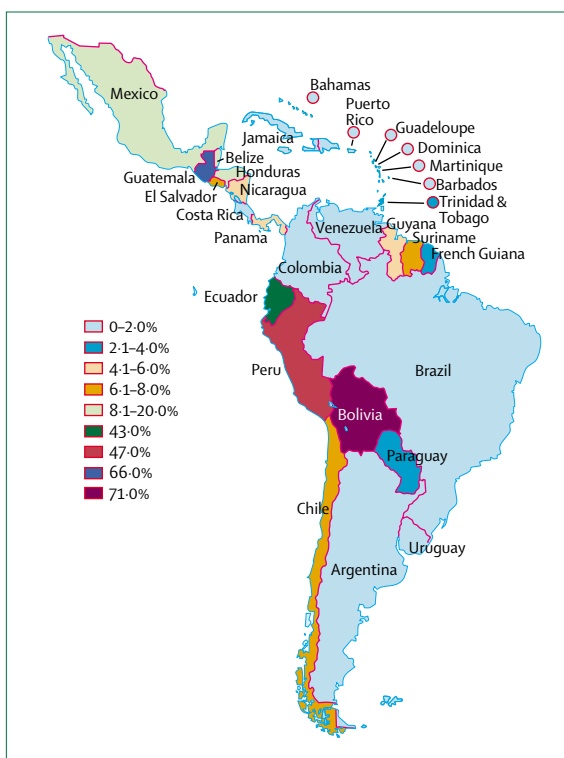


Figure 1: Percentage of Indigenous population with national population by country in Latin America and the Caribbean (end 1990s–beginning 2000s)

are likely to be approximate, especially the historical data. However, figure 2 shows the dramatic and rapid collapse of Indigenous populations after the European invasion, hitting a low in the 18th century, and a recovery that only started in the late 20th century. In view of the issues of measurement of Indigenous demography, and the effects of changing definitions of indigeneity, most analysts agree that population estimates remain only approximate. In the more recent estimates, the development of self-definition as a criterion for defining indigeneity could be responsible for some of the apparent recovery of population numbers. Reports of extinctions were also

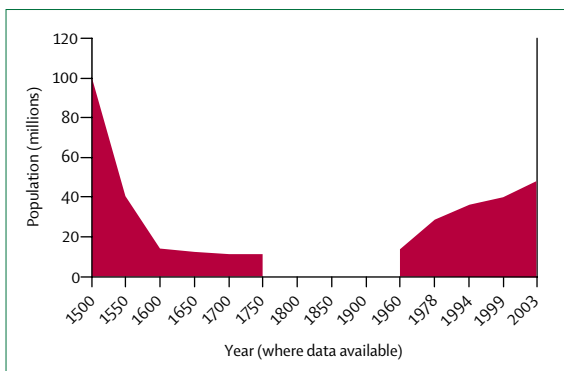


Figure 2: Indigenous population in Latin America and Caribbean (1500–2003)

Inadequate data available between 1750 and 1960.

possibly inaccurate. For example, until recently many analysts argued that by the late 18th century all Indigenous peoples in the Caribbean were extinct, a historical deception that Forte³⁶ and others argue is related to the politics of demographic recognition, which recent genetic studies have begun to overturn.^{30,37}

The changing mix of Indigenous peoples

The overlap of old Indigenous territories with new non-Indigenous ones produced new mosaics of peoples, cultures, and health systems. This colonial-dependent process distorted many pre-Columbian social and environmental conditions. The demographic collapse produced by European diseases (the so-called McNeill effect) was followed by introduction of European fauna and flora species,^{23,38} and the subsequent destruction of natural ecosystems (biological collapse and ecological collapse).

During the past two centuries, Europeans have influenced even isolated Indigenous communities, and almost all communities will probably be subjected to foreign pressures in the years to come. The result is a gradient of cultures, and a mix of inherited and non-inherited characteristics. For example, the Caribbean is a highly mixed population, linked to the decimation of Indigenous groups and the subsequent importation of slaves from Africa.^{36,37,39} Groups such as the Taino lived in Cuba, Puerto Rico, the Dominican Republic, and Jamaica before European invasion. A study in Puerto Rico recorded maternal ancestries in a sample population of 61·3% Amerindian, 27·2% sub-Saharan African, and 11·5% western Eurasian.³⁹

Outside influence on Indigenous peoples affects not only the mix of genes, but also language and cultural patterns. Relative isolation preserves behaviours through geographic, cultural, and language barriers, whereas inter-ethnic exchanges promote a new mix of cultural patterns. Isolated groups exist who maintain most of their traditional culture, and some have chosen to live in isolation from mainstream society. However, many Indigenous peoples have been forced towards cities and mainstream societies. Others have been resettled to new and often less hospitable lands, have been pushed off their land altogether, or have experienced long-term attrition of traditional cultural patterns.^{40,41}

Across Latin America and the Caribbean are substantial populations who adopted foreign cultures, both voluntarily and involuntarily (acculturation). They speak their own languages and the dominant European language. They might or might not self-identify as Indigenous dependent on political conditions, and could live and work in the same way as their non-Indigenous or mixed-race neighbours.^{6,36} These changes lead to an incorporation of Indigenous peoples into mainstream society, but often into the worst socioeconomic roles,⁴⁰ and often moving far from their homelands. A study of migration of the Mixtec of Mexico reported on their

exodus from their homes, crossing state and national boundaries, and their move into the most marginalised labour roles of western societies: “more than 20 000 Mixtec were estimated to be employed in California, Oregon, and Washington in 1990. The Mixtec find temporary work in agriculture but also in small cleaning and maintenance enterprises. In Mexico they work as agricultural laborers or construction workers, domestics or ambulatory vendors”.⁴²

One unifying feature of Indigenous peoples' socioenvironmental context is that of poverty—a term constructed in western or mainstream perspectives in material terms.^{43–45} Thus, a study of Indigenous poverty in Latin America looked at the case of Peru and indicators including housing, education, water, sanitation, and home ownership. The investigators concluded: “Most of the Indigenous population of Peru is poor, at 79 percent, and more than half is extremely poor. In fact, Indigenous people are one and a half times as likely to be poor than are non-Indigenous people, and almost three times as likely to be extremely poor.”⁴⁴ Indigenous peoples who integrate into mainstream economic systems fare worse than others. The latest World Bank study³ on poverty in the region, looking at income inequality, reports that “the Indigenous population in the region on average earns 46 to 60 percent of the earning of non-Indigenous”. Similar studies have been undertaken in many other Latin American countries.^{6,46} Material poverty has different effects on Indigenous health and wellbeing depending on the socioenvironmental context in which people live.

