



Epidemiological Transition in Iran: The Rise and Fall of Epidemics in Iran After Islam to Before the Islamic Revolution

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Abstract

Background and aims: The lack of reliable data on mortality in Iran until the last few decades has caused the early stages of the epidemiological transition to remain unknown. As such, the current study was an attempt to examine the stages and timing of the epidemiological transition in Iran in a historical effort.

Methods: This study is descriptive-analytical, and its data and information have been collected using the library method.

Results: The historical course of the emergence of epidemics in Iran after Islam to before the Islamic Revolution is divided into four periods: (1) The period after Islam to the Safavid period (650-1501 AD): The era of plague and famine, (2) Safavid to Qajar period (1501-1796 AD): The era of continued widespread outbreaks and intermittent occurrence of plague, (3) Qajar period (1796-1925 AD): The era of subsidence of the plague and widespread cholera, and finally (4) Pahlavi period (1925-1979 AD): The era of the decline of epidemic diseases.

Conclusion: The continuous and substantial reduction in deaths led simultaneously to a reduction in the incidence and scope of epidemics and an increase in chronic diseases, and this process is expected to accelerate in the future.

Keywords: Epidemic disease, Plague, Cholera, Population growth

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Introduction

Infectious and epidemic diseases have been among the most important causes of high mortality throughout human history. Some researchers believe that with the advent of the agricultural age around the 8th millennium BC and the emergence and expansion of urbanization around the 4th millennium BC, contagious and infectious diseases could spread to larger populations and areas. Considering that country of Iran has a long history and is among the first civilizations in which urbanization was followed by the agricultural revolution similar to other societies in the past, it was not yet safe from the occurrence and losses of lives from infectious diseases and epidemics. In addition, in the past, wars caused the spread of some epidemics, especially global epidemics, and Iran has always witnessed such wars, both domestic and foreign, due to its sensitive political and geographical location. Two diseases (i.e., plague and typhus) usually occur after invasions, escapes, and disorders caused by them. There is a great deal of historical evidence that the casualties caused by these two diseases, which peaked after the invasions and escapes, were far greater than the direct casualties caused by the invasions and escapes.¹ Sometimes the extent and impact of infectious diseases in

Iran have been so noticeable that caused political changes.

The economic-social development during the last two centuries led to the improvement of the health situation and consequently a substantial and continuous reduction in infectious diseases and epidemics as well as the resulting deaths. Subsequently, the reduction in these types of diseases resulted in a decrease in the level of mortality and, as a result, a significant increase in life expectancy at birth. Fundamental changes in the level of mortality as well as changes in the pattern of causes of death led Omran (1971 AD) to use the term “epidemiological transition” for the first time to describe regular transitions in the composition of causes of death, in which infectious diseases were gradually replaced by degenerative diseases that are the main cause of death.² The term epidemiological transition refers to the changes in the distribution of the causes of death that accompany the transition of mortality. In the epidemiological transition theory, the historical evolution of mortality over time is characterized by three stages:

- Age of pestilence and famine: This phase is characterized by fluctuations in mortality in response to epidemics, famines, and wars. Crude death rates are high, ranging from 30 to more than 50 deaths per 1000 populations.

- Age of receding pandemics: This stage is a transitional stage. At this point, mortality begins to decrease. The improvement in health and nutrition status and later progress in medical and public health programs will help control epidemics and the transmission of infectious and parasitic diseases.
- Age of degenerative and man-made diseases: At this stage, mortality continues to decrease and stabilizes at a relatively low level. Moreover, fertility becomes the main factor for population growth.²

There are different objectives for investigating the patterns and causes of death, but they all have a common point which is the importance of death in the development of countries.³ The indicators and patterns of death are one of the most common indicators for measuring the health status of the population and evaluating the quality of healthcare services. In addition, the study of health and mortality in the form of the epidemiological transition theory leads to a better understanding of the evolution of death indicators and patterns, especially the causes of death. In Iran, from the 2000s (1380 Solar Hijri [SH]) onwards, access to reliable information on deaths has made it possible to study the trends of epidemiological developments in recent decades. However, due to the lack of reliable information, the investigation of the early stages of the epidemiological transition is a research gap and remains unknown. Accordingly, this study examined the stages of the epidemiological transition, especially the first and second stages, and its timing in Iran through historical research in reliable sources.

