

# Changes in indigenous dress and the cocoliztli epidemic of 1544-1548 in New Spain

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**Abstract:** The changes in indigenous clothing during XVI century Mexico are examined as a factor in the creation of microclimates favorable to vectors of infectious diseases, such as exanthematous typhus, in relation to the cocoliztli epidemic of 1544-48 in New Spain. Key words: Epidemic, cocoliztli, exanthematous typhus, louse, clothing.

## Introduction

This paper explores the relationship between arthropod pathogen vectors and changes in Mexican indigenous clothing resulting from the Spanish conquest and colonization, through the cocoliztli epidemic of 1544-48. Clothing that covers the body under certain conditions creates a favorable microenvironment for the existence of certain arthropod vectors of some infectious diseases, such as human lice.

## Statement of the problem

When Europeans colonized America, they brought with them their culture and way of life, as well as a series of diseases unknown to the inhabitants of the New World, which caused large epidemics shortly after the conquest.

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The first epidemics were smallpox (1518-20), chickenpox-measles (1531) and smallpox (1538) (Gibson 1980; Malvido 1973). All of them were viral diseases transmitted through direct contact between the sick and susceptible individuals. All of them caused great morbidity and mortality, mainly due to Amerindians' lack of immunological resistance to such pathogens; a phenomenon known as "virgin soil" (Crosby 1991).

Infections transmitted by an animal vector, such as arthropods, took several years to manifest themselves, when their populations had reached a large size in the new ecology and society created by the conquest of New Spain. One of these diseases was epidemic typhus, a rickettsiosis transmitted to humans by human lice.

After the conquest, the Spaniards imposed their cultural patterns on the indigenous people, modifying their ways of life and conditions of existence. Two of these changes were the use of European clothes and the abandonment of certain hygienic habits, such as daily bathing, considered by the Spaniards to be detrimental to health. These transformations favored the spread of new diseases and their arthropod vectors amongst the inhabitants of New Spain. One of these epidemics was the Huey Cocoliztli of 1544-48.

## Changes in indigenous dress and the cocoliztli of 1544-48

The cocoliztli was a major epidemic that emerged twenty-three years after the conquest, in the midst of the consolidation of Spanish rule. Its endemic presence in the XVI century is observed in continuous epidemics during the following years: 1555, 1566, 1576, 1587 (Malvido 1973; Marquéz Morfín 1993).

In the fourth decade of the 16th century, the indigenous population of Mexico decreased, on one hand, due to the exploitation they were subjected to by their conquerors and, on the other, due to the epidemics. The inhabitants of New Spain suffered the Huey Cocoliztli epidemic from 1544 to 1548. Historians infer that one-third to one-half of its inhabitants died during the epidemic (Malvido 1973; Marquéz Morfín 1993).

Its name derives from the great morbidity and mortality it caused. Cocoliztli means, in Nahuatl, "disease that we all suffer" and "huey", large. The indigenous and Spanish chronicles gave news about it. It was probably the first epidemic caused by a bacterium transmitted by an arthropod (Benavides Carabés 2008). Historical sources describe it as a pestilential fever, with the following clinical signs: fever, and hemorrhages in the nose and eyes. Also, it caused great mortality (Codex Telleriano Remensis, fol. 46v.; Chimalpain 1965, Annals, p. 243).

*There was plague and mortality; a disease of blood that spewed from mouths and eyes, noses and anuses. It killed a great many people, men and women of the noble classes, as well as the colonists. Then, it happened that famished dogs and coyotes entered Chalco to devour people, because of the mortality (sic) (Chimalpain, 1965: 260-261).*

The Spaniards also wrote about it. In a letter sent by Geronimo de Aguilar of September 10, 1545 to the prince regent and later king Philip II, it is mentioned....