Health issues

Many Indigenous peoples in Latin America still live in isolated environments where conditions are harsh. People living within natural ecosystems are exposed to many health hazards produced mostly by their difficult environment. In the past, health risks were linked to basic access to foods, water, and shelter and, in many contexts, risks from predators. The arrival of new populations from Europe brought new diseases that were especially lethal for communities living in warm lowlands. According to Smith,⁴⁷ the 17th century depopulation of South America was catastrophic in tropical coast environments (up to 90% mortality) and less so in the central Andes plateau (between 25% and 30%). For comparison, effects in the central Andes were equivalent to the demographic collapse produced in Europe by the epidemics of bubonic plague in the 14th century.

Data for current health of Indigenous peoples in the region are plentiful, but scattered, depending on individual groups of scientists and their studies, not on government databases. Some countries such as Brazil have made great efforts to gather data, and even have a specific Indigenous government cell tasked with obtaining information on groups in isolation.¹⁹ Studies

mentioned in this review looked briefly at mortality differentials for children, then at morbidity and followed with a short discussion of patterns according to contact with mainstream society.

Health differentials

Existing studies suggest that in most Latin American countries Indigenous people have higher rates of mortality and morbidity indicators than their non-Indigenous counterparts, and in some cases indigeneity can be a proxy indicator of poverty against which to measure health disparities.^{48,49} In the late 1990s, the Pan American Health Organization undertook a review of Indigenous health in the region, and noted major inequalities in health outcomes for Indigenous peoples compared with majority populations.^{50,51}

The national average infant mortality rate in Ecuador was 22 per 1000 infants in 1994, whereas in the Indigenous communities of Colimbuela and Cumbas the rate reached 83 and 67 per 1000, respectively. Of Indigenous children in the Amazon in Peru, the Campa-Ashaninka had an infant mortality rate of 99 per 1000 infants, and the Machiguenga had a rate of 100 per 1000. Other studies show that, despite demographic recovery in some communities,¹⁹ high rates of infant mortality still persist and can be 3–4 times higher than national averages.^{48,52–54} Infant mortality in Ecuador is as high as 100 per 1000 infants for the Indigenous community compared with a national average of 30 per 1000.⁵⁵ These high rates of infant mortality can be linked to high birth rates in some communities, and as conditions improve a demographic recovery could take place. Analysis of the changing health of the Xavante in Brazil “showed evidence of introduced diseases, which increased infant mortality and threatened population replacement, followed by decreased infant mortality and a large cohort of reproductive age women increasing population growth”.⁵⁶

Differentials might persist despite demographic recovery. Unpublished data⁵⁷ show that in 2003, the national infant mortality rate in Brazil was 31 per 1000 infants, whereas for the Xavante community the rate was 106 per 1000; in Colombia the national rate was 19 per 1000, but for the Wayu was 111 per 1000; and in Mexico the rate was 40 per 1000, whereas for the Tzotzil was 81 per 1000.

Maternal mortality might also be higher for Indigenous communities, particularly in remote areas where maternal mortality rates could be twice or three times as high as national averages.^{58,59} In Ecuador in 2003, maternal mortality was 74·3 per 100 000 people nationally,⁶⁰ whereas recent data suggest that it is 250 in remote Indigenous communities.⁵⁵

Even in the context of overall social and health inequalities within the region, there is evidence that Indigenous children fare badly. In 2005, Cardoso and colleagues³³ undertook an overall review of infant

mortality differentials by race and colour within Brazil. The investigators noted that infant mortality in black children was 30–80% higher than for white or mixed race (brown) children. They report that “infant mortality in Indigenous children was 40% to 90% higher than that of white or brown children”.

Demographic viability

For smaller Indigenous populations, high rates of infant mortality are not just tragic, but demographically disastrous: small epidemics can destroy a whole generation, with effects on demographic viability for the whole community.⁶¹ Demographic crashes are not a thing of the distant colonial past, but are still linked to contact with mainstream society. A study of the Xavante in the Sangradouro-Volta Grande Indigenous Reserve in Mato Grosso, Brazil, reported that “permanent contact with Brazilian national society, established in the 1940s and 1950s, caused a population drop due to epidemics and clashes”.⁵² By 1995 there were 825 individuals in the community,⁵² showing a partial demographic recovery. According to Azevedo,¹⁹ many analysts report a demographic recovery for some Indigenous groups in Brazil.⁵⁶ She reports that the Indigenous population overall has been growing (from 1996 to 2000) on average by 3·5% per year, substantially more than the annual growth rate for the overall Brazilian population (1·6%), but this finding must be put in context with previous crashes. A study of the Nambiquara of western Mato Grosso in Brazil reported pre-contact populations of 6000 (before 1910) dropping to 600 by 1970. The death rate was estimated as 60 per 1000 individuals between 1969 and 1974, and 53 per 1000 between 1943 and 1965, and the community has only started to recover.⁶²

Morbidity patterns

Studies suggest that morbidity rates are also higher in Indigenous populations. In Bolivia, the Guaraní, with a population of 153 483, show a prevalence of tuberculosis five to eight times that of the national average.⁵⁶ Gastrointestinal diseases are the main cause of death for children younger than 5 years.⁵⁷ In Misiones in Argentina, 78 Mbya Guaraní communities remain, with 4083 members in 1400 families.¹⁸ 57% of Guaraní children younger than 5 years were undernourished and 43% had chronic undernutrition.^{63,64} Parasite loads are often high within Indigenous communities and correlate with poor nutritional status.⁶⁵

Disease patterns within and between Indigenous communities depend quite profoundly on degrees of contact with mainstream society, just as they did in the early periods of European invasion. Even short-term contact can lead to disease outbreaks that can be traced to one or two contacts, maybe passing infections up and down a transport route.⁶¹ This spread can be particularly clear in the parts of the Amazon, where all transport is by river and communities are located along these aquatic

ecosystems. Local ecology can also affect disease transmission. A study in Venezuela⁶⁶ mapped differences in the transmission dynamics of onchocerciasis between different river courses.