Materials and Methods

This study is descriptive-analytical, and its data and information are collected using the library method. Regarding the emergence of epidemics, the more we go back to the distant past, the more scattered the sources become. Historical records showed that epidemic diseases have been present in Iran for centuries; however, insufficient information, invalid documentation, and incorrect classifications prevent correct analysis. Therefore, based on the available and reliable information in this study, we discussed epidemics from the beginning of Islam to the Safavid era and then the presence of epidemics in the history of Iran, including the Safavid, Qajar, and Pahlavi eras, and their effects were discussed in more detail.

One of the most important problems in the way of this study and similar studies is the lack of reliable statistics and information about health indicators, especially the exact number of deaths, so there is no choice but to rely on descriptive studies based on estimates. To carry out this study, in addition to using historical written sources and books that briefly mentioned the issue, archival sources were used, including newspapers and documents in the National Library and Records Organization.

Results

Based on documents, information, and historical periods,

as well as the epidemiological transition in Iran, the historical course of the emergence of epidemics in Iran after Islam to before the Islamic Revolution was divided into four periods: The period after Islam to the Safavid period (650-1501 AD: 29-880 SH): The era of plague and famine, Safavid to Qajar period (1501-1796 AD: 880-1175 SH): The era of continued widespread outbreaks and intermittent occurrence of plague, Qajar period (1796-1925 AD: 1175:01304 SH): The era of subsidence of the plague and widespread outbreak of cholera, and finally Pahlavi period (1925-1979 AD: 1304-1357 SH): The era of the decline of epidemic diseases. In the following, each of these historical periods and the emergence and occurrence of epidemics and diseases will be discussed.

The Period After Islam Until the Safavid Period: The Age of Plague and Famine

Plague is one of the oldest infectious diseases in Iran and has had devastating effects on the population of Iran throughout history.⁴ The most important global epidemic that affected not only Iran but the whole world after Islam is the Black Plague or Black Death in the fourteenth century AD (eighth century SH), which spread in Iran and the world at the same time as the invasion of the Mongols. The origin of this terrible disease was China. This plague spread rapidly in Iran and reduced its population, which after successive famines, various epidemics, adverse weather conditions, and long wars had been severely weakened against any disaster. Estimates that are widely accepted for the Middle East, including Iraq, Iran, and Syria, during this time reported the death rate to be about one-third.⁵

During the Timurid era, the number of people who died from the plague was so high that it was unprecedented after the Mongols' attack and their massacre in Herat. Kasiri and Afsharifar mentioned the number of dead people in Herat city as nearly 600 000 people and the number of dead people around the city as 400 000 people. He further added that this number is apart from those who were buried in houses or thrown into pits.⁶ Although these figures seem to be exaggerated, they reflect the severity of plague casualties at that time.

The Safavid to Qajar Period: The Era of Continued Widespread Outbreaks and Intermittent Emergence of Plague

Infectious diseases such as plague, cholera, and smallpox were among the most important factors that hindered population growth or caused population decline during the Safavid period.⁷ Two diseases, plague and cholera, were more important due to a large number of casualties, and they were mentioned together in most of the sources. During the Safavid era, plague outbreaks occurred intermittently and caused population losses. The outbreak of the plague in the period of Shah Ismail I in Iraq and Persia resulted in a large population loss.⁸ The plague of 1602 AD (988 SH) in Ardabil and its surrounding areas

killed about 30 000 people.⁹ The second major plague disaster happened in 1655 AD (1034 SH) in Ardabil, Khalkhal, Sarab, and Aras, which resulted in the death of about 100 000 people.¹⁰ Cholera in 1684 AD (1096 SH) killed nearly 60 000 people in Ardabil.¹¹

In general, regarding the Safavid period and the impact of epidemics on its population, it can be said that during the 10th century of the lunar calendar, on the one hand, there were frequent wars with the Ottoman and Uzbek empires and domestic unrest, and on the other hand, the spread of epidemic diseases such as the plague, especially at the end of the century, were important obstacles to population growth. Historical researchers have estimated the population of Iran between 6 and 11 million during this period.¹²

