

INCREASED DEATH RATES IN CHILE ASSOCIATED WITH ARTIFICIAL
FLUORIDATION OF DRINKING WATER, WITH IMPLICATIONS FOR OTHER
LATIN AMERICAN COUNTRIES AND FOR THE UNITED STATES*

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*This report is a lecture which the author delivered in Buenos Aires on December 4, 1973, at the invitation of the Círculo Argentino de Odontología and the Department of Pediatric Dentistry, University of Buenos Aires. The research for this work was made possible by a grant from the National Health Federation.

DEDICATION

This report is dedicated to Salvador Allende, the former President of Chile, whose primary concern was the welfare of the poor and undernourished people of his country. "Under Salvador Allende (himself a physician), Chile's socialist government achieved health reforms that emphasized nutrition, maternal and infant care, environmental health, increased services for the poor, and improved distribution of care." (New England Jour. Medicine. p. 171. July 25, 1974). Under the Allende government, "daily pints of milk were delivered free to pregnant mothers, nursing mothers and every child under the age of fifteen. This was a particularly significant measure. Half the children in Chile under 15 years were undernourished, and 600,000 were mentally retarded through lack of protein, especially during the first months of life." (G. MacEoin, No Peaceful Way: Chile's Struggle for Dignity. 1974.). Milk, more than anything else, would most effectively counteract fluoride toxicity in Chile (to be published). But under the present military dictatorship, "most of the preventive health programs" in Chile "(such as free milk distribution to children) have been discontinued or taken over by private entrepreneurs." (New England Jour. Medicine. p. 175. July 25, 1974).

PREFACE

"The very first thing is water. It is better than the olympic victory, and more important than gold." (Ancient Greek Proverb).¹ "The fluoridation of public water supplies is a hazardous procedure. People are bound to get hurt. It remains to find out how many and when."² This present report is about people who have been killed by artificial fluoridation. At present, there is no other explanation to account for their demise.

But death corresponds only to that part of the proverbial iceberg which is visible above the water. All individuals do not react identically to a toxic substance, even when they are exposed to the same concentration under the same conditions. A chemical factor which is sufficiently detrimental to kill certain people usually produces some harmful effects in others who do not die. For that reason, the death rates in this report indicate only the minimum number of people who have been harmed by artificial fluoridation. Many others who have sustained injurious effects, such as ^{certain kinds of} congenital malformations, may survive. Therefore, survival per se is no proof that artificial fluoridation has caused no harm.

FLUORIDATION IN CHILE

Fluoridation was started in Chile, in the city of Curicó, on September 1, 1953.³ It was declared to be safe by the Commission on Dental Health of the Fifth International Odontological Congress of Chile. (The word "odontological," which is of Greek origin, has the same meaning as "dental," which comes from Latin.) This Fifth Congress, which was sponsored by the Odontological Society of Chile, was held on November 28 to December 4, 1965.⁴ The Commission based its endorsement of safety on a report which Briner and Carmona delivered at that Congress and subsequently published.⁵

Briner and Carmona were the two highest ranking officials in the Section of Odontology of the National Health Service of Chile. Their report was the first time any evidence had been publicly presented to support the claim, repeatedly made since 1953, that fluoridation was not harmful to people in Curicó.

By that time, fluoridation had become a highly controversial issue in Chile. Its alleged safety and effectiveness were being questioned in numerous newspaper and magazine articles, and at meetings of scientific and professional societies. The opponents included members of the Chilean dental and medical professions.

A meeting on Fluorine and Fluoridation in Chile was held in Santiago on April 28 to May 5, 1967. This meeting was organized by the Scientific Society of Chile in collaboration with the Chilean Society of Nutrition, Bromatology (Foods and Dietetics), and Toxicology.⁶ The Scientific Society of Chile adopted a resolution, at that meeting, which declared that fluoridation was highly controversial, and that its alleged safety and effectiveness had not been adequately investigated. The resolution, which also pointed out the scientific research that was necessary to determine whether fluoridation was safe and effective in Chile, was forwarded to the Minister of Public Health, the Sub-Secretary of Public Health, and the Director General of the National Health Service.⁶

In Argentina, Carmen Gomez Llanos de Landa reported that the same kind of "studies . . . should be carried out before drinking water is fluoridated."⁷ Among other things, he pointed out that undernourished people (who comprise a large percent of the population in all Latin American countries except Cuba) are particularly susceptible to fluoride toxicity; and that the pathological symptoms associated with fluorosis appear earlier in undernourished individuals. Unfortunately, however, both Chile and

Argentina initiated fluoridation without doing research,^{6, 7} concerned with such factors as malnutrition, on their own populations.

In 1966, Schatz published a report on The Failure of Fluoridation in Chile. A Critical Analysis after Eleven Years.⁸ In 1967, Sievers warned about the dangers of fluoridation.^{9, 10, 11}

Lazaro, in 1967, raised serious questions about fluoridation.¹² In 1969, he pointed out that opposition to fluoridation was increasing throughout the world, and that some individuals in the National Health Service of Chile had become aware of certain results which had not been publicized, as one would have desired.¹³ These are only a few of the many publications by opponents of fluoridation in Chile.

CURICO AND SAN FERNANDO

When the National Health Service decided to fluoridate Curicó in 1953, San Fernando was selected as the control city because it was near Curicó and its water contained no fluoride.⁵ It was claimed that the only difference between these two communities was the fluoride, which was added to a concentration of 1.0 part per million to the water of Curicó.¹⁴ Actually, San Fernando is a good control. It is located only about 50 kilometers (31 miles) from Curicó. Both cities are on the same kind of soil and have the same climate; i.e., rainfall and temperature. The people eat the same kinds of food, produced locally and brought in from other areas. The populations are fairly stable.

BRINER AND CARMONA'S REPORT

In 1965, Briner and Carmona analyzed mortality data covering the 10 year period, from 1953 to 1963, after Curicó was fluoridated.⁵ Their

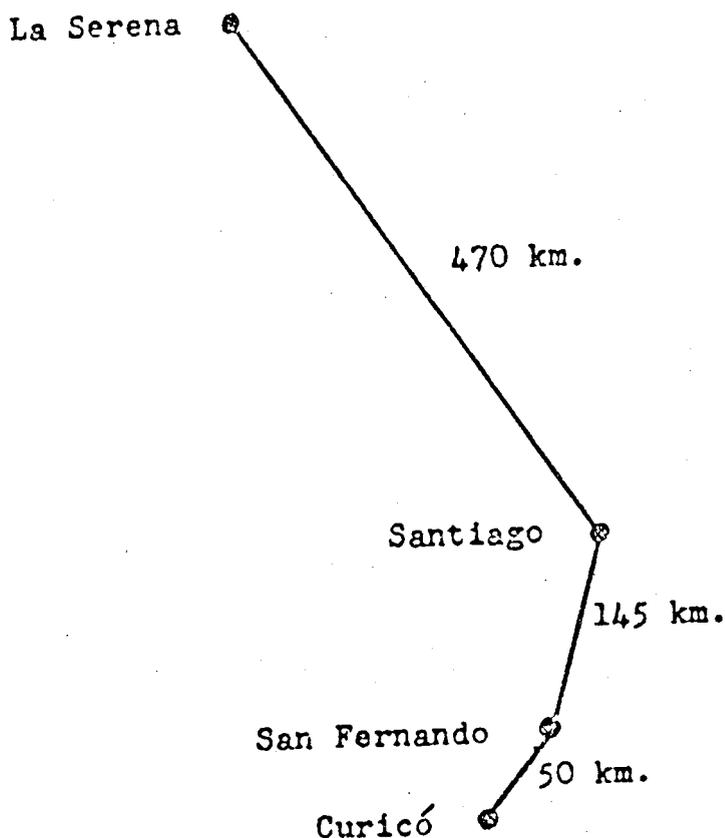
controls were San Fernando and the city of La Serena. They included La Serena as an additional control because its water naturally contains 0.67 parts per million of fluoride. In this respect La Serena is in between San Fernando and Curicó. But La Serena is located far to the north of the other two communities. It is on a very different soil, and has a much warmer and drier climate. Accordingly, La Serena must be quite different from Curicó and San Fernando in terms of the chemical composition of its home-grown food and drinking water, ~~and the diet and nutrition of its inhabitants.~~ and the diet and nutrition of its inhabitants. In these respects, it is a very poor control for Curicó.

Briner and Carmona also considered statistics for the entire country of Chile, and for the provinces in which Curicó, San Fernando, and La Serena are located. These cities and their corresponding provinces are shown below.

| City | Province |
|--------------|-----------|
| Curicó | Curicó |
| San Fernando | Colchagua |
| La Serena | Coquimbo |

Since Curicó is the name of both a city and a province, we will avoid confusion in this report by referring to the city as Curicó, but we will always say Province of Curicó when we speak of the province. In the Province of Curicó, only the city or community of Curicó is fluoridated. The rest of that province is not.

The locations of Curicó, San Fernando, and La Serena with respect to Santiago, the capital of Chile, and distances in kilometers are shown below. One kilometer equals 0.621 mile.