Resource exploitation in remote areas^{46,67,68} of Latin America affects Indigenous peoples health, almost always negatively.^{69,70} Effects can be direct through environmental contamination,⁷¹ but can also be linked to social contact with workers in mining and exploration projects. In Argentina, hair analysis of Indigenous people living near the Pilcomayo river, in Formosa, showed high concentrations of heavy metals linked to mining spills produced in Bolivia.⁷² During the 1990s, the first cases of HIV were recorded in Indigenous communities in Brazil. In a review of this issue, the journal *AIDS Weekly Plus* reported that “10–15% of Brazilian Indians are infected with some form of STD. Indians at high risk, those living near urban areas or having regular contact with mining and forestry workers, particularly the wildcat goldiggers known as ‘garimpeiros’”.⁷³ Some authors believe HIV will have the same effect on Indigenous peoples as the original epidemics brought by the conquistadores.⁷⁴

Diseases of acculturation

A range of health outcomes in Indigenous communities in the region relate to their social environment, especially for people living in reserves or in close contact with urban populations. Outcomes mirror the problems seen in other Indigenous communities in North America and Australasia, and are linked to acculturation. Indigenous communities more integrated into mainstream society are more vulnerable to so-called modern diseases and diseases of poverty. This vulnerability can be linked to disease exposures and poor living conditions. For example, high rates of tuberculosis are reported in Indigenous communities throughout the region.^{41,75,76} In 2002, in an Indigenous community in Venezuela, investigators reported serious rates of alcohol use (86·5% of all men and 7·5% of all women were reported to be heavy alcohol users). They report that “Focus group discussions revealed that traditional patterns of binge drinking of corn liquor had gradually been replaced by consumption of commercial beer and rum at more frequent intervals and with more negative social consequences”.⁶⁸ Other workers have recorded problems of obesity and hypertension linked to risks for heart disease and diabetes in communities located in reserves and those with long-term acculturation and change in diet and lifestyle.^{77–80}

Several investigators looked at maintenance of traditional culture, and suggest that this is a protective factor, especially for problems related to nutrition and moves from a nomadic to a sedentary urban life.^{81,82} In a study of blood pressure in the Indigenous Kuna who live on islands in the Panamanian Caribbean in 1997, investigators suggested that partly acculturated Kuna had lower blood pressure than fully acculturated counterparts

because of their maintenance of traditional customs.⁸² Other studies suggest isolation of the community is protective against so-called civilisation diseases.^{83,84}

Modern conflicts and violence

Social and political violence is a reality for many Indigenous communities in Latin America, with repercussions of deaths in some countries or exile and subsequent mental health difficulties.⁶⁷ Domestic violence can be another serious problem, as it is for many women in the region. One analysis reported that such domestic violence might be another imported problem. The Wayuu women of Venezuela suggest that domestic violence in their communities is caused by behaviours “learned from occidental culture such as drug use and alcoholism”.⁴⁶

Indigenous responses to ill health

This discussion would not be complete without mention of Indigenous peoples’ more radical response to outside contact and the diseases this contact has brought them. Perhaps as a result of these new health and social problems, Indigenous communities of several countries in Latin America have chosen to live in voluntary isolation from mainstream societies.^{61,85} Such isolation can profoundly affect their health conditions, but to establish how is difficult, partly because it is neither ethical or practical to access groups who do not wish to have contact with outsiders.^{86,87} Arguably, a comparatively reduced life expectancy in isolation is usually accompanied by a better life quality, according to Indigenous peoples’ own standards.^{21,88} In these situations the notion of poverty has no meaning. For isolated groups of hunters and gatherers comparisons with western poverty or richness are irrelevant because most of these communities do not recognise land property and monetary systems.

Nevertheless, self-isolation of an Indigenous people from others is difficult to maintain when the community lives close to resources valuable to mainstream society. The Nanti of Peru, for example, live in a zone of vast oil and gas wealth,^{61,89} which is currently being exploited by a major international gas and oil consortium. In reality, self-isolation can only be successful with strong and consistent government support, and in geographically remote or inaccessible regions. The Javari Valley, in the Brazilian Amazonia, where more than 17 uncontacted Indigenous groups currently live in isolation, either recognised by the state as Indigenous lands or as yet unrecognised.³⁴ Other Indigenous groups that have decided to remain as isolated as possible (some despite huge pressure and force) are the Nukak in Colombia,⁹⁰ the Ayoreo in Paraguay,⁹¹ the Haurani in Ecuador,⁹² the Nahua in Peru,⁹³ and some Mbya Guaraní communities of the Yaboti Reserve in Argentina.²¹

Alternative health systems

For most of the 45–48 million Indigenous citizens of Latin America, voluntary isolation is either not desirable

or not possible. For them the challenge is how to improve wellbeing using the best of their ancestral wisdom, and the benefits of modern medicine. Indigenous peoples in this region have perhaps one of the most sophisticated and diverse Indigenous health systems in the world.^{94,95} Before the European invasion, such health systems included transmitted knowledge (practical information, beliefs, religious practices), primary and secondary health practitioners (the Shaman, any member of the community), and closely related ecosystems. Within their lands each community obtained living space, medicinal organisms, food, building materials, water, and a landscape. All these aspects contributed to the holistic nature of their health systems. Any shortage affected wellbeing and health, in part through effects on health ecosystem resources, such as qualitative and quantitative availability of plant food (leaves, bark, roots, seeds, fruits, etc), animal food (adult and immature insects, honey, birds, mammals, etc), ritual objects, seasonal odours, sounds, and landscapes. A starting point for Indigenous health systems is a complex conception of health intimately linked to health of the ecosystem, both physical and spiritual.^{96,97}

Indigenous health systems today range from their traditional and isolated systems, increasingly threatened by deforestation, mining, and other activities, to systems strongly influenced by traditional western medicine. Between such extremes there is a gradient of intermediate systems.⁹⁸⁻¹⁰⁰ In many Indigenous communities, traditional medicine is still practised, with a link to allopathic medicine use.^{101,102} In addition to the use of traditional healers, known as Shamans (more formally Opygua, Pai, and other denominations), many families have their own knowledge and access to medicinal plants for use in emergencies.