*I make known to your majesty [...] God has entered into the concordance and has given such a frightful disease and pestilence among the natives that plagues them, that I truly say that for ten leagues around [Mexico City] from the peaks below that the disease has carried away from seven months to today more than 400,000 bodies (sic) (Epistolario, 1939, v. IV: 227-233).*

The cocoliztli devastated the viceregal capital, its major economic, political and administrative center, located in the Valley of Mexico. It eliminated 400 thousand Indians or "naturales"; a number that shows the demographic density and great communication that existed in the region (García Martínez 1987; Gibson 1980).

The crisis of the disease lasted from 3 to 11 days, during which the hemorrhages occurred, after which they died. The sociodemographic

context of the cocoliztli was New Spain. The context of an epidemic is the series of climatic, geographic, biological and human elements and relationships that combine in order to secure its development in a given society, time and space.

*it is a fearful thing to see that they do not last but three, four, until the eleventh day and the Spaniards have had to bury them: they have died of this disease up to 100: in the houses of the Spaniards it has taken out all the service of the domestic people, black and white slaves; it has been a great loss to the neighbors and so much that I do not know what to say; in my inn it entered and took them all that there was; we have buried up to now 14...(sic) (Epistolario, 1939, v. IV: 227-233).*

The New Spain was a stratified society, divided by the origin and characteristics of its inhabitants' biological and cultural affiliation, as well as by their wealth. At the top were the peninsular Spaniards, followed by the Creoles or Mexican Spaniards, Indians, mestizos - Indian and Spanish -, free blacks and slaves, culminating with the castes, formed by the miscegenation of the previous groups. In those years, the Indians numbered in the millions and constituted the majority of the population of New Spain; Spaniards, Africans, mestizos and castes numbered a few thousand.

### **Exanthematous typhus, cocoliztli and clothing**

An important point about the cocoliztli and for the analysis of the relationship between indigenous clothing and arthropod vectors is that modern science has not established the disease's identity with certainty. This has given rise to a discussion among researchers in the history of health and medicine in Mexico. Some claim it was epidemic typhus (Molina del Villar 1991), and others claim it to have been bubonic plague (Malvido 2006), while others suggest that it was hemorrhagic fever due to hantavirus (Acuña-Soto et al. 2002).

Of the above infectious diseases, exanthematous typhus is perhaps the most likely to have been the cocoliztli. Its epidemiology and clinical picture are consistent with many of the lesions and symptoms of cocoliztli: fever, petechiae on the skin and hemorrhages in the eyes, as well as in the nose (Chimalpain, 1965: 260-261).

This was the reason for choosing exanthematous typhus as an analytical and explanatory model of the relationship between the adoption of European clothing by the Indians and the presence of arthropod vectors of disease in them.

### **Exanthematous typhus**

It is a hemorrhagic fever caused by *Rickettsia prowazaki*, which occurs in impoverished or extreme populations or living situations, such as poverty, overcrowding, lack of individual and collective hygiene, lack of medical and public services, and along with endemic health problems such as malnutrition and infectious diseases. These factors weaken the organisms of people and their immune systems, allowing its appearance, when infected by *Rickettsia prowazaki*, which is introduced by the bite of the body louse. *Rickettsia prowazaki* is an intracellular microparasite, which feeds and reproduces inside the cells of its host (Ryan and Ray 2011: 520).

When endemic in a population, exanthematous typhoid mainly affects adults rather than other age groups. This is the case in some regions of Africa, Latin America, Russia, the United States and France. Epidemic typhus begins suddenly with a high fever 40.6°C to 41.1°C for two weeks; with cephalgia, chills, myalgia, conjunctivitis with photophobia, the face and neck have a characteristic flushing. In addition to dry cough, meningeal irritation, anorexia, vomiting, vertigo, decreased alertness, delirium, severe joint and muscle pain, photosensitivity, low blood pressure, confusion, delirium, and seizures (Foreign Health Physicians Association 2016; Ryan and Ray 2011: 520).