Briner and Carmona concluded that the statistics on mortality, which they analyzed, demonstrate the safety of fluoridation. Actually, the reverse is true. Their statistics show that increased death rates are associated with fluoridation in Curicó. And since the only variable is said to be fluoride added to the water of Curicó,¹⁴ one has no choice but to conclude that fluoridation per se is responsible for the increased death rates.

Consider, for example, the deaths resulting from congenital malformations as a percent of the total number of deaths (Table 1). Curicó has 233% more such deaths than San Fernando, 94% more than La Serena, and 288% more than the entire country. Briner and Carmona reported some of the statistics shown in Table 1, but did not calculate the greater percentage of deaths in Curicó. They did not even mention the increased percent of deaths in Curicó due to congenital malformations. On the contrary, they specifically claimed that there was no significant difference in death rates due to

congenital malformations. "Attention is directed," they wrote, "to the marked similarity in death rates" (due to all of 19 different causes of death) "in the three cities, except for Cause No. 17," which is infant mortality.⁵

With respect to infant mortality, Briner and Carmona did present and discuss statistics (Table 2), but their interpretation is erroneous. "The death rates in the Provinces of Curicó and Colchagua," they wrote, "are 19.1 and 15.5 respectively. These figures for the provinces show a difference which is similar to that revealed by the corresponding data for the cities." But they did not present any calculations to support or justify their conclusion.

Our calculations (Table 2), from Briner and Carmona's data, clearly reveal that the infant mortality rate in Curicó is 69% greater than in San Fernando and La Serena. However, the infant mortality rate in the Province of Curicó is only 23% greater than in Colchagua, where San Fernando is located. This death rate in the city of Curicó, compared to San Fernando, is therefore 200% greater than it is in the Province of Curicó compared to Colchagua: $(69 - 23)/23 \times 100 = 200\%$.

Briner and Carmona also pointed out that the death rate due to diseases of the digestive system was greater in Curicó than in San Fernando and La Serena (Table 2). But they concluded that fluoridation was not responsible for that increased death rate in Curicó because the death rate was also greater, and to the same extent, in the Province of Curicó compared to Colchagua.

This lack of significance of the higher death rate in Curicó, due to diseases of the digestive system, when death rates in the cities are compared

to death rates in the corresponding provinces, attaches that much more significance to the increased infant mortality rate in Curicó when the same comparisons are made (Table 2).

Despite such incriminating information in the report which they themselves published, Briner and Carmona none-the-less concluded that fluoridation produced no harmful effects in Curicó.⁵

INACCURATE CURVES

Another criticism of Briner and Carmona's work concerns the mortality curves in Figures 1 and 2 of their report. These figures are reproduced, with English legends, in Figure 1 in this present publication. Briner and Carmona specifically stated that "The object of" their "study is to demonstrate the safety of fluoridation, as shown by the mortality curves."

But the accuracy and reliability of their curves is open to the most serious criticism. Note, for example, that the curves (in their Figure 1) for the entire country of Chile and for the three provinces extend to the years 1967 and 1969! How is this possible for a study which covered the 10 year period of 1953-1963 and was published in 1966? Note also that there are no points on their curves for intermediate years; i.e., 1954 through 1962! Finally, it is virtually impossible for the death rates of four large populations to give perfectly straight lines over a 10 year interval. Yet that is precisely what their Figure 1 shows!

Briner and Carmona's curves for the three cities (their Figure 2) show no points at all for any year, and are also perfectly straight lines! These curves are therefore no more acceptable than the curves in their Figure 1. If the data given in the tables of Briner and Carmona's report are accurately plotted, one obtains the curves shown in my Figure 2. Note how different these curves are from the curves which Briner and Carmona

It is important to recall that Briner and Carmona were the two highest ranking officials in the Section of Odontology in the National Health Service of Chile when they delivered their report, in 1965, before the Fifth International Odontological Congress of Chile.^{4, 5} Furthermore, it was on the basis of their report that the Commission on Dental Health, of that Congress, endorsed the safety of fluoridation in Chile.

There are many other errors in Briner and Carmona's report. But I do not wish to go into a further analysis of their work at this time. In 1966, I sent Briner and Carmona my analysis of their report in the hope that they would do more reliable research on the alleged safety of fluoridation in Chile.

But, it seemed that the reverse occurred. Briner became more adamant in his insistence that fluoridation was safe and effective, and publicly ridiculed those who raised questions and expressed doubts.^{15, 16} Gonzalo Lazaro knew that Briner and Carmona had received my communication criticizing their publication and pointing out that there were increased death rates in Curicó, but had done nothing with the information I sent them. That is why Lazaro wrote, in 1969, that people in the National Health Service were aware of results which they did not permit to see the light of day.¹³

In the United States, L. C. Hendershot, editor of the Journal of the American Dental Association, refused even to look at a short article I sent him, early in 1965, about increased death rates associated with artificial fluoridation in Chile (Figure 3). I first wrote Hendershot to ask him if he would be interested in seeing my report, and if he would consider it for publication in the Journal of the American Dental Association. When he did not reply to that letter of inquiry, I sent him three copies of

the report in January, February, and March of 1965. But Hendershot refused to accept all three communications, which were therefore returned to me, unopened.

INCREASED DEATHS IN THE TOTAL POPULATION OF CURICO

Briner and Carmona attempted to prove that fluoridation was safe. Instead, they showed it was harmful. That shocking information, gleaned from their publication, suggested it might be profitable to undertake a study of death rates independently of their work. For that purpose statistics were obtained directly from annual reports put out by the Demographic Department of the Chilean government. These reports are the Anuarios de la Dirección de Estadísticas y Censos, Sección Demografía, published in Santiago, Chile. Working with data from this original source eliminated errors which might have been introduced by using the mortality statistics in Briner and Carmona's report, if any of their data were inaccurate.

Table 3 and 4 give the annual populations and numbers of deaths in the cities and provinces, and in the entire country for the eleven year period from 1954 through 1964. The data for rural areas (Tables 3, 4, and 5) were obtained by subtracting the value for each city from the value for the respective province.

Table 5 shows average annual death rates for all age groups combined for the 11 year interval. Curicó has a 16% higher death rate than San Fernando, and a 100% higher death rate than La Serena. Moreover, the city of Curicó has a 167% higher death rate than the rural area in the Province of Curicó. San Fernando and La Serena, on the other hand, have 103% and 7% higher death rates, respectively, than the rural areas in their provinces.

The rural area in the Province of Curicó actually has a lower death rate than the rural areas in the other two provinces. That lower death rate

may attach more significance to a higher death rate in the city of Curicó compared to San Fernando and La Serena.

Briner and Carmona compared death rates in the cities and in the entire provinces, which include the cities. I am comparing death rates in the cities and in the rural areas. The rural areas represent those parts of the provinces without Curicó, San Fernando, and La Serena.

Curicó has a 113% greater death rate than Chile as a whole. The death rates in San Fernando and La Serena are 84% and 7% greater, respectively, than in the entire country.

The death rate in Curicó is therefore higher than in the two other cities, and higher than in the rural area in the Province of Curicó. In the absence of evidence to the contrary, one has no choice but to attribute the greater death rate in Curicó to fluoridation.

The fact that La Serena, with 0.67 parts per million of fluoride, has a lower death rate than fluoride-free San Fernando is not surprising because, as already pointed out, conditions are very different in these two communities. The lower death rate in La Serena is additional evidence that this city is an unsuitable control for Curicó. I included La Serena in my analysis only because Briner and Carmona used this city as an additional control in their report.

INCREASED INFANT DEATHS IN CURICO

Tables 6, 7, and 8 give the numbers of total births, live births, stillbirths, and deaths of infants during their first year of life in Curicó, San Fernando, and La Serena. These data, for each city, cover the eleven year period (1943-1953) before Curicó was fluoridated, and the eleven year interval (1954-1964) after Curicó was fluoridated. The numbers of

stillbirths (Table 9), infant deaths (Table 10), and total deaths; i.e., stillbirths plus infant deaths (Table 11), per 1,000 births were calculated from the annual averages given in Tables 6, 7, and 8. How these and other data in Tables 9, 10, and 11 were computed is shown in the footnotes of Table 9.

The deaths per 1,000 births reported in Tables 9, 10, and 11 are average annual death rates in each city for the two eleven year periods: 1943-1953 (before Curicó was fluoridated) and 1954-1964 (after Curicó was fluoridated). These average annual death rates are also presented graphically in Figure 4. The following analysis of the results in Tables 9, 10, and 11 shows that:

1. The death rates (stillbirths, infant mortality, and stillbirths plus infant deaths) in each city, taken by itself, were lower in 1954-1964 than in 1943-1953. This is what one would expect since the standard of living in Chile generally improved from 1943 to 1964.
2. The death rates increased in Curicó, compared to San Fernando and La Serena, after Curicó was fluoridated.
3. The death rates decreased in La Serena compared to San Fernando and Curicó, after Curicó was fluoridated.