Importantly, Indigenous health in isolated groups in Latin America is closely related with natural ecosystem conservation. If environmental destruction takes place, community ability to obtain medicinal plants, food, and building materials collapses.^{103,104} More recently, linkages between Indigenous people and western culture could have resulted in better health status, through vaccination and improved sanitary conditions.^{102,105} However, in many cases the process of environmental destruction can negatively affect access to traditional medicines, and also has an effect on nutrition and overall wellbeing, especially when this destruction is combined with acculturation of Indigenous groups into mainstream society.⁸¹

In some settings, western medical interventions such as vaccination, family planning, and maternal care have all played a part in the demographic recovery of Indigenous communities.^{106,107} However, studies suggest that Indigenous peoples of Latin America still have inadequate access to mainstream health services, and health prevention and promotion programmes, and that services that do exist are often culturally inappropriate.^{101,102,108} Some

of the barriers to health care access are structural and economic factors (distance and location of health care facilities, isolation of Indigenous communities, scarcity of health insurance or funds to pay for services, or time factors) and poor cultural sensitivity and appropriateness of health care systems (disregard of health personnel towards Indigenous peoples or their culture, disrespect for traditional healing practices, language and religious barriers, or uncomfortable and impersonal environment of hospitals and clinics).^{13,51,109,110}

There have been several responses to these problems with the health system. In some contexts, such responses have been at the level of individual Shaman and Indigenous healers, with traditional practitioners negotiating a new space within the changing world.¹⁰² A study in highland Guatemala reported how traditional bonesetters have reacted to the introduction of radiographic technology in their practice both in terms of the threats to their legitimacy, and to their practice towards broken bones.¹¹¹ The investigators report that bonesetters have incorporated radiography into their diagnostic discussions with patients and use them as a complement to hand diagnosis.

In many Latin American countries, Indigenous communities have become organised and have developed their own health services.^{55,101,102,111} In 1991, the Asociación Interétnica de Desarrollo de la Selva Peruana (Aidesep) in Peru developed their own health policy and programme for 120 communities of the Ashaninkas, Yanesha, Shipibos, and Konibos, and for three Indigenous organisations. This policy strengthened local Indigenous health experts, and revived the use and management of medicinal plants.¹¹² In other countries, national institutes have been created with similar aspirations and with a specific focus on Indigenous medicines. In Panama in 2000, the Indigenous community of Kuna created the Autonomous Institute of Traditional Medicine, with the objective to ensure that the Ministry of Health “recognizes the existence, value and importance of traditional Indigenous medicine”.¹¹³

In some cases, well established health centres based in Indigenous communities have passed into community control, and increasing coverage quite dramatically.⁵³ In Chile, the Hospital Rural Makewe has been in existence since 1927, and in 1999 was passed into the hands of the local Indigenous association, the Asociación Indígena para la Salud Maquehue-Pelale. Their health team now includes traditional and allopathic healers.¹¹⁴

Indigenous plants and medicine

The use of medicinal plants is a fundamental component within Indigenous health systems and medical practice in Latin America. Many of the products used are of great importance to health worldwide. Notably, most of the studies since the 1970s on Indigenous medicines are undertaken by non-Indigenous scientists, and in some cases institutions linked to the pharmaceutical

companies. This situation raises, among other concerns, issues of intellectual property rights, but also highlights the importance of Indigenous peoples' wisdom about their medicinal, biocide, stimulants, hallucinogenic, and ritual plants, and their understanding.¹¹⁵⁻¹²¹

In several countries, the importance of plants and medication systems has led to the creation of national bodies to protect them. The main threat to such plants in Latin America is the rapid destruction of ecosystems, and the loss of biodiversity, both exacerbated by climate change. Between 1975 and 1988, nearly 500 000 km² of tropical rainforest was deforested in Amazonia, 10·1% of the total surface.^{23,122} The migration of Indigenous peoples to cities, and the loss of their ancient knowledge, poses another threat, only somewhat alleviated by the cultural tradition of oral knowledge transmission. And the complete extinction of whole groups of Indigenous peoples, such as the Tetetes of Ecuador;¹³ possibly the Curuaia, Xipaia, and Creniê in Brazil,³² or the Tonocotés, Lule-Vilela, Sanavirones, and Chana-Timbúes in Argentina, has almost certainly resulted in a loss of rich information on local medicinal plants and their ecosystems.¹²³

Changing legal system

Indigenous health relies on access to appropriate health services, or even isolation in protective ecosystems,

	%
Colombia	75%
Bolivia	72%
Nicaragua	72%
Ecuador	71%
Venezuela	70%
Panama	69%
Peru	64%
Brazil	58%
Costa Rica	58%
Oaxaca, Mexico	53%
Chile	49%
Argentina	45%
Mexico	44%
Paraguay	41%
Guatemala	23%
Honduras	14%
Guyana	8%
Suriname	3%
El Salvador	2%
Uruguay	1%
Belize	1%

Data are percentage of qualitative indicators achieved by country.¹²⁷ Index has eight criteria: percentage of indicators of best practice=30% of overall points; percentage of fulfilment of Convention 169/89 indicators=15%; percentage of existing primary legislation=15%; ratification of convention 169/89=10%; percentage existence of constitutional legislation=10%; percentage of existing secondary legislation=10%; existence of jurisprudence=5%; ratification of Biodiversity Convention=5%.

Table 2: Quality of legislative support for Indigenous peoples

neither of which can be maintained or protected without a protective policy environment. The quality of legislative support in Latin America is an important indicator of the space and protection of Indigenous peoples within their country. Many communities and the academics who study and work with them place great hope in the shifting national and international policy environment. In particular, several states within the region have developed constitutional changes that are similar to international legislation on Indigenous rights. Many countries (including Argentina, Bolivia, Venezuela, Colombia, Ecuador, Mexico, Nicaragua, and Paraguay) have revised their Constitutions to legally recognise the rights of Indigenous people to maintain and promote their specific cultural, linguistic, and territorial integrity.^{10,46}

In 2003, the Unit of Indigenous Communities and Community Development analysed the constitutions and legislation of 21 Latin American countries according to eight variables of best legislative practice (table 2).¹²⁴ Looking at particular rights to health of Indigenous peoples, Zamudio¹²⁴ distinguished three categories of legal rights guaranteed in the countries studied in relation to the International Labour Organisation Convention 169.¹²⁵ First was whether the country had special legislation for Indigenous rights to health, including special access to health services. The second was whether traditional practice is accepted and integrated into national health. The third was whether the Indigenous communities have procedural rights to participation, and eventually autonomy of the management of their health resources.¹²⁵ Four countries, Argentina, Ecuador, Nicaragua, and Panamá, fulfil all these levels of legislation within health. Brazil, Colombia, and Venezuela rank just below this level. Three central American countries (Guatemala, Costa Rica, and Honduras), along with Paraguay, have no special legislation to protect or recognise Indigenous medicines. In Mexico, with the exception of regions such as Chiapas and Quintana Roo, there is no legal recognition of traditional medicine. Overall, Colombia achieved the highest value (with 75% of the variables achieved positively), followed by Bolivia (72%).