On the fifth day of fever, a maculopapular rash appears in the axillae and trunk, which then spreads to the chest and subsequently to the rest of the body; it does not affect the palms of the hands, soles of the feet, and face. The rash is pinkish at onset and fades when pressed; as time goes by, it becomes pale red and does not disappear. If typhoid is aggravated, it exhibits small intradermal hemorrhages. Sometimes with renal failure, pneumonia and damage to the central nervous system. Recovery takes two to three weeks; if complications arise, death occurs. In severe

epidemics up to 50% of its morbidity dies (Association of Foreign Health Physicians 2016).

### **Pediculosis and exanthematous typhoid**

*Rickettsiae* are introduced and infect humans through the bite of the human body louse (*Pediculus corporis*); they enter the organism through the droppings secreted by the louse into the bloodstream when it feeds on the blood of its host. Therefore, louse-infested individuals easily contract exanthematous typhoid (Ryan and Ray 2011: 520).

The louse becomes infected with rickettsiasis when it feeds on a sick person or an individual carrying inactive rickettsiasis. Inside the louse, the pathogens reproduce after five to ten days of incubation and are then expelled through its feces. When the infected louse moves to another person, it deposits the rickettsiae on that person (Ryan and Ray 2011).

If the infested individual scratches the wound, they introduce the feces into their veins and arteries. The rickettsiae in the bloodstream target the cells of epidermal epithelia and blood vessels, their target tissues. These pathogens readily infect eyes and respiratory mucous membranes lacking a protective keratin coating (Ryan and Ray 2011).

### **Pediculosis and clothing**

Infestation of the human body by lice is called pediculosis. Human lice are hematophagous ectoparasites, measuring 2 to 3 mm, light or gray in color, the shade varying with skin color. They live for twenty-eight days on the skin and clothing of their host; they may die if separated, from starvation, by chilling at temperatures below 27°C, or by heating, if higher than 38°C (American Academy of Pediatrics 2016; Association of Foreign Health Practitioners 2016).

Three species inhabit and reproduce on human skin and pilosity: *Pediculus capitis*, is located on the head; *Pediculus corporis*, occupies the trunk and its extremities. Finally, *Pthirus pubis* occupies the pubic area (American Academy of Pediatrics 2016; Association of Foreign Health Practitioners 2016).

Pediculosis is contracted by contact with infested people, clothing, blankets, and objects. They reproduce easily, when their host has poor

hygiene, is not accustomed to bathing, wears dirty clothes and lives in unhygienic conditions with overcrowding. Another route of infestation is sexual intercourse (American Academy of Pediatrics 2016; Association of Foreign Health Practitioners 2016).

The feeding louse causes irritation and itching due to an allergic reaction of the host to its saliva. Consequently, the host scratches the wounds, introducing the feces with rickettsia into its bloodstream. Body lice can also be found on the head and pubis (American Academy of Pediatrics 2016; Association of Foreign Health Practitioners 2016).

### **Living conditions and pediculosis in the 16th century.**

In the fifth decade of the 16th century, precarious living conditions that allowed for the proliferation of lice were common in New Spain. During droughts, these were due to the lack of potable water for drinking and washing. During frosts, the cold allowed for easy infestation. In extreme socioeconomic conditions such as lack of food and high food prices, the infested bodies were weakened, allowing for the proliferation of rickettsia. On many occasions, both factors combined to give rise to epidemics such as the Huey Cocoliztli of 1544-48.

In the first half of the 16th century, the indigenous people, who made up the majority of the population of New Spain, lived in impoverished conditions; many of them were subjected to the Spaniards through the Encomienda. This consisted of placing a group of Indians at the orders and service of a Spaniard, satisfying his needs and paying tribute to him. In exchange, the encomendero had the obligation to protect and evangelize them. The reality was that the encomenderos exploited the Indians to the point of exhaustion in construction projects for religious, civil and private buildings, as well as in other activities such as mining and agriculture (Malvido 1992).

