

RESEARCH ARTICLE

Description of Deaths on Easter Island, 2000-2012 Period

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Abstract

Easter Island is a small island of 180 km², located 3,800 km from the Chilean coast and one of the most isolated inhabited places in the world. Since the mid-twentieth century, it has been undergoing an epidemiological transition in relation to the causes of death, from a predominance of infectious to non-communicable diseases (NCDs) such as cardiovascular ailments and cancer. The aim of this study is to describe the causes of death to Easter Island between 2000 and 2012, so the statistical records of Hanga Roa Hospital and death certificates were reviewed. The period under review of 13 years there was a total of 252 deaths, an average to 19.3 deaths per year. The most frequent causes of death found in the general population of Easter Island were cardiovascular diseases (25.4%), followed by neoplasms (23.4%), accidents (18.6%). Related to Rapa Nui people, cardiovascular and neoplastic diseases (both 26.7%) predominate, while in the population without belonging to the ethnic group the main causes were traumatic (25%) and cardiovascular (22.2%). Comparing the leading causes of death of Easter Island with mainland Chile, it can be seen how they resemble. Taking the island death profile, it is necessary to work on public health strategies aimed to this, considering that some of the causes are completely preventable.

Keywords: Cancer - Easter Island - cardiovascular diseases - deaths

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Introduction

Easter Island is a small island of 180 square kilometers, located in the Polynesian 3,800 km from the Chilean coast, and is one of the most isolated inhabited places in the world (Rius et al., 2013). Historically, it has been inhabited by the Rapa Nui culture, the makers of the giant stone statues called moai. Chile maintains sovereignty over Easter Island since 1888, resulting in a progressive fusion of Polynesian ethnic (Rapa Nui) and Chilean population (average mixed 66% Caucasian and 34% Amerindian), (Arcos-Burgos et al., 2004) and other visitors from around the world (France, England, French Polynesia, Spain and others) who have left descendants (Englert, 2009; Stambuk, 2010). Easter Island currently has a projection of 5,167 inhabitants (INE, 2008), approximately 60% with genes Rapa Nui, and 40% without genes Rapa Nui, primarily Chileans (INE, 2002) (Cruz-Coke, 1989).

Along the history of Rapa Nui, have been numerous events that led to major demographic changes in its inhabitants. It is estimated that between 400 and 800 A.D. would come to this previously uninhabited island the first Polynesians in a small group, where they found the conditions to survive and develop, reaching centuries after thousands of people and their own culture (Vargas et al., 2006), (Englert, 2009).

The discovery of Easter Island by the western culture takes place in 1722, marking an important milestone

in the history of Rapa Nui culture, because since then, successive expeditions, pirates and slave begin to visit the island, which decimated the population to reduce just over 100 inhabitants in 1877, the product of making slaves, kill and transmission of infectious diseases a susceptible population for its extreme isolation (Englert, 2009), (Cristino and Fuentes, 2011). Later in the twentieth century, the population experiences a progressive growth with high birth rates and declining mortality, which, coupled with the arrival of immigrants (many of them were mixed with the original inhabitants), resulting in today's multicultural residents Easter Island (Garcia-Moro et al., 2000).

In Chile, as in the rest of the world since the mid-twentieth century, has been developing an epidemiological transition with respect to the causes of death, from a predominance of infectious to non-communicable diseases (NCD) diseases, which are presented a major challenge for the XXI century medicine. The leading causes of death globally include cardiovascular disease, cancer, diabetes and respiratory diseases. (Minsal, 2011). Only for cancer, in 2008 it was reported that 12.7million people were newly diagnosed and that 7.6 million people died of cancer. (Jeong et al., 2014).

Analysis of deaths provides important information regarding the health status of a population reflects the changing causes of death range according to environmental conditions that affect the population, and in the case of a

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population at Easter Island, how to contact the external influences on the health of Easter population (Garcia-Moro et al., 2000).

The purpose of this study is to describe the causes of death of the inhabitants of Easter Island during 2000 to 2012 and analyze the results in the historical context of Easter Island and the current national situation.

Materials and Methods

Retrospective statistics patients who died treated at the Hanga Roa Hospital between January 2000 and December 2012 were reviewed. Few epidemiological data on patients was collected. The causes of death were classified according to ICD-10 and were taken from the

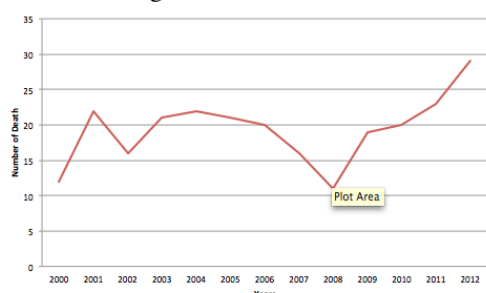


Figure 1. Annual Number of Deaths on Easter Island, 2000-2012

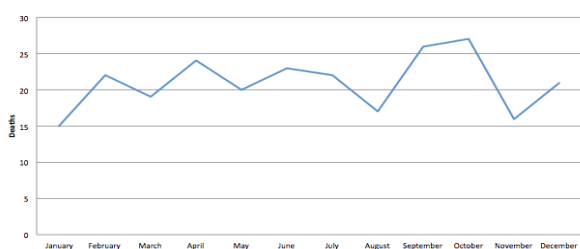


Figure 2. Total deaths on Easter Island 2000-2012 Period, According to Month

death certificates of patients. To classify the patient as belonging to the Rapa Nui ethnicity was considered that at least 1 of their last names were original Rapa Nui. By age group, child was considered a person less than 15 years of age, older adults who were 65 or more years old, and the adult group between 15 and 64 years old. The Microsoft Office Excel 2007 program for the tabulation of the data was used.