The shifting political context will not have immediate effects. A 2006 report from the World Bank³ states that Indigenous peoples are still some of the most marginalised in the region. Looking at the country that did the best in Zamudio's study, Colombia, evidence shows that Indigenous communities still have high rates of infant mortality and low life expectancy¹²⁶ and Indigenous peoples are caught in violent conflict in parts of the country. Bolivia has similar problems, and Indigenous wellbeing was perhaps one of the driving forces behind the election of an Indigenous leader as President in 2006.¹²⁷ The region is slowly changing and Indigenous peoples are returning to real power, but it will take a long time before this translates into real health gains.

Conclusion

Indigenous health cannot be viewed as uniquely an issue of health systems, nor can people be viewed in isolation of their ecosystem and sociopolitical context. People in Latin America and the Caribbean have lived for centuries in close contact with their environment. Some Indigenous communities still maintain their isolation and their traditional health systems, even at the potential expense of life expectancy, but retain their more harmonious ways of life within ecosystems. Some Indigenous communities mix traditional and western practices, and others act without any trace of ancestral culture.

Historically, Indigenous peoples suffered enormously after contact with western cultures, and many have disappeared along with their wisdom and knowledge.¹²⁸ These effects have reduced but still exist today, despite demographic recovery of some communities. Even isolated peoples are at risk from the new colonists and their pursuit of natural resources.¹²⁹ Attitudes persist that have their roots in the perspectives of the original conquistadores and filter into health systems and overall society.

Information on Indigenous health in the region is scattered, and we know of no systematic database that documents health outcomes, either over time or within specific communities. Disaggregated national databases are an important step forward, but few governments currently provide this service. As definitions of indigeneity change within the region, information systems need to be developed both within countries and across the region to track the status of Indigenous health and to monitor interventions aimed at improving health.⁴⁸

Notably, Indigenous movements in Latin America have become much more politically active in recent years in pursuit of their rights. A major trend has been towards greater recognition of Indigenous peoples' rights to land and autonomy. In several settings, this activism has also led to the development of Indigenous controlled health systems mixing traditional and western medical practice. Indigenous knowledge and medicines have become more valued. Most of these Indigenous peoples rights have been incorporated into the constitutional frameworks of several countries.

Against this backdrop of positive changes is continued conflict in many settings in the region, some still reminiscent of historical interactions with colonists. The challenge for all peoples in the region is how to live together, and how to combine the merits of their systems of health and culture. Many academics and policymakers in the region understand now that they have much to learn from the Indigenous cultures. As Feliciano Valencia, coordinator of human rights in the Association of Indigenous Councils of Northern Cauca, in Colombia, suggests "We are not a threat to the world...On the contrary, we hold out a hope, an alternative for humanity".¹³⁰ Unfortunately for some communities, time is extremely scarce.

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References

- 1 Summer Institute of Linguistics. Ethnologue language family index: Summer Institute of Linguistics, 1996.
- 2 Aliaga-Peru C. Panorama de las bibliotecas indígenas en América Latina: el caso Peruano. World Library and Information Congress, 69th IFLA General Conference and Council 2003, Berlin: 181-5: 1-13.
- 3 Lopez H, Maloney W. Poverty reduction and growth—virtuous and vicious circles. Washington DC: The World Bank, 2006.
- 4 United Nations. The concept of Indigenous. Background paper prepared by the Secretariat of the Permanent Forum on Indigenous Issues. In: Affairs DoEaS, ed. Workshop on Data Collection and Disaggregation for Indigenous Peoples. New York United Nations, Secretariat for Indigenous Peoples, 2004.
- 5 World Bank. HRO Dissemination Notes Number 8, June 7, 1993: Human Resources Development and Operations Policy, 1993.
- 6 Gonzalez ML. How Many Indigenous People? Indigenous People and Poverty in Latin America and the Caribbean. Washington DC: The World Bank, 1994: 21-39.
- 7 Peyser A, Chackiel J. [The indigenous population in Latin American censuses]. *Notas Poblacion* 1994; 22: 93-119.
- 8 Schmal J. The Hispanic experience—Indigenous identity in Mexico. Houston: Houston Culture, 2004.
- 9 Jordan-Pando R. Poblaciones Indígenas de América Latina y el Caribe. Rome and Mexico City: United Nations Food and Agriculture Organisation and Instituto Indigenista Americano, 1990.
- 10 International Labour Office. Indigenous Peoples in Latin America. Geneva: International Labour Office, 1999.
- 11 Population Reference Bureau. World Population Data Sheet. Washington DC: Population Reference Bureau, 1994.
- 12 Terborgh A. Family planning among indigenous populations in Latin America. *Int Fam Plan Perspect* 1995; 21: 143-50.
- 13 Conejo M. Población indígena y reforma del sector salud. El caso de Ecuador. Iniciativa de Salud de los Pueblos Indígenas. Washington DC: Pan American Health Organisation, 1998: 37.
- 14 Confederación de Nacionalidades Indígenas del Ecuador. Proyecto Político de la CONAIE. Quito: Confederación de Nacionalidades Indígenas del Ecuador, 1997.
- 15 Vinding D. Mexico, Central America and the Circumcaribbean. In: Vinding D, ed. The Indigenous World 2002-2003. Copenhagen: International Workgroup for Indigenous Affairs, 2003: 70-112.
- 16 COICA. Organisatie van Imheemseen in Surinam. Coordinadora de las Organizaciones Indígenas de la Cuenca Amazonica, Quito, 2006.
- 17 Ministerio de Salud. 2005: Año de logros en salud indígena Ministerio de Salud de Venezuela, 2006.
- 18 INDEC. Primeros resultados de la Encuesta Complementaria de Pueblos Indígenas. Instituto Nacional de Estadísticas y Censos, INDEC: Buenos Aires, 2005.
- 19 Azevedo M. How many were they? How many will they be? Povos Indígenas do Brasil. Sao Paulo/Manaus: Instituto Socio Ambiental, 2006.
- 20 Instituto Socio Ambiental. How many? Different estimates. Indigenous Peoples in Brazil. Sao Paulo/Manaus: Instituto Socio Ambiental, 2006.
- 21 Montenegro R. El silencioso genocidio de los Mbya Guaraní. Vida y lucha de dos comunidades que viven en la selva misionera de Yabotí pese a las madereras y la indiferencia de los gobiernos Resistencia, Chaco Ed Endepa, 2006.
- 22 Denevan W. The native population of the Americas in 1492. Madison, Wisconsin: University of Wisconsin Press, 1976.
- 23 Tudela F. Desarrollo y Medio Ambiente en América Latina y el Caribe Una visión evolutiva. Madrid: Ministerio de Obras Públicas y Urbanismo, 1990.
- 24 Melia B. El Guaraní conquistado y reducido. *Biblioteca Paraguaya de Antropología* 1993; 5: 1-299.
- 25 Wrong D. Population and Society. New York: Random House, 1965.