In addition to tremendous exploitation and deplorable living conditions they faced, it is probable that their clothing and body hygiene were deficient, facilitating pediculosis and the emergence of exanthematous typhus. The new European-style indigenous clothing imposed by the Spaniards facilitated the spread of lice,

rickettsia and its hosts in the first decades of the 16th century.

Only a few Spaniards obtained a privileged life as encomenderos. Most of them were foot soldiers, who got only a small reward for the conquest of Mexico. They shared the hunger, overcrowding and impoverished living conditions in which the Indians and other inhabitants of New Spain lived, as well as their diseases, among them cocoliztli. The extreme and impoverished living conditions of the inhabitants of New Spain, in combination with a changing environment, exerted a synergistic effect contrary to human health; allowing for pediculosis, physiological and psychological weakness. Perhaps these conditions favored the emergence exanthematous typhus, by favoring infection by rickettsia through the proliferation of lice on the body and clothes of the weakened and weakened individuals.

Among the habits that the Indians were forced to abandon was the hygienic practice of daily bathing. The Spaniards considered it a barbaric and unnatural custom that attracted diseases. These were essential factors in the general epidemiology of infectious diseases in New Spain.

### **Indigenous dress at the time of the Spanish conquest**

The Spanish colonization of Mexico was consolidated between 1521 and 1560. During those years, the indigenous and Spanish ways and styles of life were integrated in the New Spanish lifestyle. Tight-fitting clothing, which was characteristic of the Spanish way of life in the 16th century, provided human lice with an ideal environment for their existence by bringing them close to the skin of their hosts, where they fed and reproduced. In addition, the Spaniards changed the indigenous hygienic habits by forbidding the daily bath they used to take, considering it detrimental to human health.

The most notable changes in indigenous dress occurred with male clothing. The men were forced or convinced to wear pants instead of the maxtlatl or loincloth they used to wear, which left the upper body and legs uncovered, and the tilma, with which they covered their bodies.

Indigenous women's clothing did not undergo as many changes as men's, possibly because of its similarity to European women's

clothing of the time. Women wore a long shirt with loose sleeves called huipil and a long skirt.

### Changes in indigenous dress in the Codex Telleriano Remensis and the cocoliztli of 1544-48

The indigenous people adopted the Spanish way of dressing in the 16th century, as part of the transformations in their lifestyle they underwent due to the imposition of the Hispanic conquest. Pre-Hispanic indigenous male clothing underwent more transformations than female clothing. Indigenous men were forced to wear pants and blanket shirts, which replaced the taparrabo and the tilma, a cape which covered their bodies. Indigenous women's clothing was more similar to that of Spanish women. Pre-Hispanic women wore a loose blouse with wide sleeves called huipil and a long skirt, a form of dress that did not contravene the dress style of Spanish women.

The indigenous people's new way of dressing favored the emergence of some of the infectious diseases spread by arthropod vectors, the first of which was possibly the cocoliztli of 1544-48 (Benavides Carabés 2008). Neither history nor medicine has successfully identified the disease that constituted the cocoliztli. Some authors consider that it could have been exanthematous typhus or another disease with a similar clinical picture.

In 1544, the year in which the cocoliztli appeared, the changes in indigenous dress were patent, as some of the indigenous iconographic sources show. Among them, folio 46v. of the Codex Telleriano Remensis, a Nahuatl manuscript, with indigenous pictograms and references written in Spanish.

At the top of the folio are the calendrical glyphs of 1544; 1545 and 1546, with their Latin numerals above. The first two years are joined by black lines to two mortuary wrappers placed below. The left mortuary wrapper is of a noble personage seated on a pre-Hispanic stool - equipal - covered with a colorful blanket or tilma. To his right, at the same level is a group of shrouded bodies, stacked one on top of the other in a horizontal position and tied together, representing the victims of the cocoliztli, both pictograms are joined by two black lines to the glyphs of 1544 and 1545, years in which the epidemic was in the Valley of Mexico.