Stillbirths. Let us first compare the results in each city, taken by itself, before and after Curicó was fluoridated. Table 9 shows that Curicó had 32% fewer stillbirths annually after fluoridation (1954-1964) than it had before fluoridation (1943-1953). San Fernando had 25% fewer stillbirths, and La Serena had 43% less stillbirths, for 1954-1964 compared to 1943-1953. These comparisons suggest that after 1953 conditions

improved in Curicó more than they did in San Fernando. However, they improved much more in La Serena than in Curicó.

Now let us compare Curicó to each of the other cities. Table 9 shows that Curicó had 14% more stillbirths than San Fernando before fluoridation but only 3% more after fluoridation. This comparison again suggests a relative improvement in Curicó with respect to San Fernando. However, Curicó had 67% more stillbirths than La Serena before fluoridation, but 100% more after fluoridation. This comparison indicates a relative increase in stillbirths in Curicó with respect to La Serena.

Infant mortality. Table 10 gives information about infant deaths. Let us again first compare each city by itself. The infant death rate decreased in Curicó after fluoridation by 8%, compared to what it had been before fluoridation. This improvement is understandable because infant mortality decreased generally throughout Chile during the 22 years from 1943 through 1964. However, in San Fernando, infant mortality in 1954-1964 was 24% less than in ¹⁹⁴³⁻1953. This 24% decrease is 200% more than the corresponding 8% ^{decrease} in Curicó. In La Serena, infant mortality decreased 31% in 1954-1964, compared to 1943-1953. This 31% decrease is 288% greater than the 8% decrease in Curicó.

Let us now compare Curicó to each of the other two cities. Curicó had 26% more infant deaths than San Fernando before fluoridation, but 53% more after fluoridation. That is an increase of 104%. Before fluoridation, Curicó had 14% more infant deaths than La Serena, but 52% more after fluoridation. That increase amounts to 271%.

These statistics (Table 9) tell what happened to the relatively greater percentage of babies who were born alive in Curicó (Table 8). Their fate

is clearly revealed in the phenomenally higher infant mortality rate in Curicó (Table 9). More babies survived birth in Curicó, but they were not alive a year later.

Total deaths. Table 11 reports information on total deaths; that is, stillbirths plus infant deaths. Here again, we shall first consider each city by itself, and then compare Curicó to San Fernando and La Serena. In Curicó, the death rate was 12% lower after fluoridation, than it was before. The decrease in San Fernando, for 1954-1964 compared to 1943-1953, was 24%. This 24% improvement in San Fernando is 100% greater than the 12% improvement in Curicó. In La Serena, the total death rate decreased 32% in 1954-1964 compared to 1943-1953. This 32% improvement in La Serena is 167% greater than the 12% improvement in Curicó.

Now let us compare Curicó to the other two cities (Table 11). Curicó had 22% more deaths than San Fernando before fluoridation, but 42% more deaths after fluoridation. This 42% greater death rate in 1954-1964 is 91% more than the 22% greater death rate in 1943-1953. Curicó had 21% more deaths than La Serena before fluoridation, but 56% more deaths after fluoridation. This 56% greater death rate in 1954-1964 is 166% more than the 21% greater death rate in 1943-1953.

LOWER DEATH RATES IN LA SERENA

So far, we have compared Curicó to San Fernando and La Serena. Let us now compare La Serena to San Fernando and Curicó.

When each of the three cities is considered by itself, for 1954-1964 compared to 1943-1953, La Serena clearly had a greater decrease in stillbirths (Table 9), infant deaths (Table 10), and stillbirths plus infant deaths (Table 11) than San Fernando and Curicó. When compared to San Fernando and Curicó, La Serena had fewer stillbirths (Table 9), fewer infant deaths

(Table 10), and fewer total deaths (Table 11) in 1954-1964 than in 1943-1953.

These comparisons show that the death rates in La Serena and Curicó changed in diametrically opposite directions after 1953, when Curicó was fluoridated. The death rates decreased in La Serena compared to San Fernando, but increased in Curicó compared to San Fernando. Fluoride-free San Fernando is a control for La Serena, where the water naturally contains 0.67 parts per million of fluoride, just as it is for Curicó where one part per million of fluoride was artificially added to the water.

BACK TO BRINER AND CARMONA

Briner and Carmona⁵ compared death rates during the 11 year period of 1953 through 1963. But fluoridation was started in Curicó on September 1, 1953.¹⁴ Therefore, Briner and Carmona should not have included 1953 in their eleven year period since Curicó was fluoridated for only four months in 1953. That is why our 11 year period, after Curicó was fluoridated, begins with 1954 instead of 1953.

Like Briner and Carmona, we considered the mortality in Curicó, compared to San Fernando and La Serena, for the 11 year interval after Curicó was fluoridated. However, we also considered the average annual mortality in each city, taken by itself, for the 11 year period (1954-1964) after Curicó was fluoridated compared to the 11 year period (1943-1953) before Curico was fluoridated. We thus had two bases for evaluating the increased death rates in Curico, relative to San Fernando and La Serena. Briner and Carmona, on the other hand, had only one basis for their comparison.

We have already pointed out that we disagree with Briner and Carmona in the interpretation of the mortality statistics in their report, and we

of the mortality statistics which we obtained directly from the annual reports put out by the Demographic Department of the Chilean government, led us to the same conclusions that we arrived at by analyzing the mortality statistics in Briner and Carmona's publication.⁵ Their data show 69% more infant mortality in Curicó compared to San Fernando for 1953-1963 (Table 2). The statistics which we obtained directly from the Demographic Department of the Chilean government show a 53% greater infant mortality in Curicó compared to San Fernando for 1954-1964 (Table 10).

SOME COMMENTS ABOUT THE STATISTICS

We would now like to comment on the following questions that may occur to the reader. First, are the numbers of stillbirths and infant deaths large enough to be significant? We have worked with the total numbers of such deaths. If those numbers are not large enough to prove that fluoridation in Curicó is harmful, they are also not large enough to prove that it is safe.

Second, are our samples of deaths representative? We did not use samples, but worked with the total numbers of deaths. The question as to whether samples are representative is therefore irrelevant and meaningless.

Third, are the differences in death rates significant? Some of the differences range from 100% to 288%. We consider differences of that magnitude to be highly significant. Furthermore, the likelihood that such large differences, which occur so consistently, would be due to chance, is virtually nil.

INCREASED DEATHS IN OTHER LATIN AMERICAN COUNTRIES

The increased total death rates associated with fluoridation in Curicó (Table 5) indicate what is happening in other Latin American countries where

artificial fluoridation has also been introduced. The average annual death rate in Curicó for 1954-1964 was 256 per 10,000. For San Fernando, the corresponding death rate was 221 per 10,000 (Table 5). If we attribute the difference in these two death rates; i.e., 35 per 10,000, to fluoridation, we can then extrapolate from Curicó to other Latin American populations that are also being artificially fluoridated. That has been done in Table 12, where we have selected only those countries in which a large number of people or a large percent of the total population is artificially fluoridated.¹⁸ Statistics for other countries, not listed in Table 12, are available in the report from which we obtained data for those countries we selected.¹⁸

The results (Table 12) show that artificial fluoridation may be responsible annually for the death of approximately 10,000 people in Brazil, 10,000 people in Chile, 8,000 people in Columbia, and 36,000 people in all Latin American countries¹⁸ combined.

These estimated increases in death rates due to fluoridation will probably be even greater in the future. The per capita production of food in Latin America is decreasing¹⁹ and "decreases . . . in life expectancy . . . are now being observed . . . in Latin America."²⁰ The harmful effects of fluoridation will become more serious as Latin Americans have less food and poorer health. The decreasing life expectancy in some countries shows that this is already happening.

The extent to which fluoridation may increase death rates can be more reliably estimated by considering infant mortality rather than death rates for all age groups combined (Table 12). During their first year of life, infants are generally more susceptible to toxic substances than older individuals are. Each age group consists of the survivors of the next younger age group. Resistance therefore increases with age, until other

Table 13 shows that infant mortality was somewhat more than twice as great in Curicó, compared to San Fernando, in 1954-1964 as it had been in 1943-1953. On the other hand, the total death rate in Curicó, compared to San Fernando, was in 1954-1964 only half of what it had been in 1951-1952. This relatively greater improvement in the total death rate in Curicó, compared to San Fernando, is very likely due to the much higher infant mortality in Curicó, compared to San Fernando.

In terms of the Darwinian concept of survival of the fittest, the population in Curico, consisting of individuals beyond the age of one, was generally stronger than the corresponding population in San Fernando. Fluoridation produced that difference by weeding out the weaker individuals in Curico during the first year of life. This weeding out process continued during the pre-school years; i.e., up to age five. For these reasons, one would expect fluoridation to increase infant mortality to a greater extent than it increases the overall or total death rate of the entire population. The data in Table 13 show that.