After the actions of Shah Abbas I (1571-1629 AD: 950-1008 SH), Iran witnessed a period of internal and external security, and from the beginning of this century, the population grew, the largest growth of which was in the 1650s AD (1030s SH). At this time, the population of Iran was estimated to be around 10 million people. During the reign of Shah Abbas II (1642-1666 AD: 1021-1045 SH), successive famines and plagues caused a decline in the rate of growth and the number of the population in such a way that in the 1708s AD (1120s AH), country's population was about 9 million and then it decreased. However, the peak of the population decline occurred from 1669 to 1688 AD, that is, during King Suleiman's reign when widespread famines, plague, and cholera caused a large-scale drop in the population.¹³ After the Safavid era, which ended with Mahmud Afghan's attack on Iran, it seems that this decrease in population continued. One of the biggest plague epidemics occurred in Iran during the rule of Afsharia and Zandiyeh, and this outbreak killed about 2 000 000 people in Iran and the territories under its control in the west of the country which killed more than 250,000 people in Basra alone.⁴

If we accept a population of about 8-9 million at the end of the Safavid era for Iran, it seems that due to the spread of diseases, famines, and consecutive internal and external wars between the fall of the Safavids and the rise of the Qajar dynasty, the population decreased again, so a population of 6-7 million seems to be a reasonable number for Iran at the beginning of the 19th century. During the Qajar period, as in other periods before that, no general census or population and health surveys was conducted in Iran, and the system of registration for health or health statistics had not yet been established in the country. Therefore, the number of deaths and diseases, like the number of population in this period, is based on speculation and observation of tourists and historians of that period.

Qajar Period (1796-1925 AD): The Era of Subsidence of the Plague and Widespread Outbreak of Cholera

In the 19th century, at the same time as the Qajar rule in Iran, the scope and severity of deaths caused by the plague

decreased, and instead, diseases such as cholera, typhoid, malaria, smallpox, measles, and whooping cough became more prevalent. During the Qajar period, the plague never had the dimensions of a widespread pandemic epidemic. Curzon reported the outbreak of plague in Shushtar and explained that in 1830-1831 AD (1209-1210 SH), due to the plague, the population of the city greatly reduced and about 20,000 people died.¹⁴ Regarding the population of the two provinces of Mazandaran and Gilan, he asserted that the population of these two provinces suffered a great deal due to the plague of 1830-1831 AD, and it is said that two-thirds of the people died. During this period, due to the expansion of Iran's communications with the surrounding world and foreign wars, the ground for the epidemic of other diseases such as cholera was provided.¹⁴

Although infectious diseases such as smallpox, malaria, tuberculosis, whooping cough, and measles have been mentioned in historical sources, these diseases did not mainly occur on a national scale and were common as local epidemics; therefore, they had less impact on the lives of the population. The most important epidemic disease of the Qajar era was cholera, the prevalence of which has been mentioned numerous times in historical sources. Sometimes, most of the victims of cholera were infants and children, and this disease was one of the reasons for the high mortality rate of children and babies in Iran and the low life expectancy in the past. What follows are the important cholera epidemics with high mortality rates in the Qajar era, which were part of the global epidemics of this disease at that time, with especially infants and children as the victims.¹⁵

In 1821 AD (1199 SH), a cholera epidemic started in the Persian Gulf and spread to Shiraz and Isfahan. This wave of cholera had many casualties, especially in Shiraz. In 1828 AD (1207 SH), the second widespread epidemic originated from India and entered Iran from Afghanistan. This disease has affected the people of Iran and their lives consecutively in these years in a way that it took many years to restore the population lost by this crisis.¹⁵ During the years 1845-1847 AD (1224-1226 SH), the third cholera epidemic occurred, and Elgood estimated the death toll of this disease in Tehran to be 12 000, which was equivalent to 10% of Tehran's population in that days.¹⁶