- 26 Whitmore TM. Population geography of calamity: the sixteenth and seventeenth century Yucatan. *Int J Popul Geogr* 1996; 2: 291–311.
- 27 Joralemon D. New World depopulation and the case of disease. *J Anthropol Res* 1982; 38: 108–27.
- 28 Ramenofsky A. The Cambridge World History of Human Disease. Cambridge: Cambridge University Press, 1993.
- 29 Denevan W. The pristine myth: the landscape of the Americas in 1492. *Ann Assoc Am Geogr* 1992; 82: 369–85.
- 30 Livi-Bacci M, Maeder E. The Missions of Paraguay: the demography of an Experiment. *J Interdiscip Hist* 2004; 35: 185–224.
- 31 Newson L. Indian survival in colonial Nicaragua. Oklahoma: University of Oklahoma, 1987.
- 32 Ribeiro D. Culturas e Linguas Indígenas do Brasil. *Educação e Ciências Sociais* 1957; 2: 5–102.
- 33 Chauun P. Conquete et exploitation des Nouveaux Mondes (XVIeme Siecle). Nouvelle Clio. L'Histoire et ses Problemes. Paris: Presses Universitaires de France, 1969.
- 34 Instituto Socio Ambiental. Como Vivem? Povos Indígenas do Brasil. Sao Paulo: Instituto Socio Ambiental, 2006.
- 35 Melatti J. População Indígena. *Serie Antropologia, Brasilia* 2004; 39.
- 36 Forte M. Extinction: historical trope of anti-indigeneity in the Caribbean. *Issues in Caribbean Amerindian Studies* 2005; 4 (4).
- 37 Martinez-Cruzado JC, Toro-Labrador G, Ho-Fung V, et al. Mitochondrial DNA analysis reveals substantial Native American ancestry in Puerto Rico. *Hum Biol* 2001; 73: 491–511.
- 38 McNeill W, McNeill W. Plagues and peoples. Oxford: Basil Blackwell, 1976.
- 39 Martinez-Cruzado JC, Toro-Labrador G, Viera-Vera J, et al. Reconstructing the population history of Puerto Rico by means of mtDNA phylogeographic analysis. *Am J Phys Anthropol* 2005; 128: 131–55.
- 40 Bou LC. The new urban poor: the Tobas indians. *Dev Pract* 2000; 10: 71–76.
- 41 Baruzzi RG, Barros VL, Rodrigues D, Souza AL, Pagliaro H. [Health and disease among Panara (Kreen-Akarore) Indians in Central Brazil after twenty-five years of contact with our world, with an emphasis on tuberculosis]. *Cad Saude Publica* 2001; 17: 407–12.
- 42 Anguiano ME. [The migration of indigenous mixtecos. Population mobility and preservation of identities]. *Demos* 1993; 6: 16–7.
- 43 Deruyttere A. Pueblos Indigenas, globalizacion, y desarrollo con identidad: algunas reflexiones de estrategia. InterAmerican Bank for Development: IADB, 2001.
- 44 Patrinos HA, Psacharopoulos G. Indigenous peoples and poverty in Latin America: an empirical analysis: The World Bank, 1994.
- 45 Plant R. Issues in Indigenous poverty and development. Report No IND-105. Washington DC: InterAmerican Development Bank, 1998.
- 46 Hughes J. Gender, Equity and Indigenous Women's Health in the Americas: Pan American Health Organisation, 2004.
- 47 Smith C. Depopulation of the Central Andes in the 16th Century. *Curr Anthropol* 1970; 11: 453–64.
- 48 Casas JA, Dachs JN, Bambas A. Health Disparities in Latin America and the Caribbean: The role of social and economic determinants. Washington DC: Pan American Health Organisation, 2001.
- 49 Plant R. Issues in indigenous poverty and development. InterAmerican Development Bank Report No IND-105, Washington DC, 1998. <http://www.iadb.org/sds/doc/952eng.pdf> (accessed Dec 12, 2005).
- 50 PAHO. Health of Indigenous Peoples. Washington DC: Pan American Health Organisation, 1997.
- 51 PAHO. Health of indigenous peoples. *Rev Panam Salud Publica* 1997; 2: 357–62.
- 52 Souza LG, Santos RV. [Demographic profile of the Xavante Indian population in Sangradouro-Volta Grande, Mato Grosso]. *Cad Saude Publica* 2001; 17: 355–65.
- 53 Cardoso AM, Santos RV, Coimbra Jr CE. [Infant mortality according to race/color in Brazil: what do the national databases say?]. *Cad Saude Publica* 2005; 21: 1602–08.
- 54 Garnelo L, Brandao LC, Levino A. [Dimensions and potentialities of the geographic information system on indigenous health]. *Rev Saude Publica* 2005; 39: 634–40.
- 55 Hinrichsen D. Working from within and from without—Jambi Huasi—a model for community empowerment. New York: UNFPA, 2006.