Other considerations also indicate that fluoridation will have a markedly greater effect on infant mortality. "Forty-four percent of all those who die in Latin America are children under five years of age. . . . Seventy-seven percent of these deaths were avoidable. . . . These children could have been saved if they were properly nourished and in a condition to withstand the onslaught of the environment and of disease."²¹ In Recife, the San Salvador area, and Monterrey, "nutritional deficiency was an underlying or associated cause" of 65-70% "of all deaths . . . of children from 1 to 4 years of age."²¹ Children who are in such an advanced state of malnutrition are prime targets for fluoride. Artificially fluoridated water may well determine whether some of them live or die. Malnourished infants, during the first year of life, are even more susceptible

IMPLICATIONS FOR THE UNITED STATES

Whether fluoride produces chronic or acute toxicity is generally considered to be determined only by the dose. However, an individual's nutritional state can markedly influence his susceptibility to fluoride toxicity.⁷ Therefore, a concentration of fluoride which is so low that it produces no clinical symptoms in well-nourished people may be acutely toxic to certain individuals in a population which is so poorly nourished that malnutrition is responsible for high infant mortality. In this respect, one would expect infants to be the first to succumb to acute fluoride toxicity because they comprise the age group that is generally most susceptible to adverse environmental factors. Malnourished infants are probably the most sensitive barometer for revealing harmful effects of fluoride.

In Chile and other Latin American countries with widespread malnutrition and high infant mortality, it is not necessary to observe a generation of people throughout their entire life-span in order to determine whether artificial fluoridation is or is not harmful. One can see the lethal effect of fluoridation within the first year of life in terms of increased infant mortality. Some adverse effects, like congenital malformations, may or may not cause death.

In the U.S., the harmful effects of artificial fluoridation are not revealed by large-scale, comparative studies of the total populations of fluoridated and control cities because Americans are in a considerably much better state of nutrition than Chileans.

In terms of nutrition, the majority of people in Chile correspond to a minority in the U.S. If one wants to detect harmful effects of fluoridation in the U.S., one should therefore not work with the total population. Instead,

it is necessary to study those segments of the population which are most susceptible to the harmful effects of fluoridation.

One minority group in ^{the} U.S. whose counterpart is a majority in Chile ^{File} consists of infants in urban families of low socio-economic status. In the U.S., such infants are 15% below normal in body weight at birth, due to undernutrition, and have a high perinatal mortality.²² What is therefore needed in the U.S. are studies of the effect of artificial fluoridation on the occurrence of stillbirths, infant mortality, and congenital malformations in the offspring of poor urban families.

Other specific groups should also be studied per se. For example, Black children exhibit more mottled enamel than White children do, and are therefore more susceptible to fluoride toxicity.²³ Special studies should therefore be carried out to determine harmful effects of artificial fluoridation on the offspring of Black mothers in poverty areas where nutritional conditions may be as poor as they are in Chile and other Latin American countries.

The large-scale, overall statistical studies which compare total populations in fluoridated and control cities in the U.S. actually conceal the very information which is purportedly being sought. This occurs because the well-nourished majority numerically overwhelms those groups, in the undernourished minority, which are most susceptible to fluoride toxicity. A consideration of infant mortality among whites and non-whites reveals how that cover-up works. In 1964, the predicted white and non-white infant mortality rates in the U.S. were 18.5 and 38.6, respectively. The non-white rate is 109% higher. But "white births in this country constitute about 85% of the whole, so that the high non-white mortality is washed out in the total."²⁴

Therefore, the large-scale, over-all statistical surveys of total populations, which purport to demonstrate the safety of artificial fluoridation, have been designed and carried out in a manner which actually washes out, covers up, and conceals harmful effects. This present report about the harmful effects of artificial fluoridation in Chile indicates some segments of the U.S. population which are most likely to be harmed by artificial fluoridation. It also indicates the kinds of studies which are necessary to reveal those harmful effects in the U.S.

CONCLUSION

Artificial fluoridation of drinking water may well dwarf the thalidomide tragedy which was dramatic because it produced crippled children who are living testimonials to what that drug has done. Many victims of artificial fluoridation, on the other hand, die quietly during the first year of their lives or at a later age under conditions where their deaths are attributed to malnutrition or some other cause.

Briner and Carmona⁵ and others claim that fluoridation is a safe, effective, and economical means of preventing caries. I have shown elsewhere that fluoridation does not really prevent tooth decay.^{25, 26, 27} But even if it did do so, "let us get our priorities right. If it is economic to poison people, then there must be something wrong with economics."²⁸

Artificial fluoridation has not been as widely accepted as its proponents imply. Many cities in the United States have discontinued fluoridation after starting it. Many local health authorities in England are opposed to fluoridation.²⁵ In Denmark, Sweden, and Holland, fluoridation has been declared illegal.²⁶ A report by the World Health Organization's Regional Office for Europe reveals that, as of 1972, 21 out of 31 European

countries were not fluoridating at all.²⁹ Seven other countries were fluoridating only 5% or less of their populations. Only three countries were fluoridating 10% or more of their people. Obviously fluoridation has not been widely accepted in Europe despite more than a quarter of a century of intensive propaganda on its behalf.

At the Twenty-Second World Health Assembly, held in Boston in July, 1969, Professor G. Penso of Italy raised an objection to fluoridation. He "warned that substances such as fluoride might have far-reaching long-term effects that are as yet unknown, and called for further research into the long-term effects of fluorides on organs other than teeth."³⁰ In addition, Dr. M. N'Diaye of Senegal "was worried about the link between fluorides and mottled enamel."³⁰ Both proponents and opponents of fluoridation consider mottled enamel to be a harmful effect, and the earliest symptom of fluoride poisoning.³¹

In Latin America, the Ninth Panamerican Congress of Pharmacy and Biochemistry, held in Panama City on November 26-December 2, 1972, adopted the following resolution: "Resolved: To direct attention to (or warn about) problems (or dangers) (caused by) artificial fluoridation at doses presently considered optimal because the ingestion of fluoride over long periods of time can cause disturbances which can be serious (for people's health). It is therefore necessary to immediately undertake research designed to investigate this matter in a (scientifically) reliable manner." This resolution was presented to the Congress by the Toxicology Section. It was based on research by Dr. Dora M. Paez and her collaborators who had conducted "Studies in Areas of Endemic Fluorosis."³²

This present report is, in effect, a warning to all countries that are now artificially fluoridating. Unless they have carried out properly designed studies which demonstrate that artificial fluoridation is not

harmful to those segments of their own populations that are most susceptible to fluoride toxicity, they may literally be killing some of their people. As the late Benjamin Nesis said, "Fluoridation of public water supplies is a hazardous procedure. People are bound to get hurt. It remains to find out how many and when."²

Those who are inclined to look for harmful effects of fluoridation in specifically susceptible individuals or groups, within a total population, will find it profitable to familiarize themselves with Nesis's discussion of "adverse effects reported by medical investigators" which "include an assorted intermediate array of symptoms and disability commonly characteristic of insidious chronic poisoning."²

They should also study Polya's book Are We Safe?, and pay particular attention to the following one of his many comments about the alleged safety of fluoridation:³³ "The number of American fluoride-drinkers has been estimated as between 30 and 50 million; let us take the higher figure which is more favorable to the fluoridators' case. The uncertainty of findings on a sample of 50 million is its square root, 7,000 in round figures. In other words, when we think that 50 million fluoridated Americans are safe we are likely to be in error of about 7,000. Now 7,000 in 50 million is about the same as 1.4 in 10,000. Let us recall the discussion in the chapter on safety about the implications of an incidence of 1:100,000 observable by not more than 1% of the doctors at the best, or by a much smaller fraction on normal expectations (p. 82). If fluoride has been found pragmatically safe in a population of 50 million, it could have harmed 7,000 without having been observed by more than a small minority of critical doctors opposed to fluoridation. Clearly, safety has to be established more carefully."

EPILOGUE

According to Sir Arthur Amies, one of Australia's leading dentists: "The passion to regulate the lives of others is deep-seated in many individuals. When this is based on political expedience, it is bad, and when it is inspired by an idealism which wishes to inflict benefits on others, it can become dangerous."³³

This report presents evidence that drinking water artificially fluoridated to contain 1.0 milligram of fluoride per liter (the concentration which is claimed to be optimal for preventing caries) can be acutely toxic to fetuses and infants under conditions of malnutrition.

If artificial fluoridation causes deaths among individuals who are for one reason or another more sensitive to fluoride toxicity than the total population taken as a whole, then the controversy over whether fluoridation does or does not reduce caries becomes purely academic because it is criminal to implement a so-called public health measure which kills certain people even if it does reduce tooth decay in some of the survivors.