Of course, the important and outstanding impact of the Spanish flu disease on the increase in deaths and the decrease in the population in the late Qajar period should not be overlooked. Since there was little familiarity with influenza in Iran, this disease induced numerous deaths and affected most families. Some researchers estimated the total death toll from famine and disease during 1917-1919 (after World War I) to be around 2 million people.¹⁶

If we acknowledge the population estimate of 10-11 million people for Iran in those days, this number would be equal to around 20% of the total population of Iran, while some other researchers who estimated the population of Iran to be 19 000 000 people at that time reported a loss of 50% in Iran's population due to famine,

cholera, typhus, and the Spanish flu in those days, which seems exaggerated.¹⁷

It should be noted that the first census of Tehran and several other cities such as Kerman (National Library and Documents Organization of Iran, Deputy of National Library, document number 11501.1) was conducted during this period and the reign of Naser al-Din Shah between 1882-1887 AD (1261 and 1265 SH). Referring to the statistical yearbook of Tehran in 1925 AD (1304 SH), in this census, the total population of Tehran was 106 482 people in 1883 AD (1262 SH), although from other information such as the consumption of bread in the city at that time, it can be estimated that the population of the city at that time was greater than 150 000 people (Tehran Statistical Yearbook, pp. 12-13).

With a retrospective approach and considering the historical sources and intermittent outbreaks of famine, cholera, and other infectious diseases during the Qajar era, the estimate of 10-11 million at the beginning of World War I seems to be more reasonable. After the spread of the Spanish flu and the great famine, if Iran had lost one to two million of its population,¹⁴ the population of Iran at the end of the Qajar rule and the beginning of the Pahlavi rule would have been equivalent to a figure around 9-9.5 million and less than 10 million people, which is consistent with demographic estimates at the beginning of the 1920s (14th century SH). If we accept a population of 6.5 million people at the beginning of the Qajar rule as previously estimated and a population of around 9-9.5 million people at the end of the Qajar rule, according to the formula of the annual natural growth rate of the population ($P_t = P_0(1 + r)^t$), Iran's population has grown on average between 2.5 and 3 per thousand during the Qajar rule. Considering the political-social situation of the country, the decline of the plague, and the spread of cholera during the Qajar period and based on estimates at the beginning of the 14th century, this figure seems reasonable for the growth of Iran's population during this period.

Pahlavi Period (1925-1978 AD) (1304-1357 SH): The Era of Decline in Epidemic Diseases

With the change in political situation and governance from Qajar to Pahlavi, the government's approach also underwent fundamental changes in the face of epidemics. During this period, the role of epidemics in mortality and its effects on population reduction clearly decreased. Both political and social changes inside and outside the country were effective in this regard. During the first Pahlavi era, epidemic diseases such as smallpox and cholera were still present, but with the serious measures of the government, the establishment of national laws, and also international efforts, especially regarding quarantine, the ground was laid for the eradication of these diseases and the reduction of deaths caused by them.¹⁸

During the Pahlavi era, cholera became widespread in Iran for several periods, but health measures and educational and therapeutic efforts of the government

prevented the outbreak and spread of cholera from one region to another; therefore, the number of deaths caused by them was kept at a low level. One of the laws enacted in Reza Shah's government to fight against cholera and other contagious diseases was the law against epidemic diseases.¹⁹ Legislations were also pushed in the direction that improved the health of the environment. For example, the 19th, 20th, 23rd, and 24th articles of the building regulations that were approved by the Tehran Municipality Association in 1932 AD (1311 SH) directly emphasized the improvement of the quality and hygiene of drinking water.^{19,20} According to the same document, the Municipality Association, the Health and Charity Department, and the General Vice-Chancellor used to issue notices and announcements for public health education, which were effective in raising the level of people's awareness.