- 56 Flowers N. Demographic crisis and recovery: a case study of the Xavante of Pimentel Barbosa. *South Am Indian Stud* 1994; 18–36.
- 57 CEPIS. Curso de Autoinstrucción en interculturalidad y proyectos de desarrollo. In: CEPIS, ed, 2003.
- 58 Kestler EE. Guatemala: maternal mortality in Guatemala: assessing the gap, beginning to bridge it. *World Health Stat Q* 1995; 48: 28–33.
- 59 Farmer A. Give choice a chance: new report on Guatemala. *Reprod Freedom News* 2000; 9: 4.
- 60 PAHO. Country Health Profile, Ecuador (data updated for 2003). Washington DC: Pan American Health Organisation, 2006.
- 61 Napolitano D, Stephens C. La salud de los pueblos indígenas y el Proyecto de Gas de Camisea. Informe para la AIDSESP: London School of Hygiene & Tropical Medicine/Shinai Serjali, 2003.
- 62 Price D. Notes on Nambiquara demography. *South Am Indian Stud* 1994; 63–76.
- 63 Agencia Dyn. Misiones: mas de la mitad de los niños indígenas estan desnutridos. *Diario la Voz del Interior* 2005 May 13, 2005; 17.
- 64 Oyhenart EE, Techenski MF, Orden AB. Nutritional status in two Mbya-Guarani communities from Misiones (Argentina). *Homo* 2003; 54: 170–79.
- 65 Beltrame A, Scolari C, Torti C, Urbani C. Soil transmitted helminth (STH) infections in an indigenous community in Ortigueira, Parana, Brazil and relationship with its nutritional status. *Parassitologia* 2002; 44: 137–39.
- 66 Botto C, Escalona E, Vivas-Martinez S, Behm V, Delgado L, Coronel P. Geographical patterns of onchocerciasis in southern Venezuela: relationships between environment and infection prevalence. *Parassitologia* 2005; 47: 145–50.
- 67 Miller KE. The effects of state terrorism and exile on indigenous Guatemalan refugee children: a mental health assessment and an analysis of children's narratives. *Child Dev* 1996; 67: 89–106.
- 68 Seale JP, Shellenberger S, Rodriguez C, Seale JD, Alvarado M. Alcohol use and cultural change in an indigenous population: a case study from Venezuela. *Alcohol Alcohol* 2002; 37: 603–08.
- 69 Witzig R, Ascencios M. The road to indigenous extinction: case study of resource exportation, disease importation, and human rights violations against the Urarina in the Peruvian Amazon. *Health Hum Rights* 1999; 4: 60–81.
- 70 San Sebastian M, Hurtig AK. Cancer among indigenous people in the Amazon Basin of Ecuador, 1985–2000. *Rev Panam Salud Publica* 2004; 16: 328–33.
- 71 Dorea JG, de Souza JR, Rodrigues P, Ferrari I, Barbosa AC. Hair mercury (signature of fish consumption) and cardiovascular risk in Munduruku and Kayabi Indians of Amazonia. *Environ Res* 2005; 97: 209–19.
- 72 Cabrera AD. Evaluación de metales pesados en ribereños del rio Pilcomayo Oeste formoseño. Tesis de Maestria. Resistencia, Chaco, 2003.
- 73 Editor. Brazil launches anti-AIDS campaign for Indians. Education and prevention. *AIDS Wkly Plus* 1996; 9.
- 74 McKenna N. A disaster waiting to happen. *World AIDS* 1993; 5–9.
- 75 Araujo Z, Fernandez de Larrea C, Lopez D, et al. Hematologic values among Warao indians with tuberculosis from the Orinoco Delta of Venezuela. *Acta Cient Venez* 2003; 54: 247–53.
- 76 Escobar AL, Coimbra CE, Jr, Camacho LA, Portela MC. [Tuberculosis among indigenous populations in Rondonia, Amazonia, Brazil]. *Cad Saude Publica* 2001; 17: 285–98.
- 77 Tavares EF, Vieira-Filho JP, Andriolo A, Sanudo A, Gimeno SG, Franco LJ. Metabolic profile and cardiovascular risk patterns of an Indian tribe living in the Amazon Region of Brazil. *Hum Biol* 2003; 75: 31–46.
- 78 Filozof C, Gonzalez C, Sereday M, Mazza C, Braguinsky J. Obesity prevalence and trends in Latin American countries. *Obes Rev* 2001; 2: 99–106.
- 79 Cardoso AM, Mattos IE, Koifman RJ. [Prevalence of risk factors for cardiovascular disease in the Guarani-Mbya population of the State of Rio de Janeiro]. *Cad Saude Publica* 2001; 17: 345–54.
- 80 Coimbra CE, Jr, Chor D, Santos RV, Salzano FM. Blood pressure levels in Xavante adults from the Pimentel Barbosa Indian Reservation, Mato Grosso, Brazil. *Ethn Dis* 2001; 11: 232–40.