REFERENCES

1. Schmidt-Hebbel, H. Química y Tecnología de los Alimentos. Editorial Salesiana. Santiago de Chile. 1966.
2. Nesin, B. A water supply perspective of the fluoridation discussion. Jour. Maine Water Utilities Assoc. March 1956.
3. Otte, E. Reseña sobre la fluoración de los abastecimientos de agua por la dirección de obras sanitarias. Revista Dental de Chile. 50:301-306, 1960.
4. V Congreso Internacional de Odontología de Chile, Organizado por la Sociedad Odontológica de Chile. Santiago de Chile. 28 de Noviembre al 4 de Diciembre de 1965.
5. Briner, A., and Carmona, I. Fluoración y mortalidad en Chile. Odontología Chilena. Año XV. No. 83. pp. 7-21. 1966.
6. Lazaro, G. Jornadas científicas sobre fluor y fluoración. Revista Odontológica de Valparaíso. 2:37-42, 1967.
7. de Landa, Carmen Gomez Llanos. Fluoración del agua de consumo y la prevención de las caries. Revista de la Asoc. Odont. Argentina. 55:39-44, 1967.
8. Schatz, A. El fracaso de la fluoración en Chile. La Tribuna Odontológica (Buenos Aires). 50:225, 1966.
9. Sievers, H. Aguas peligrosas. Ercilla. (Santiago de Chile) No. 1.650. 18 de enero de 1967.
10. Sievers, H. Foro sobre fluoración. Ercilla. (Santiago de Chile) No. 1.656. 1 de marzo de 1967.
11. La batalla del fluor. Ercilla. (Santiago de Chile). No. 1.666. 10 de mayo de 1967.
12. Lazaro, G. Crítica a un informe sobre fluoración de las aguas. Revista Odontológica de Valparaíso, 2:8-13, 1967.

13. Lazaro, G. Fluoración de aguas potables, su otra cara. *Odontología Chilena*. Año. XVIII. No. 92. p. 39. 1969.
14. Alvarez Ubilla, Atilio. ^{Primera} ~~Primera~~ evaluación del programa de ^{fluoración} ~~fluoración~~ del agua potable Curicó-San Fernando, 1953. *Odontología Chilena*. Año. VIII. No. 41. pp. 1277-1283. 1959.
15. Briner, A. Beneficios de fluoración del agua potable. *El Mercurio*. (Santiago de Chile). 19 de diciembre de 1966.
16. Briner, A. Aguas beneficiosas. *Ercilla*. (Santiago de Chile). No. 1.652. 1 de febrero de 1967.
17. Schatz, A. On censorship. How dentistry suppresses information unfavorable to fluoridation. (To be published)
18. Status of Water Fluoridation in the Americas, 1971. Document No. HP/DH 7. Dental Section. Department of Health Services. Pan American Sanitary Bureau, World Health Organization. Washington, D.C.
19. Frank, A. G. Hunger. The Radical Education Project. Box 625. Ann Arbor, Michigan.
20. Health Conditions in the Americas, 1965-1968. Scientific Publication No. 207. Pan American Health Organization. World Health Organization. Washington, D.C. September 1970.
21. Quadrennial Report of the Director, 1966-1969. Official Document No. 101. Pan American Health Organization. World Health Organization. Washington, D.C. August 1970.
22. Naeye, R. L., et al. Urban poverty: effects on prenatal nutrition. *Science*. 166:1026, 1969.
23. Russell, A. L. Dental fluorosis in Grand Rapids during the seventeenth year of fluoridation. *Jour. Amer. Dent. Assoc.* 65:608-612, 1962.
24. Infant Mortality. *Medical Tribune*. June 26, 1967.

25. Schatz, A., and Martin, J. J. The failure of fluoridation in the United Kingdom. *Pakistan Dental Review*. 22:3-7, 1972.
26. Schatz, A. The case of the missing data. *National Fluoridation News*. July-August, 1973.
27. Schatz, A. How to look for missing data. *National Fluoridation News*. October-December, 1973.
28. Reed, C. D., and Tolley, J. A. Lead in our drinking water. *Ecologist*. Vol. 3, No. 8, August 1973.
29. Kostlan, J. Systems of prevention in dental care. Health Planning and Organization of Medical Care. 1:56-60, 1972. (World Health Organization. Regional Office for Europe. Copenhagen.)
30. Fluoridation and dental health. WHO (World Health Organization) *Chronicle*. 23:505-511, 1969.
31. Schatz, A. 9,500 children harmed by artificial fluoridation. *National Fluoridation News*. July-August, 1970.
32. Resoluciones del IX Congreso Panamericano. *Correo Farmacéutico*. (Buenos Aires). No. 59. p. 14. Abril de 1973.
33. Polya, J. Are We Safe? A Layman's Guide to Controversy in Public Health. F. W. Cheshire. Melbourne, Australia. 1964.

Table 1

Deaths resulting from congenital malformations, 1953-1963

| | Total No. deaths* | Deaths due to congenital malformations | |
|--------------|-------------------|----------------------------------------|-------------------------------|
| | | % of total* | % more in Curicó compared to: |
| Curicó | 2,255 | 3.1 | |
| San Fernando | 1,003 | 0.9 | 233** |
| La Serena | 1,306 | 1.6 | 94 |
| Chile | 975,665 | 0.8 | 288 |

*The data in these columns are taken from Table 11 in Eriner and Carmona's publication.⁵

$$** 233\% = \frac{3.1 - 0.9}{0.9} \times 100.$$

Table 2

Infant mortality and deaths from diseases of the digestive system,
1953-1963

| | Infant mortality | | Diseases of the digestive system | |
|------------------|--------------------|----------------------------------------------------------|----------------------------------|----------------------------------------------------------|
| | Deaths per 10,000* | % more deaths in Curicó (city and Province) compared to: | Deaths per 10,000* | % more deaths in Curicó (city and Province) compared to: |
| Cities | | | | |
| Curicó | 56.5 | | 18 | |
| San Fernando | 33.4 | 69 | 12 | 50 |
| La Serena | 33.4 | 69 | 12 | 50 |
| Provinces | | | | |
| Curicó | 19.1 | | 18 | |
| Colchagua | 15.5 | 23 | 12 | 50 |

*The data in these columns are taken from page 21 of Briner and Carmona's publication.⁵ They are annual averages for 1953-1963.

Table 3

Annual populations ($\times 10^3$)

| Year | Curicó | Curicó Provincia | San Fernando | Colchagua | La Serena | Coquimbo | Chile |
|------------------------------------------|--------|---------------------|--------------|-----------|-----------|----------|-------|
| 1954 | 46.5 | 99.4 | — | 155.1 | 50.6 | 291.5 | 6,597 |
| 1955 | 47.7 | 101.9 | 20.0 | 159.0 | 51.8 | 298.8 | 6,761 |
| 1956 | 31.2 | 104.7 | 20.5 | 163.3 | 43.8 | 306.8 | 6,944 |
| 1957 | 32.0 | 107.3 | 21.0 | 167.5 | 44.9 | 314.6 | 7,127 |
| 1958 | 32.7 | 110.0 | 21.5 | 171.6 | 46.0 | 322.5 | 7,298 |
| 1959 | 33.5 | 112.5 | 22.0 | 175.6 | 47.1 | 329.9 | 7,465 |
| 1960 | 32.6 | 111.1 | 21.8 | 166.5 | 40.9 | 324.6 | 7,736 |
| 1961 | 34.9 | 114.0 | 22.9 | 170.8 | 44.3 | 333.1 | 7,938 |
| 1962 | 35.8 | 117.0 | 23.3 | 175.3 | 45.1 | 341.8 | 8,145 |
| 1963 | 36.7 | 117.9 | 23.8 | 176.6 | 46.0 | 344.3 | 8,217 |
| 1964 | 37.6 | 118.3 | 24.3 | 176.2 | 46.9 | 354.9 | 8,391 |
| Average | 36.5 | 110.2 | 22.1 | 169.0 | 46.2 | 324.0 | 7,520 |
| Average annual population of rural areas | | | | | | | |
| | 73.7 | | 146.9 | | 277.8 | | |

Table 4

Number of deaths per year

| Year | Curicó | Curicó Province | San Fernando | Colchagua | La Serena | Coquimbo | Chile |
|--------------------------------------|--------|-----------------|--------------|-----------|-----------|----------|--------|
| 1954 | 837 | 1,523 | 441 | 1,949 | 596 | 3,667 | 84,519 |
| 1955 | 979 | 1,725 | 564 | 2,309 | 543 | 3,943 | 87,843 |
| 1956 | 898 | 1,596 | 502 | 2,162 | 558 | 4,022 | 84,199 |
| 1957 | 900 | 1,669 | 504 | 2,170 | 553 | 3,947 | 91,506 |
| 1958 | 934 | 1,688 | 498 | 2,030 | 627 | 3,913 | 88,930 |
| 1959 | 1,089 | 1,895 | 544 | 2,268 | 575 | 3,966 | 94,491 |
| 1960 | 940 | 1,640 | 485 | 2,228 | 558 | 3,954 | 95,486 |
| 1961 | 1,020 | 1,694 | 446 | 1,978 | 649 | 4,152 | 91,348 |
| 1962 | 982 | 1,647 | 494 | 2,018 | 630 | 3,865 | 94,874 |
| 1963 | 912 | 1,620 | 469 | 2,049 | 636 | 4,042 | 98,293 |
| 1964 | 886 | 1,576 | 487 | 1,998 | 647 | 3,961 | 94,058 |
| Average | 935 | 1,645 | 488 | 2,085 | 592 | 3,910 | 90,500 |
| Average annual deaths in rural areas | | | | | | | |
| | 710 | | 1,597 | | 3,318 | | |