For statistical analysis, the projected population of Easter Island was used, obtained from publicly available information on the websites of the Department of Statistics and Information of Health and the National Institute of Statistics in order to calculate the mortality rates of period between the years 2000-2012 (INE, 2008). The infant mortality rate is defined as the number of deaths in children under 1 year per 1,000 live births in a year (Romero et al., 1994). The crude overall mortality rate is defined as the number of deaths in the population per 1,000 inhabitants in the period of 1 year. (INE, 2007).

Results

In the period studied of 13 years there was a total of 252 deaths, an average of 19.3 deaths per year, the fewest in 2008 with 11 deaths, while the highest amount was recorded in 2012 with 29 cases (Figure 1). Figure 2 shows the deaths of the study period is observed as month of the year, noting a slight increase in the number of deaths in the months of September and October, coinciding with the end of winter and early spring on the island.

Regarding the most common causes of death found on the general population of Easter Island were cardiovascular diseases, followed by neoplasms, accidents and respiratory diseases (Table 1). In Rapa Nui gene dominated cardiovascular diseases and neoplastic diseases by the same proportion, while the population without Rapa Nui gene the main causes of death were cardiovascular and traumatic. By age group, the most common causes

Table 1. Death on Easter Island, 2000-2012 Period, by Cause, Age Group and Ethnicity

ICD-10 Classification	Total Death	%	Rapa Nui	%	No Rapa Nui	%	Child	%	Adult	%	Elder	%
I. Infectious and parasitic diseases	5	2	5	2.7	0	0	0	0	2	1.8	3	2.3
II. Neoplasias	59	23.4	48	26.7	11	15.2	0	0	25	22.7	34	26
III. Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	0	0	0	0	0	0	0	0	0	0	0	0
IV. Endocrine, nutritional and metabolic diseases	1	0	1	0.6	0	0	0	0	0	0	1	0.8
V. Mental and behavioural disorders	0	0	0	0	0	0	0	0	0	0	0	0
VI. Diseases of the nervous system	2	0.8	1	0.6	1	1.4	1	9.1	0	0	1	0.8
VII. Diseases of the eye and adnexa	0	0	0	0	0	0	0	0	0	0	0	0
VIII. Diseases of the ear and mastoid process	0	0	0	0	0	0	0	0	0	0	0	0
IX. Diseases of the circulatory system	64	25.4	48	26.7	16	22.2	0	0	21	19.1	43	32.8
X. Diseases of the respiratory system	34	13.5	23	12.7	11	15.3	0	0	11	10	23	17.6
XI. Diseases of the digestive system	13	5.2	4	2.2	9	12.5	0	0	8	7.3	5	3.8
XII. Diseases of the skin and subcutaneous tissue	0	0	0	0	0	0	0	0	0	0	0	0
XIII. Diseases of the musculoskeletal system and connective tissue.	0	0	0	0	0	0	0	0	0	0	0	0
XIV. Diseases of the genitourinary system	6	2.4	6	3.3	0	0	0	0	1	0.9	5	3.8
XV. Pregnancy, childbirth and the puerperium	0	0	0	0	0	0	0	0	0	0	0	0
XVI. Certain conditions originating in the perinatal period	3	1.2	1	0.6	2	2.8	3	27.3	0	0	0	0
XVII. Congenital malformations, deformations and chromosomal abnormalities	2	0.8	1	0.6	1	1.4	2	18.2	0	0	0	0
XVIII. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified.	16	6.7	13	7.2	3	4.2	1	9.1	4	3.6	11	8.3
XIX and XX. External causes of morbidity and mortality	47	18.6	29	16.1	18	25	4	36.3	38	34.6	5	3.8
Total	252	100	180	100	72	100	11	100	110	100	131	100

Table 2. Death Rates on Easter Island and Chile. 2000-2012 period

Year	Death Rates Chile	Number of Death on Easter Island	Death Rates on Easter Island
2000	5.1	12	3.3
2001	5.3	22	5.8
2002	5.1	16	4.1
2003	5.3	21	5.2
2004	5.4	22	5.2
2005	5.3	21	4.8
2006	5.2	20	4.5
2007	5.6	16	3.5
2008	5.4	11	2.3
2009	5.4	19	3.9
2010	5.7	20	4.1
2011	5.4	23	4.5
2012	---	29	5.6
Mean	5.4	19	4.4

of death in children was accidents followed by newborn complications for adults were accidents, followed by neoplasms secondly, while the elderly died mainly from cardiovascular diseases and tumors.