The envelope of the indigenous ruler has two glyphs above. The one on the right is the pictogram of the site he ruled, which is related to the drawing of two uprooted trees placed under his equipal and to the phrase "ay[i]res grandes quebrando los arv[b]oles", under them in Latin letters.

To the left of the trees is the ruler who replaced him in 1544. He is a personage seated on a European stool and dressed in Spanish clothes, a doublet covers his torso and arms, his legs are covered with tights. In his hand he holds a cane as a scepter, a sign of authority and command of pre-Hispanic origin (Lechuga 1990). Underneath is written the Spanish phrase: "2 Año de 1544/ y de mil quinientos cuarenta y cinco [h]ubo una gran mortandad entre los indios" (2 Year of 1544/ and of one thousand five hundred and forty-five [h]ubo una great mortality among the Indians).

Codex



### Indigenous-Spanish Cultural Syncretism

The black lines that relate the glyphs to each other allow us to follow the cultural transformation that syncretized the pre-Hispanic and the Spanish in the society of New Spain. The Spaniards encouraged the change of indigenous dress for ideological and practical reasons. Indigenous male clothing left a large part of the male body naked, a sociocultural practice contrary to 16th century Hispanic Catholic thought, for which nudity was sinful. In addition, this imposition allowed them to demonstrate their

dominance and power by forcing them to abandon one of their cultural roots.

The Spanish evangelizers promoted the change in dress in part by the educational work or "latinization" of the children of indigenous nobles. The children of the indigenous leaders learned in the schools, churches and convents the language, reading, writing and thinking in the Spanish way. The Colegio de Santa Cruz Tlatelolco stands out among these educational institutions, founded on January 6, 1536 (Baudot 1990).

The macehuales adopted the European dress forced by the Spaniards, by religiosity when they were Christianized or by imitating the conquerors and their leaders. Subaltern social groups follow the dress of the most favored groups for aesthetics, recognition, notoriety and social acceptance. Fashion is a complex phenomenon, which implies staying within an accepted social norm. The exclusive garment ceases to be so when it is reproduced, its uniqueness disappears when it is massified and socialized. In colonial times, textile activity was combined with home and proto-industrial craftsmanship in the large textile workshops called obrajes. In the obrajes, fabrics were made with the treadle loom, using wool and silk (Lechuga 1990).

As time progressed, all indigenous people adopted Hispanic clothing, providing the lice on the human body, vectors of epidemic typhus, with a suitable microenvironment to survive.

### **Pre-Hispanic clothing**

Pre-Hispanic clothing was made in homes by women using backstrap looms. The fabrics were produced from ixtle fibers, obtained from maguey and henequen in Yucatan. Ixtle was used by the common people (macehuales) and cotton by the nobles (pipiles) (Lechuga 1990).

The pre-Hispanic male garment par excellence was the maxtlatl (taparrabo), formed by a scarf and a long ribbon that went around the waist and hung in front and back; occasionally it was complemented with a triangle of cloth in front. For many macehuales it was their only clothing. The body was covered with the tilma, which was a large rectangle of cloth that was knotted on two of its near sides, forming a cloak that hung over the back, shoulder or front of the wearer. Its length and material varied with social rank. For the common people it was short,

reaching to the hip and long as the importance of the person increased (Lechuga 1990: 66-72).

The female garments consisted of a tangle of fabric around the waist to the ankles as a skirt. On the upper part of the body they wore the huipil - a shirt with or without sleeves of variable length - which could reach the hips or cover almost the entire tangle down to the ankles. All huipiles had a small rectangle of cloth immediately below the neckline (Lechuga 1990: 66-72).

### **Spanish dress in the 16th century**

Spanish influence on the indigenous clothing of the XVI century was more noticeable in the male clothing than in the female; it began among the leaders and was later emulated by the rest of the population. Women's clothing underwent few changes, possibly due to three factors.