Table 5

Average annual death rates for all age groups combined,
1954 through 1964

| | Deaths per 10,000 | Ratio | % Difference |
|-------------------------------------|----------------------|-------|--------------|
| Curicó | 256 | | |
| Rural area | 96 | | |
| Curicó Province | 149 | | |
| San Fernando | 221 | | |
| Rural area | 109 | | |
| Colchagua | 123 | | |
| La Serena | 128 | | |
| Rural area <i>Rural area</i> | 119 | | |
| Coquimbo <i>Coquimbo</i> | 121 | | |
| Chile | 120 | | |
| Curicó/San Fernando | | 1.16 | 16 |
| Curicó/La Serena | | 2.00 | 100 |
| Curicó/rural area* | | 2.67 | 167 |
| San Fernando/rural area* | | 2.03 | 103 |
| La Serena/rural area* | | 1.07 | 7 |
| Curicó rural/Colchagua rural | | 0.88 | -13 |
| Curicó rural/Coquimbo rural | | 0.81 | -19 |
| Curicó/Chile | | 2.13 | 113 |
| San Fernando/Chile | | 1.84 | 84 |
| La Serena/Chile | | 1.07 | 7 |

* Each city and rural area are in the same province.

Annual births, stillbirths, and infant deaths in Curicó
before and after fluoridation

| Before fluoridation | | | | | | After fluoridation | | | | | |
|---------------------|--------|-------|------|---------|-----------------------|--------------------|--------|-------|------|---------|---------------------|
| Year | Births | | | Deaths | | Year | Births | | | Deaths | |
| | Total | Live | Dead | Infants | Infants + stillbirths | | Total | Live | Dead | Infants | Infants stillbirths |
| 1943 | 1,535 | 1,453 | 82 | 316 | 398 | 1954 | 2,845 | 2,745 | 100 | 477 | 57 |
| 1944 | 1,399 | 1,323 | 76 | 256 | 332 | 1955 | 2,038 | 1,954 | 84 | 292 | 37 |
| 1945 | 1,470 | 1,394 | 76 | 289 | 365 | 1956 | 2,114 | 2,040 | 74 | 296 | 37 |
| 1946 | 1,416 | 1,349 | 67 | 250 | 317 | 1957 | 2,410 | 2,330 | 80 | 348 | 42 |
| 1947 | 1,603 | 1,505 | 98 | 254 | 352 | 1958 | 2,444 | 2,352 | 92 | 407 | 49 |
| 1948 | 1,596 | 1,500 | 96 | 239 | 335 | 1959 | 2,476 | 2,392 | 84 | 487 | 57 |
| 1949 | 1,557 | 1,494 | 63 | 265 | 328 | 1960 | 2,588 | 2,501 | 87 | 408 | 49 |
| 1950 | 1,587 | 1,511 | 76 | 223 | 299 | 1961 | 2,533 | 2,440 | 93 | 394 | 48 |
| 1951 | 1,616 | 1,543 | 73 | 279 | 352 | 1962 | 2,521 | 2,455 | 66 | 410 | 47 |
| 1952 | 1,713 | 1,639 | 74 | 219 | 293 | 1963 | 2,600 | 2,511 | 89 | 289 | 37 |
| 1953 | 1,855 | 1,783 | 72 | 244 | 316 | 1964 | 2,358 | 2,286 | 72 | 305 | 37 |
| Average | 1,575 | 1,498 | 78 | 258 | 335 | | 2,450 | 2,370 | 84 | 374 | 45 |

Table 7

Annuals births, still births, and infant deaths in San Fernando
before and after fluoridation of Curicó

| Before fluoridation | | | | | | After fluoridation | | | | | |
|---------------------|--------|-------|------|---------|-----------------------|--------------------|--------|-------|------|---------|--------------------|
| Year | Births | | | Deaths | | Year | Births | | | Deaths | |
| | Total | Live | Dead | Infants | Infants + stillbirths | | Total | Live | Dead | Infants | Infants stillbirth |
| 1943 | 1,036 | 980 | 56 | 143 | 199 | 1954 | 1,258 | 1,218 | 40 | 108 | 148 |
| 1944 | 1,091 | 1,027 | 64 | 147 | 211 | 1955 | 1,353 | 1,305 | 48 | 164 | 212 |
| 1945 | 1,231 | 1,167 | 64 | 186 | 250 | 1956 | 1,413 | 1,374 | 39 | 167 | 206 |
| 1946 | 1,020 | 971 | 49 | 157 | 206 | 1957 | 1,540 | 1,488 | 52 | 159 | 211 |
| 1947 | 1,152 | 1,116 | 36 | 136 | 172 | 1958 | 1,470 | 1,428 | 42 | 155 | 197 |
| 1948 | 1,164 | 1,123 | 41 | 146 | 187 | 1959 | 1,602 | 1,545 | 57 | 143 | 200 |
| 1949 | 1,189 | 1,148 | 41 | 162 | 203 | 1960 | 1,666 | 1,620 | 46 | 180 | 226 |
| 1950 | 1,117 | 1,071 | 46 | 152 | 198 | 1961 | 1,674 | 1,615 | 59 | 143 | 202 |
| 1951 | 1,081 | 1,021 | 60 | 127 | 187 | 1962 | 1,583 | 1,524 | 59 | 168 | 227 |
| 1952 | 1,190 | 1,147 | 43 | 143 | 186 | 1963 | 1,638 | 1,580 | 58 | 125 | 182 |
| 1953 | 1,267 | 1,217 | 50 | 125 | 175 | 1964 | 1,739 | 1,682 | 57 | 175 | 232 |
| Average | 1,140 | 1,088 | 50 | 148 | 198 | | 1,540 | 1,488 | 51 | 153 | 204 |

Table 8

Annual births, stillbirths, and infant deaths in La Serena
before and after fluoridation of Curicó

| Year | Before fluoridation | | | | | Year | After fluoridation | | | | |
|---------|---------------------|-------|------|---------|-----------------------|------|--------------------|-------|------|---------|-----------------------|
| | Births | | | Deaths | | | Births | | | Deaths | |
| | Total | Live | Dead | Infants | Infants + stillbirths | | Total | Live | Dead | Infants | Infants + stillbirths |
| 1943 | 1,259 | 1,205 | 54 | 205 | 259 | 1954 | 2,079 | 2,037 | 42 | 201 | 243 |
| 1944 | 1,614 | 1,557 | 57 | 208 | 265 | 1955 | 2,599 | 2,544 | 55 | 273 | 328 |
| 1945 | 1,411 | 1,361 | 50 | 205 | 255 | 1956 | 1,925 | 1,898 | 27 | 222 | 249 |
| 1946 | 1,452 | 1,405 | 47 | 233 | 280 | 1957 | 2,394 | 2,360 | 34 | 215 | 249 |
| 1947 | 1,585 | 1,524 | 61 | 286 | 347 | 1958 | 2,137 | 2,107 | 30 | 281 | 311 |
| 1948 | 1,539 | 1,488 | 51 | 235 | 286 | 1959 | 2,041 | 2,011 | 30 | 202 | 232 |
| 1949 | 1,488 | 1,447 | 41 | 199 | 240 | 1960 | 2,363 | 2,333 | 30 | 217 | 247 |
| 1950 | 1,508 | 1,469 | 39 | 208 | 247 | 1961 | 2,177 | 2,148 | 29 | 265 | 294 |
| 1951 | 1,634 | 1,590 | 44 | 232 | 276 | 1962 | 2,472 | 2,427 | 45 | 206 | 251 |
| 1952 | 1,762 | 1,716 | 46 | 239 | 285 | 1963 | 2,470 | 2,415 | 55 | 238 | 293 |
| 1953 | 1,938 | 1,908 | 30 | 257 | 287 | 1964 | 2,410 | 2,361 | 49 | 254 | 303 |
| Average | 1,560 | 1,510 | 47 | 228 | 275 | | 2,280 | 2,240 | 39 | 234 | 273 |

Table 9

Stillbirths in Curicó, San Fernando, and La Serena
before and after Curicó was fluoridated

| Stillbirths | Curicó | | San Fernando | | La Serena | |
|------------------------------------------------------------------------------------|--------|-------|-----------------|-------|-----------|-------|
| | Before | After | Before | After | Before | After |
| Stillbirths/1,000 live births | 50* | 34 | 44 | 33 | 30 | 17 |
| Decrease (before minus after) | | 16 | | 11 | | 13 |
| % decrease | | 32** | | 25 | | 43 |
| % more stillbirths in Curicó: Compared to San Fernando Compared to La Serena | | | 14 [†] | 3 | 67 | 100 |
| % less stillbirths in La Serena: Compared to San Fernando Compared to Curicó | 40 | 50 | 32 [‡] | 49 | | |

* From data in Table 6:

$$50 = \frac{(78)(1,000)}{1,575}$$

$$† 14 = \frac{(50 - 44)(100)}{44}$$

$$** 32 = \frac{(50 - 34)(100)}{50}$$

$$‡ 32 = \frac{(44 - 30)(100)}{44}$$

Table 10

Infant deaths in Curicó, San Fernando, and La Serena
before and after Curicó was fluoridated

| Infant deaths | Curicó | | San Fernando | | La Serena | |
|---------------------------------------------------------|--------|-------|--------------|-------|-----------|-------|
| | Before | After | Before | After | Before | After |
| Deaths/1,000 live births | 172 | 158 | 136 | 103 | 151 | 104 |
| Decrease (before minus after) | | 14 | | 33 | | 47 |
| % decrease | | 8 | | 24 | | 31 |
| % more deaths in Curicó: | | | | | | |
| Compared to San Fernando | | | 26 | 53 | | |
| Compared to La Serena | | | | | 14 | 52 |
| % less deaths ^{deaths} in La Serena | | | | | | |
| Compared to San Fernando | | | -11* | -1 | | |
| Compared to Curicó | 12 | 34 | | | | |

*Negative numbers represent increases in deaths.