At the beginning of the 14th century, on the order of Reza Khan, another census of Tehran was carried out, and its report was published in the Statistical Yearbook of Tehran (1304 SH). This document contained useful information in the social and demographic fields, including the population by age and sex, the number of births and deaths, as well as the most important causes of deaths by age and sex. Although the accuracy of these statistics can be doubted, the details of the published information contained valuable points. The second part of this document was about population statistics, according to which the total population of Tehran at the beginning of the current solar century (1922 AD: 1301 SH) was estimated at 210 000 people. In addition, the third part of this document examined marriages, divorces, births, and deaths from 1921-1924 AD (1300 to 1303 SH). In the death statistics section, the average number of annual deaths in Tehran in these four years was 4531 (21.6 per 1000), and as mentioned in the introduction, the number of deaths is not completely reported, and if the full number were available, the above ratio would be around 23 or 24 per 1000. According to the table in this section, more than 40% of the deaths were only due to four diseases: tuberculosis, pleurisy, diarrhea (caused by cholera), and malaria. According to the information in this part of the document, malaria, measles, whooping cough, and tuberculosis were the most important causes of death of children under 5 years old in that era.²⁰

The beginning of the fundamental and continuous reduction in deaths in Iran as a result of the eradication of epidemics dates back to the years after the Second World War (during the Pahlavi II regime), when widespread vaccinations were available, attention to the health of children and schools was raised, and increasing measures were taken in these cases. Furthermore, in these years, organized efforts have been made to eradicate and treat diseases, especially cholera, malaria, and tuberculosis.²¹

The first estimates related to the level of mortality through making a life table and so calculating life expectancy were based on general censuses. Based on these

estimates, the life expectancy at birth in Iran has increased from 37.5 years in 1956 AD to 47.5 years and 57.5 years in 1966 and 1976, respectively.²¹ In this way, in this era, demographic and health statistical registration systems took a better shape, and statistical bases were provided for more effective health planning and policy making.

During this period, the decline of epidemics played an important role in increasing the population and its growth rate, and Iran's population had a low growth rate until the late 1920s. The first census of the country in 1956 showed that the population is 18.9 million and the growth rate is 1.7%. In 1965, the population reached 25 million and the growth rate was 3.1%. After the implementation of the family planning program in the Pahlavi period in 1975, the growth rate and the population reached 2.7% and 33 million, respectively. Studies indicated that the reduction in mortality caused by infectious and parasitic diseases and the control of epidemics caused by them were important factors in Iran's population transition in the 20th century. Mortality decreased from 40 per thousand in 1981 (1280 SH) to about 20 per thousand in the 1960s and 1970s.^{21,22} This decrease in mortality was mostly due to the developmental measures of the Pahlavi regime in the 1950s and 1960s. During this period, life expectancy doubled, and infant mortality decreased to less than half (Table 1). All these figures were a sign of the decline of epidemic diseases and the reduction of their prevalence in this era. Therefore, during the second Pahlavi period, concurrent with the significant decrease in the death rate in the country, the share of epidemics and contagious diseases also decreased drastically, and during this period, epidemics did not have much effect on the size and growth rate of the population in the country.

Discussion

Pandemic epidemics have played an important and outstanding role in the course of historical developments in Iran's population after Islam. They have sometimes caused severe and irreparable damage to the country's population throughout history. The slowness of population growth and the obstacles to it in the past are somewhat consistent with the Malthusian view. Due to the limitation of resources in the past, whenever there was an increase in population beyond normal, natural countermeasures such as infectious diseases and famine started to work, and they prevented the population from exceeding the resources' estimates by stopping the growth of the population and

sometimes decreasing the population. On the other hand, the three major causes of population decline in the past (i.e., epidemics, wars, natural disasters, and famines) seem to be closely interwoven. Epidemics weakened the people and the country's army against internal and external enemies and provided the ground for insecurity, rebellion, failure, and more deaths. Wars disrupted and destroyed the economic and health infrastructure of the country in dealing with epidemics and famines. Famines affected people's health and made them vulnerable to epidemics. Generally, a famine occurred after the wars, and subsequently, epidemic diseases such as cholera and plague appeared. The outcome of all these epidemics in the past was high mortality. As a result, population growth stopped and even decreased.