The first was the small number of Hispanic women who emigrated in the early years of the colony. The second was that the indigenous and Spanish female clothing of the common people did not differ much. Spanish women wore a blouse and skirt. The indigenous women wore a cloth tie around the waist, which served as a skirt, complemented by the huipil that covered the upper part of their body, like the European blouse. Pre-Hispanic women's clothing covered their bodies, so it did not clash with the puritanical ideology of the Spaniards of the time.

In men, the tilma was preserved and transformed into the indigenous zarape. The shirt covered the previously naked torso of the Indians. The ixtle was substituted in part by cotton and wool. The maxtlatl was replaced by the pants, which covered the previously bare legs. The head was protected by the hat, while the indigenous footwear continued to be the huaraches (Gibson 1980: 344; Lechuga 1990: 95-101).

Cultural transformations in the 16th century were gradual. The indigenous people adopted European clothing at a different pace according to social level (Gibson 1984: 344; Lechuga 1990: 95-101). The socio-cultural change was vertically descending. The indigenous nobles were the first to adopt European clothing; voluntarily or forcibly, to conserve and show their power before their subordinates, by imitating the Spanish conquistadors; as well as to protect and maintain their position in the new socio-political system.

## Spanish clothing of the 16th century nobility and indigenous leaders

Spanish noble clothing before 1560 was rich and ostentatious, following the fashion imposed by King Charles V, a monarch of Austrian origin and educated in Flanders, who liked to enjoy life, as well as wealth and elegance in dress.

Spanish nobles wore a shirt as underwear, over it, a doublet that reached the waist and tights that covered the thighs. Under the breeches, there were booties, similar to socks. The footwear were shoes and slippers with covered heels. Over these garments, they wore an overcoat open at the front, adorned with sleeves and collars. On the head they wore hats and caps.

In folio 46v. of the Codex Telleriano Remensis, the indigenous leader who replaced the dead ruler sits on a European stool and not on an equial. This is an example of the transition and cultural syncretism that existed in the viceroyalty during those years. The character wears a red doublet with sleeves and a European-style beard. His change of appearance shows the power crisis of the indigenous elites in the face of Spanish domination. The old leaders, whose authority and power was based on tradition, were dying. The power and authority of the new indigenous elites depended on the Spanish.

The new indigenous leaders adapted to the new socio-political structure and organization by adopting Spanish clothing and customs, such as sitting in the European style. The indigenous leader has a hat on his head, a garment unknown to the Indians until the arrival of the Spaniards. In his hands he holds a scepter, a symbol of power and authority. Western kings used the scepter as a symbol of power.

The impact of the changes in indigenous dress on the epidemiology of infectious diseases in the history of New Spain and Mexico, lies in their daily use by the indigenous population, providing arthropods such as lice and fleas a suitable habitat close to their hosts.

## Final Considerations

The European style of clothing used by the Indians after the conquest was more tight fitting and hermetic than what they had worn before. The shirt and pants gave the lice an ideal environment to live in. It was a factor in the introduction and proliferation of European vector-borne infectious

diseases in the Americas. It encompassed a change in the conception, practice and sense of the natives' hygienic habits, such as was the abandonment of the consuetudinary bath, recorded in the quote "and they used to walk naked and used to bathe at midnight, and now they do not do it that way and eat more" (Del Paso and Troncoso 1979: 259; Malvido and Viesca 1985).

If cocoliztli was a disease transmitted by an arthropod vector, as is the louse for typhus, the adoption of European clothing by the indigenous people facilitated the presence of these vectors and their diseases in the population of New Spain from the sixteenth century to the beginning of the nineteenth century. The European conquest and colonization of America from the 16th century onwards, created new ecological niches that did not exist before in the continent. This allowed new pathogens, their vectors and new diseases to become endemic among the inhabitants of this continent.

The Spanish conquest and colonization of Mexico also meant a change in health, hygienic habits, medicine, and the establishment of new infectious diseases. One of the crucial events was the Huey Cocoliztli in 1544-48. Clothing and dress are one of the sociocultural manifestations that link ecology, health and social ways of life.