Table 2 shows the gross mortality rates in Chile and Easter Island is shown from 2000 onwards, resulting in an average mortality rate of 4.36 deaths per 1,000 populations on period. In 2001 the Table 2 shows the highest mortality rate (5.6 deaths per 1,000 population), while the minimum occurred in 2008, with only 11 cases (2.3 deaths per 1,000 population) (Villalon, 2010).

Discussion

Easter Island is undergoing an accelerated epidemiological transition reflected on the evolution of the causes of death population. Published some historical background on the causes of deaths are summarized in Table 3, which calls attention to the early twentieth century high infant mortality, an indicator of the sanitary quality of a country, which until now has been declining in the present study period of 13 years, only 4 deaths in children under 1 year (one per trisomy 13, one per extreme prematurity and two per peripartum complications). Despite the isolation and the difficulties that have historically existed to deliver

quality health care to the population, we can see that the island keeps the predominantly lower overall mortality rate than continental Chile, so it is interesting to study the climatic factors, environmental, ethnic and cultural, among others, that may influence this phenomenon. Added to this constant improvement in Hanga Roa Hospital personnel, equipment, supplies and infrastructure, which is historically the only hospital that population has to get medical care. Although it is not the purpose of this study, it is striking that in Easter Island there are few child deaths, no major differences between children with genes Rapanui and non Rapanui, unlike that found in infant mortality rates in other islands according Polynesian ethnicity. (Hirai et al., 2013). In the same table (Table 3) shows that the causes of death described historically on Easter Island were mostly secondary to infection. Currently causes of death have a profile where NCDs and accidents predominate over infectious diseases. Striking that to separate causes of death by ethnic, the main causes of death is NCDs for Rapa Nui, while in the other group, are accidents. This could be explained by the increasing migration of population is in the workforce productive stage, which decides to stay resident on the island, and also the pleasant climate prevailing encourages performing outdoors sport, such as fishing and diving. Also takes importance, the increase in vehicles, with a consequent increase on the number of accidents, and custom an important part of people riding motorcycles without wearing a helmet.

Another issue to be highlighted concerns, that the main cause of death in the adult population is cancer. Most frequent cancers described on Easter Island are breast, cervical, lung and skin, which can be prevented or detected early through education of the population (Moore et al., 2013; Rius et al., 2013) which leaves a pending all institutions involved in the health of the inhabitants of Easter Island task. Particularly regarding to breast cancer in women, is not only the most common tumor of Easter Island, but also from other Polynesian islands and the world. (Norlaili et al., 2013), (Afsharfard et al., 2013).

Comparing the main causes of death on Easter Island with mainland Chile, there's some resembling. Easter Island has a profile of deaths just like developed or developing nations. Striking that on Chile, 9% of

Table 3. Historical Background of Deaths on Easter Island

Year	Population	Death	O.D.	C. M.	Cause	Reference
1864	4000	1000 - 3200			Pox	(Cristino C, Fuentes M, 2011)
1916	250			230		(Cruz-Coke R, 1989)
1917	301	3a				(Drapkin I, 1935)
1934	456		low			(Drapkin I, 1936)
1949	757	11	low			(Camus D, 1950)
1950	770	10b			Adults: 3 leprosy, 2 cardiac disease, 1 atherosclerosis Children: 3 gastrointestinal infection, 1 preterm infant	(Camus D, 1951)
1953		9			Measles	(Gajardo R, 1954)
1962			12	50		(Cruz-Coke R, 1963)
1967		11c			Diphtheria	(Evans H, 1968)
1971	1780	12				(Cea A, 1974)
1972	1804	5				(Cea A, 1974)
1973	1833	5		25		(Cruz-Coke R, 1989)
1914-1965			19.46			(García-Moro, 2000)
1966-1996			3.36			(García-Moro, 2000)

O.D.: Overall Death Rate. C.M.: Child Mortality; ^aOnly 9 months analyzed; ^bThat year they were 6 adults and 4 infants; ^cThat year only children died

all deaths are for external causes. Meanwhile in Easter Island, in the same period, 18.6% of deaths were for these causes. Namely, it is twice that occurs in Chile. (Minsal, 2009). Accidents described above can be explaining this phenomenon, and the role of school on preventions of these dangers is relevant, because a high percentage of deaths from external causes occur in children.

The constraints of this study are related to the Hanga Roa Hospital is a low complexity medical center. People with severe illnesses that cannot be resolved locally are transferred to mainland Chile for study and treatment. This is the reason that some islanders who have died off Easter Island, cannot be considered in this study, resulting in an artificial decrease in mortality on Easter Island.

In addition, the causes of death were extracted from certificates of death, so that there may be misclassification by the doctor certifying the death with respect to the true etiology that caused the death, for in the Hospital Hanga Roa exceptionally autopsies performed.

It becomes necessary to work in public health strategies designed to impact the causes of death and therefore in death rates of Ester Island population, considering the differences between the Rapa Nui population and no-Rapa Nui population with respect to causes of death.

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