Table 11

Stillbirths plus infant deaths combined in Curicó, San Fernando,
and La Serena before and after Curicó was fluoridated

| Stillbirths plus infant deaths | Curicó | | San Fernando | | La Serena | |
|--------------------------------|--------|-------|--------------|-------|-----------|-------|
| | Before | After | Before | After | Before | After |
| Deaths/1,000 total births | 213 | 187 | 174 | 132 | 176 | 120 |
| Decrease (before minus after) | | 26 | | 42 | | 56 |
| % decrease | | 12 | | 24 | | 32 |
| % more deaths in Curicó: | | | | | | |
| Compared to San Fernando | | | 22 | 42 | | |
| Compared to La Serena | | | | | 21 | 56 |
| % less deaths in La Serena: | | | | | | |
| Compared to San Fernando | | | | | -1* | 9 |
| Compared to Curicó | 17 | 36 | | | | |

*A negative number represents an increase in deaths.

Table 13

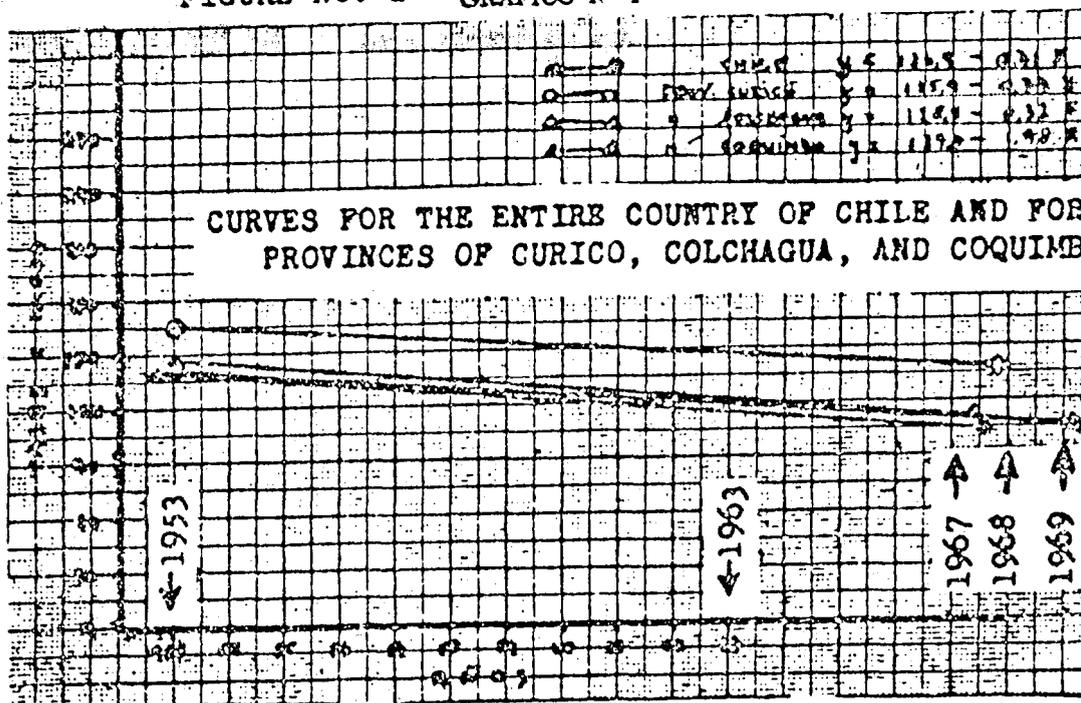
Changes in infant mortality and in death rates for all age groups combined in Curicó and San Fernando after Curicó was fluoridated in 1953

| | Curicó | San Fernando | % Greater death rate in Curicó compared to San Fernando |
|-------------------------------------|--------|--------------|---------------------------------------------------------|
| Infant deaths per 1,000 live births | | | |
| 1943-1953 | 172 | 136 | 26 |
| 1954-1964 | 158 | 103 | 53 |
| Total deaths per 10,000 population | | | |
| 1951-1952* | 198 | 150 | 32 |
| 1954-1964 | 256 | 221 | 16 |

* Data for 1951-1952 are calculated from statistics in Table 5 in Briner and Armona's publication.⁵ Other data are from Tables 5 and 10 in this report.

FIGURE No. 1 GRAFICO Nº 1

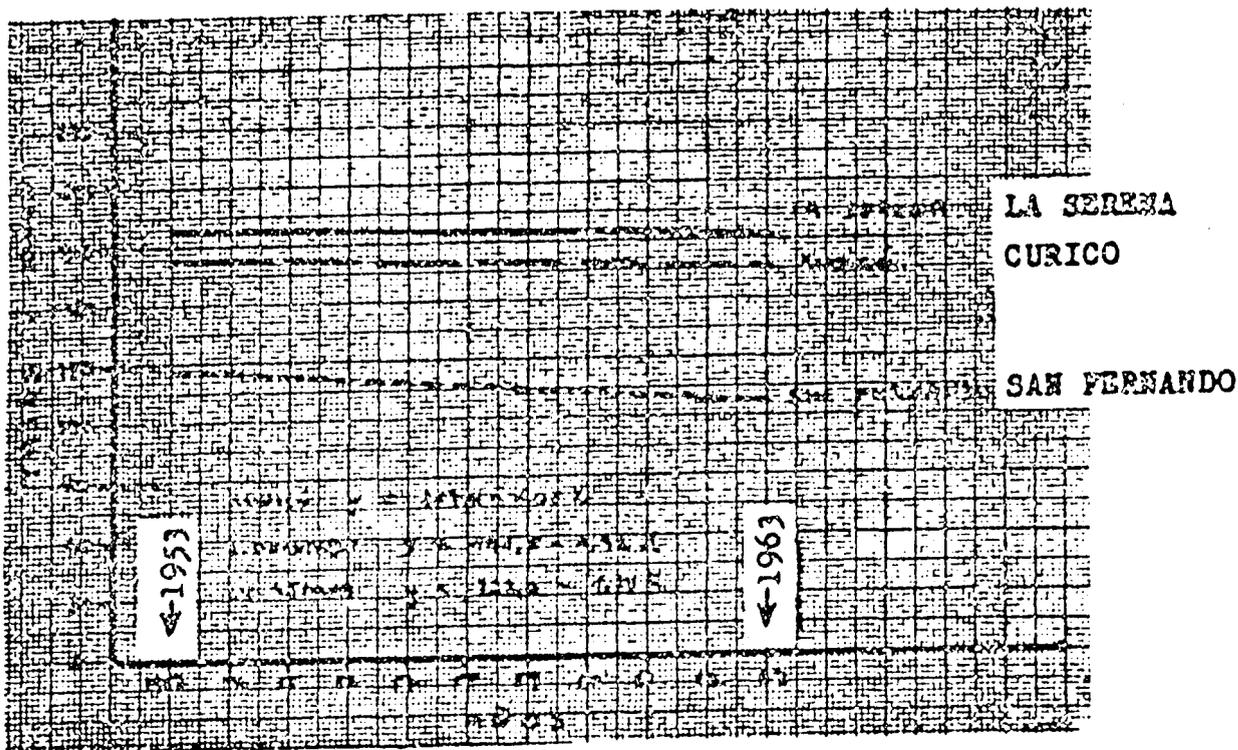
DEATHS PER 10,000



YEARS (from 1953 to 1963)

FIGURE No. 2 GRAFICO Nº 2

DEATHS PER 10,000



YEARS (from 1953 to 1963)