## References

- Acuña-Soto, Rodolfo, David W. Stahle, Malcolm K. Cleaveland, y Matthew D. Therrell. 2002. "Magadrought and Megadeath in 16th Century Mexico". *Emerging Infectious Diseases online* 8, No 4:360-62.
- American Academy of Pediatrics. 2016. "Pediculosis (piojos): lo que los padres deben saber". 06-04-2017. Recuperado el 16 de enero de 2018 (<https://www.healthychildren.org/spanish/health-issues/conditions/from-insects-animals/paginas/signs-of-lice.aspx.%0D>).
- Asociación de Médicos de Sanidad Exterior. 2016. "Tifus epidémico. Epidemiología y situación mundial". *Información Epidemiológica* 1-3.
- Baudot, George. 1990. *La pugna franciscana por México*. México: Consejo Nacional de Cultura y Arte.
- Benavides Carabés, Oscar René. 2008. *Las epidemias de viruela y matlazahuatl de 1761-1763 en la Nueva España. Una aproximación paleoepidemiológica*. México.
- Cook, Sherburne F. y Woodrow Borah. 1960. "The

- Indian population of Central México 1531-1610”,. *Ibero-Americana* 44, University of California Press.
- Crosby, Alfred W. 1991. *El Intercambio Transoceánico. Consecuencias biológicas y culturales a partir de 1492*. México: Universidad Nacional Autónoma de México, Instituto de Investigaciones Históricas.
- García Martínez, Bernardo. 1987. “Consideraciones corográficas”. Pp. 9–82 en *Historia General de México*. Mexico: El Colegio de México.
- Gibson, Charles. 1980. *Los aztecas bajo el dominio español. México, 1519-1810*. México: Siglo XXI.
- Lechuga, Ruth D. 1990. *El traje indígena de México. Su evolución desde la época Prehispánica hasta la actualidad*. 4ta ed. México: Panorama Editorial S. A.
- Malvido, Elsa. 1973. “Factores de despoblación y reposición de la población de Cholula 1641-1810”. *Historia mexicana* 89:52–110.
- Malvido, Elsa. 1992. “¿el arca de Noé o la caja de Pandora? Suma y recopilación de pandemias, epidemias y pandemias en Nueva España”. Pp. 45–87 en *Temas médicos de la Nueva España, 1519-1810*. México: Instituto Mexicano del Seguro Social (Colección Salud y Seguridad Social, Instituto Cultural domecq.
- Malvido, Elsa. 2003. “La epidemiología, una propuesta para explicar la despoblación americana”. *Revista de Indias* LXIII(227):65–77.
- Malvido, Elsa. 2006. *La población, siglos XVI al XX. Historia Económica de México*. editado por E. Semo. México: Universidad Nacional Autónoma de México.
- Malvido, Elsa y Carlos Viesca. 1985. “La epidemia de cocoliztli de 1576”. *Historias* 11, 27–3.
- Marquéz Morfín, Lourdes. 1993. “La evolución cuantitativa de la población novohispana: siglos XVI, XVII y XVIII”. Pp. 36–63 en *El poblamiento de México, tomo II; El México Colonial*. México: Secretaría de Gobernación, Consejo Nacional de Población.
- Del Paso y Troncoso, Francisco. 1979. *Relaciones Geográficas de México*. México: Editorial Cosmos.
- Ryan, Kennrth J. y C. George Ray. 2011. “Rickettsia, Ehrlichia, Coxiella y Bartonella”. en *Sherris Microbiología Médica*. México: McGraw-Hill Interamericana Editores.
- Sánchez Albornoz, Nicolás. 1973. *La población de América Latina*. Madrid: Alianza Universidad. [Pediculosis \(piojos\): lo que los padres deben saber](https://www.healthychildren.org/spanish/health-issues/conditions/from-insects-animals/paginas/signs-of-lice.aspx) <https://www.healthychildren.org/spanish/health-issues/conditions/from-insects-animals/paginas/signs-of-lice.aspx>.