This process was a common practice during Iran's history until the Qajar government took the power. In the 19th century and concurrent with the Qajar rule in Iran, the scope and severity of deaths caused by the plague decreased. However, since the public health situation was poor during this period, the spread of deadly diseases such as cholera was not surprising. Although these diseases were abundantly mentioned in historical sources, they were common in the form of local epidemics. Therefore, compared to the plague in the past, they had less impact on the lives of the population. During this period, due to the expansion of Iran's connections with the surrounding world and foreign wars, the ground for the epidemic of other diseases such as cholera was provided. This was opposed to the fact that there was still no effective treatment or prevention for these diseases, and in addition to the low level of people's awareness, the government also did not have a specific plan to fight and eradicate epidemic diseases. The constitutional revolution and political developments following that also had an impact on how to deal with epidemics. In addition, the actions of countries in which cholera originated (e.g., India and Russia) and the international community in dealing with cholera disease at the end of the Qajar era reduced the force of cholera deaths and its widespread outbreak. As such, it seems that at the end of the Qajar reign, the severity of deaths caused by epidemics decreased and the population growth rate started to rise.

With the beginning of the 14th century (1920s AD), the ending of the Pahlavi government, and the subsequent social-political changes and developments, the role of epidemics in reducing the population and even mortality

Table 1. Demographic situation of Iran between 1921 and 1975

Year	Life expectancy at birth	Mortality rate of children under 1 year old	Crude birth rate	Crude death rate	Natural growth rate
1921	25	305	43.3	40	3
1921-1941	30	256	44.8	33	11
1941-1956	40	201	46.6	23	22.5
1956-1966	47.5	132	47.1	17	30
1966-1976	52.5	106	41.1	14	27

Source: Saraei (1997: 53)

gradually decreased, and they almost played no historical role until after the Second World War. However, their absence also created important demographic changes. After the deaths caused by the epidemic diseases mentioned in the existing texts until the 1951s AD (1330s SH), it seems that the improvement of the living conditions of the Iranian people and the control of the biggest death crises led to more reliable signs of the end of the first era and the advent of the population into the second period of demographic transition. In the 1950s AD (1330s SH), several health projects, including the project to fight malaria, eradicate infectious diseases, help health institutions and health education, train paramedics and general practitioners, and provide medical equipment and health facilities (e.g., the construction of hospitals and clinics) were implemented by the Health and Public Affairs section of the Management and Planning Organization in cooperation with the Ministry of Health (three-year report of the Health and Public Affairs section of the Management and Planning Organization, from 1955-1958 AD (Mehr 1334 to Mehr 1337 SH). In the 1950s, under the White Revolution, the Health and Knowledge Corps were employed and sent to rural areas to raise the level of health and literacy and to promote health measures and education so as to improve health conditions. In the 1960s and 1970s, extensive efforts were made to modernize Iran and reduce the inequality between urban and rural areas. The Pahlavi regime planned a health network system for the entire country.²³ All these measures caused the decline of epidemic diseases in this period, paved the way for the transition to higher stages of the epidemiological transition, and caused non-infectious diseases to gradually replace epidemic, infectious, and parasitic diseases.

The most important limitation of this study was the lack of mortality data and its pattern regarding age and sex, which made it impossible to provide an accurate and complete picture of mortality and its epidemiological face in the past centuries. Moreover, the presence of contradictory statistics in some historical sources and the recognition of real and more reliable information and statistics rather than other published statistics are other limitations of this study.

Conclusion

The epidemiological transition model can be useful for epidemiologists because it provides a means by which findings related to individual diseases in different populations can be combined into a framework that facilitates understanding of the phenomenon and, in turn, can create a platform for appropriate intervention. As the phenomenon of globalization causes the emergence of new epidemics and also accelerates the spread of old epidemics and infections, and on the other hand, chronic and man-made diseases are increasingly combined with antibiotic-resistant pathogens, this model can facilitate the understanding of the outlook of upcoming diseases that have become more complicated. Epidemiological

transition studies provided a suitable opportunity for researchers to have a more realistic assessment of mortality indicators with more details and more accurate explanations. However, longitudinal studies in developing countries, including Iran, face severe limitations. It is suggested that the mortality data be recorded with more detail and precision to produce reliable data about the mortality trend in the country. Therefore, longitudinal studies such as epidemiological transmission in the country can be used. These types of studies depict the mortality profile and challenge planners and policymakers.

Authors' Contribution

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Competing Interests

The authors declare that they have no competing interests.

Ethical Approval

Not applicable.

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