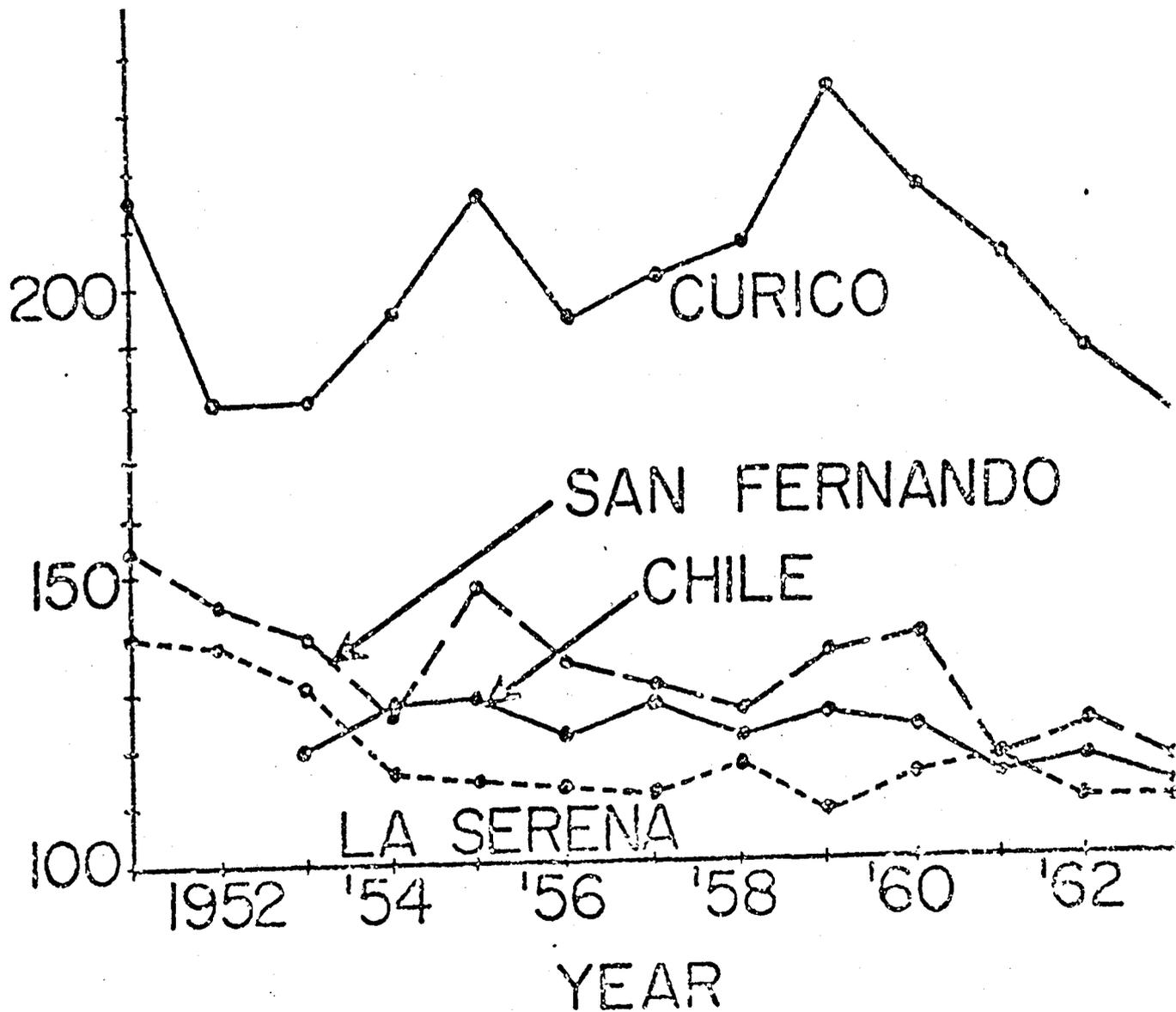
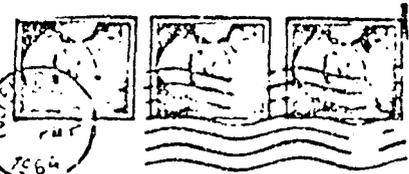


Figure 2. Mortality curves for Curicó, San Fernando, La Serena and Chile drawn from the data in the tables of Briner and Carmo publication.⁵

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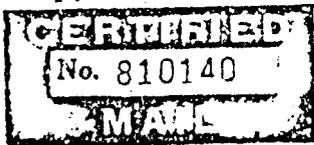
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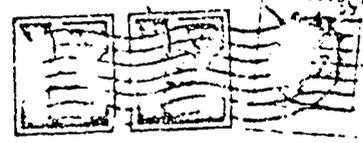


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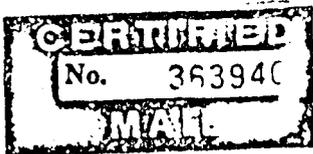


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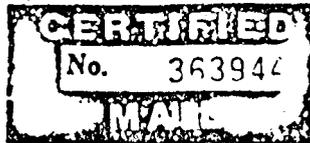
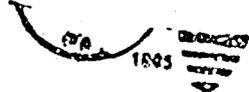
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Figure 3. Envelopes containing communications which L. C. Hendershot, editor of the Journal of the American Dental Association, refused to accept.

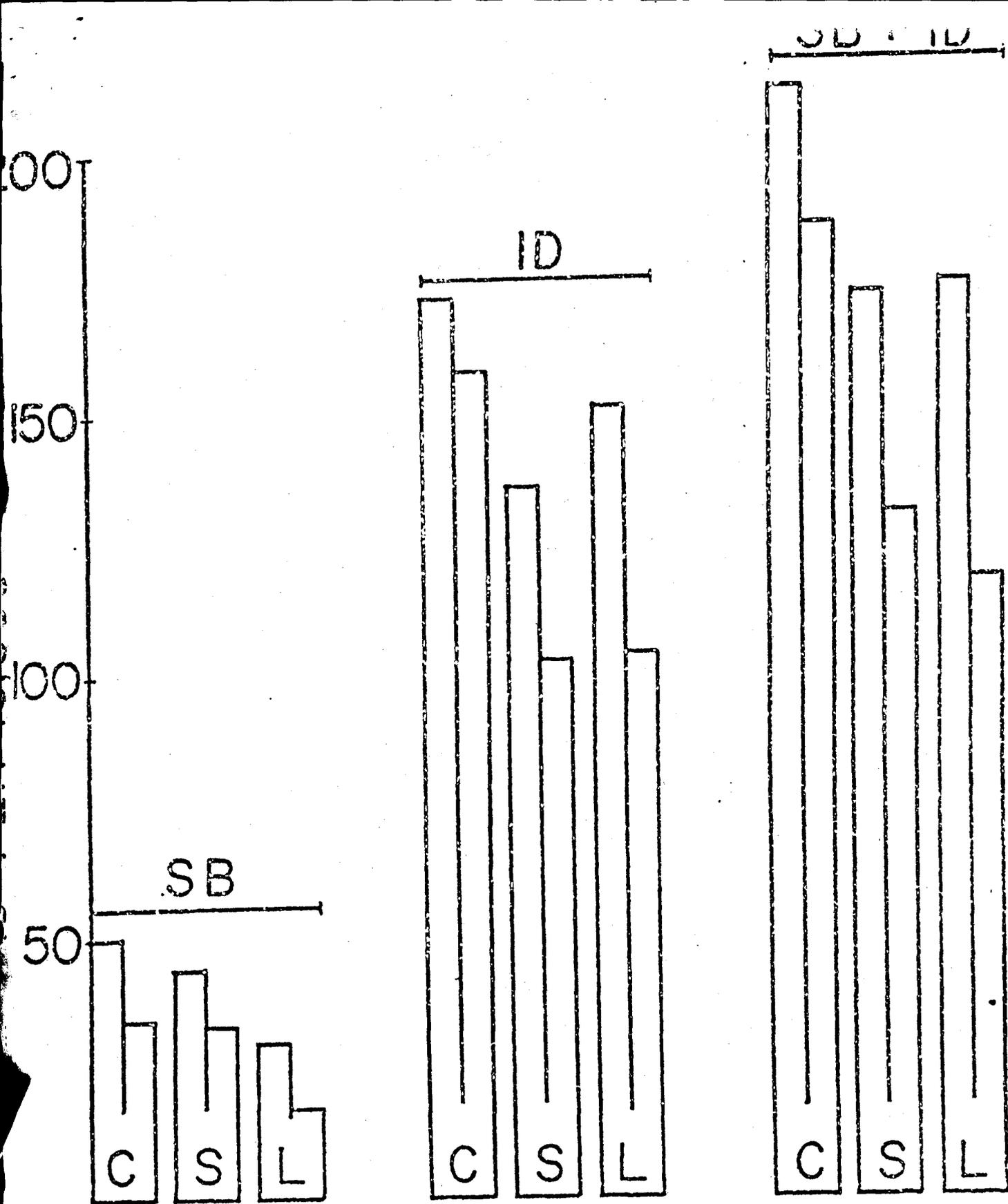


Figure 4. Death rates for stillborns and infants in Curicó (C), San Fernando (S), and La Serena (L). For each city, the columns on the left and right represent annual averages for 1943-1953 and for 1954-1964, respectively.