- 81 Santos RV. [Physical growth and nutritional status of Brazilian indian populations]. *Cad Saude Publica* 1993; **9** (suppl 1): 46–57.
- 82 Hollenberg NK, Martinez G, McCullough M, et al. Aging, acculturation, salt intake, and hypertension in the Kuna of Panama. *Hypertension* 1997; **29** (1 Pt 2): 171–76.
- 83 Mancilha-Carvalho JJ, Carvalho JV, Lima JA, Sousa e Silva NA. [The absence of risk factors for coronary disease in Yanomami Indians and the influence of acculturation on arterial pressure]. *Arq Bras Cardiol* 1992; **59**: 275–83.
- 84 Carneiro O, Jardim PC. [Blood pressure in a Xavante tribe. Comparison after 15 years]. *Arq Bras Cardiol* 1993; **61**: 279–82.
- 85 Azanha G, Possuelo S. Brasil: los indígenas aislados y la política para su defensa y protección. Pueblos indígenas en aislamiento voluntario. *World Rainforest Movement Bulletin* 2004; **87**: 6–8.
- 86 United Nations Economic and Social Council. Report of the workshop on data collection and disaggregation for indigenous peoples. Workshop on Data Collection and Disaggregation for Indigenous Peoples, Jan 19–21, 2004, New York.
- 87 Gracia D. The historical setting of Latin American bioethics. *J Med Philos* 1996; **21**: 593–09.
- 88 Montenegro R. El silencioso genocidio de los Mbya Guarani, 2a Parte. *Revista Letra Viva* 2005; **5**: 9.
- 89 Cabeceras Aid Project. Update. Cabeceras Aid Project, 2001: 1–3.
- 90 Mahecha-Rubio D. Colombia: los Nukak el ultimo pueblo nomada contactado. *World Rainforest Movement Bulletin* 2004; **87**: 8–10.
- 91 Glauser B. Paraguay: los últimos Ayorea en aislamiento voluntario. *World Rainforest Movement Bulletin* 2004; **87**: 13–14.
- 92 Rival L. Ecuador: el pueblo Huaorani de la Amazonia: autoaislamiento y contacto forzado. *World Rainforest Movement Bulletin* 2004; **87**: 10–12.
- 93 Feather C. Peru: políticas para pueblos en aislamiento voluntario. *World Rainforest Movement Bulletin* 2004; **87**: 14–17.
- 94 Junge B. Indigenous concepts useful in programs. Experiences in the Bolivian highlands. *Sante Salud* 1994; **10**: 1–11.
- 95 Healy K. Back to the future: ethnodevelopment among the Jalq'a of Bolivia. *Grassroots Dev* 1992; **16**: 22–34.
- 96 Tousignant M. [Emotions and psychopathology: an indigenous theory]. *Acta Psychiatr Scand* 1981; **27**: 194–9.
- 97 Pedersen D, Coloma C. Traditional medicine in Ecuador: the structure of the non-formal health systems. *Soc Sci Med* 1983; **17**: 1249–55.
- 98 Finger C. Health care in indigenous populations: the Xingu Indian park. *Lancet* 2003; **362** (suppl): s38–39.
- 99 Kroeger A. South American Indians between traditional and modern health services in rural Ecuador. *Bull Pan Am Health Organ* 1982; **16**: 242–54.
- 100 Pedersen D, Baruffati V. Healers, deities, saints and doctors: elements for the analysis of medical systems. *Soc Sci Med* 1989; **29**: 487–96.
- 101 Athais R. Indigenous Traditional Medicine among the Hupda'ah-Maku of Tiquie River (Brazil). Indigenous Peoples' Rights to Health Conference and Public Meeting 2004, London: 44–52.
- 102 Sanchez G. I render services for science don't I?...and I am an indigenous descendant. Indigenous Peoples' Right to Health Conference and Public Meeting 2004, London: 16.
- 103 Montenegro R. Introducción a la ecología urbana. Neuquen: Universidad Nacional de Comahue, 1999.
- 104 Montenegro R. Mbya Guarani. Determinación del territorio que necesitan dos comunidades Mbya Guarani para satisfacer sus necesidades vitales y evaluación del impacto ambiental producido en Misiones, Argentina Resistencia: Ediciones Endepa, 2004.
- 105 Spindel R, Baruzzi RG, Souza VA, Ferreira AW, Avila SL. Measles vaccine coverage and immune response in children of Caiabi and Metuktire Indian tribes living in malarial endemic area: Parque Indígena do Xingu, Central Brazil. *Trop Doct* 2001; **31**: 142–44.
- 106 Kaplan JE, Larrick JW, Yost J, et al. Infectious disease patterns in the Waorani, an isolated Amerindian population. *Am J Trop Med Hyg* 1980; **29**: 298–312.
- 107 Dietz V, Rota J, Izurieta H, Carrasco P, Bellini W. The laboratory confirmation of suspected measles cases in settings of low measles transmission: conclusions from the experience in the Americas. *Bull World Health Organ* 2004; **82**: 852–57.
- 108 Bristow F, Stephens C, Nettleton C, Utz W'achil: health and wellbeing among Indigenous peoples. London: Health Unlimited/ London School of Hygiene & Tropical Medicine, 2003.
- 109 Raunig L, Houston J. Midwives for midwives. Protecting the sacred circle. *Midwifery Today Int Midwife* 2002: 51–53.
- 110 Schuler SR, Choque ME, Rance S. Misinformation, mistrust, and mistreatment: family planning among Bolivian market women. *Stud Fam Plann* 1994; **25**: 211–21.
- 111 Hinojosa S. Bonesetting and radiography in the southern Maya highlands. *Med Anthropol* 2004; **23**: 263–93.
- 112 Reategui J. Programa de Salud Indígena (PSI) de AIDSESP, durante el periodo 1999–2002. *Voz Indígena*. Lima, 2003.
- 113 Barroso A. Indígenas preservan su medicina. Ciudad de Panamá: Programa Panamericano de Defensa y Desarrollo de la Biodiversidad Biológica, Cultural y Social, 2004.
- 114 Asociación Indígena para la Salud Makewe-Pelale. La Salud Makewe-Pelale. Araucanía, Chile: Asociación Indígena para la Salud Makewe-Pelale, 2000.
- 115 Chagnon N. Algunos aspectos del uso de drogas, comercio y domesticación de plantas entre los indígenas Yanomami de Venezuela y Brasil. *Acta Científica Venezolana* 1970; **21**: 186–93.
- 116 Etkin NL, Elisabetsky E. Seeking a transdisciplinary and culturally germane science: the future of ethnopharmacology. *J Ethnopharmacol* 2005; **100**: 23–26.
- 117 Bennett B. Hallucinogenic plants of the Shuar and related indigenous groups in Amazonian Ecuador and Peru. *Brittonia* 1992; **44**: 483–93.
- 118 Gottlieb O, Kaplan M. Das plantas medicinales e os farmacos naturais. *Ciencia Hoje* 1993; **15**: 51.
- 119 Souza AB, Souza AB. Forty years of Brazilian Medicinal Plant Research. *Journal of Ethnopharmacology* 2003; **39**: 53–67.
- 120 Vinuesa S. Anticoncepción en mujeres de la etnia Toba (Quoms de la provincial del Chaco). Tesis de Maestría Escuela de Enfermería: Universidad Nacional de Córdoba, Argentina, 2003.
- 121 Rodriguez E, Carlini E. Ritual use of plants with possible action on the central nervous system by Kraho Indians Brazil. *Phytotherapy Research* 2005; **19**: 129–135.
- 122 Mahar D. Government policies and deforestation in Brazil's Amazon region. Washington DC: World Bank, 1989.
- 123 Asis R. Geocultura, identidad y conservación In: Lascano PB, ed. La mundialización en la realidad Argentina. Ed. del Copista, Córdoba 2005: 71–101.
- 124 Zamudio T. Calidad Legislativa Indígena en América Latina. Washington DC: Banco Interamericano de Desarrollo, 2003: 17.
- 125 International Labour Office. Convention (Number 169) concerning Indigenous and Tribal Peoples in Independent Countries Adopted on 27 June 1989 by the General Conference of the International Labour Organisation at its seventy-sixth session. Geneva: International Labour Office, 2005.
- 126 Pinos-Petersen M, Ruiz-Salguero M. [Demographic aspects in indigenous communities of 3 regions of Colombia]. *Salud Publica Mex* 1998; **40**: 324–29.
- 127 Schwimler D. Bolivia's new leader vows change. BBC News Online, Jan 22, 2006: <http://news.bbc.co.uk/1/hi/world/americas/4636190.stm>.
- 128 Hern WM. Health and demography of native Amazonians: historical perspective and current status. *Cad Saude Publica* 1991; **7**: 451–80.
- 129 Chapin M. The view from the shore: Central America's Indians encounter the quincentenary. *Grassroots Dev* 1992; **16**: 2–10.
- 130 González G. 'War on terror' has Latin American Indigenous people in its sights. Inter Press Service, June 6, 2005.