

RURAL-URBAN MORTALITY IN DEVELOPING COUNTRIES: AN INDEX FOR DETECTING RURAL UNDERREGISTRATION

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RESUMEN

El presente estudio comienza con un breve análisis del pasado y presente de la mortalidad urbana-rural en los países actualmente considerados desarrollados. El mismo análisis en el presente es hecho para los países en desarrollo. La investigación se centraliza en estos últimos países concluyéndose, racionalmente, que la mortalidad rural debería ser más alta que la urbana. Debido a que las estadísticas disponibles generalmente muestran lo contrario, se presenta una idea para construir índices que muestren las posibilidades de subregistro de estadísticas vitales en ciertas áreas de estos países. El índice variaría principalmente de acuerdo al sistema de registro de estadísticas vitales. México es presentado como ejemplo; luego de construir y analizar el índice, se muestra en que áreas rurales existiría subregistro de defunciones. Finalmente a efectos de confirmar la hipótesis de una más alta mortalidad en áreas rurales que en las urbanas (en estos países en desarrollo) se analizan también los casos de India y Taiwán.

SUMMARY

This study begins with a brief analysis of past and present urban-rural mortality in those countries which are presently considered to be developed. The same analysis centers in developing countries, for it is thought that their rural mortality should be greater than their urban mortality. Since available statistics generally show the contrary, a way is presented for constructing possible means of sub-registering vital statistics in some areas of these countries. The index would vary to agree with the system of the registry of vital statistics in a given area. Mexico is used as an example—the result of constructing and analyzing the index is to show in which areas there should be a subregistry of deaths. Finally, the cases of India and Taiwan are analyzed in order to confirm the hypothesis that in developing countries there will be a higher mortality rate in rural than in urban areas.

The dearth of reliable information in underdeveloped countries often forces us to estimate what the facts are. One estimating technique is the argument by analogy. Country X, for which an estimate is to be made, is regarded as similar in certain relevant ways to another country, Y, for which more comprehensive and reliable data are available. Given these similarities, it is argued (usually implicitly), the two countries will be similar in other respects too, including those for which estimates are needed. Hence, country Y's parameters may be used as a reasonable estimate for country X. Usually, currently developing countries are compared with currently developed countries at an earlier, presumably comparable, stage of development.¹ But in some cases there are good reasons for questioning the validity of the argument. In particular, the assumption that rural mortal-

ity is lower than urban mortality in the developing countries because it was lower in the past in the industrialized countries may be questioned on both theoretical and empirical grounds.² Our analysis is devoted to the empirical evidence tending to show that in backward countries rural mortality is higher than urban and that generally either this fact is unknown or the degree of the inequality is underestimated.

In general, populations with high

¹In this paper, industrialized countries are designated "Type A" and developing countries "Type B." In Type A are included such countries as western European countries, excluding Portugal, Spain, and Italy. In Type B are included Latin American, African, and some Asiatic countries.

²This subject has been extensively discussed in some of the lectures that Professor Kingsley Davis has given at the University of California, Berkeley. For a preliminary treatment, see his "The Urbanization of the Human Population," *Scientific American*, CCXIII, No. 3 (September, 1965), 44-45.

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mortality have a high percentage of deaths due to infectious-contagious diseases. Reduction of these diseases³ is the principal cause of the decline of mortality. For example, in Type A countries in the past century, when they had a high mortality, infectious-contagious diseases represented the majority of causes of death. Now, in these countries the proportion of such diseases is small. Recent mortality in Type B countries is higher than it is in Type A countries at a recent date (around 1960); and as expected, the proportion of deaths due to infectious-contagious dis-

³ Thomas McKeown and R. G. Record, "Reasons for the Decline of Mortality in England and Wales during the Nineteenth Century," *Population Studies*, XVI (November, 1962), 94-122.

eases is also higher—over 30 percent (see Table 1).

In Type A countries during the eighteenth and nineteenth centuries, urban mortality was higher than rural mortality. In the absence of scientific medical techniques, cities were conducive to contagion and the spread of disease.⁴ Today, in these countries, the percentage of deaths due to infectious-contagious diseases is minimal, while the major causes of deaths are degenerative and cardiovascular diseases. Sanitary conditions in both areas are still similar, but in both cases these are now good. Modern urban-rural transpor-

⁴ B. Benjamin, "The Urban Background to Public Health Changes in England and Wales, 1900-1950," *Population Studies*, XIV (March, 1964), 225-48.

Table 1.—PERCENT DISTRIBUTION OF ALL DEATHS, GROUPED BY CAUSES OF DEATH, FOR SELECTED COUNTRIES, BY TYPE^a

Countries	Years	Groups ^b			Total
		I	II	III	
TYPE A					
United States.....	1961-62	5.6	74.4	20.0	100.0
Sweden.....	1960-61	6.6	74.7	18.7	100.0
Canada.....	1960-61	7.1	71.1	21.8	100.0
Netherlands.....	1959-60	7.4	73.7	18.9	100.0
France.....	1960-61	7.5	70.5	22.0	100.0
Norway.....	1960-61	8.1	75.8	16.1	100.0
Finland.....	1960-61	8.9	71.1	20.0	100.0
New Zealand.....	1959-60	10.5	69.0	20.5	100.0
Ireland.....	1960-61	11.6	73.7	14.7	100.0
South Africa.....	1959-60	11.8	63.8	24.4	100.0
England and Wales.....	1959-60	12.7	72.5	14.8	100.0
TYPE B					
Panama.....	1960-61	32.8	42.5	24.7	100.0
Dominican Republic.....	1959-60	36.0	32.2	31.8	100.0
India.....	1960-61	38.1	27.6	34.3	100.0
Chile.....	1961-62	38.3	35.1	26.6	100.0
Taiwan.....	1959-60	38.5	36.3	25.2	100.0
Colombia.....	1959-60	38.9	35.6	25.5	100.0
Mexico.....	1959-60	43.7	28.9	27.2	100.0
Philippines.....	1960-61	44.6	27.7	27.7	100.0
Ecuador.....	1957-58	48.9	32.8	18.3	100.0
Nigeria.....	1959-60	51.7	23.1	25.2	100.0
Guatemala.....	1960-61	61.3	20.0	18.7	100.0

^a Industrialized countries are called type A, and developing countries type B. In type A are included such countries as western European countries excluding Italy, Portugal, and Spain. In type B are included Latin-American, African, and some Asiatic countries.

^b According to the 1948 (sixth) Revision of the International List of Causes of Death:

Group I (Principally infectious-communicable diseases): B1 to B17, B23, B30, B31, B32, B36, B43.

Group II (Principally degenerative and cardio-vascular-renal diseases): B18, B19, B20, B22, B24, to B29, B33, B37, B38, B39, B41, B45.

Group III: All the other causes of death.

Source: United Nations *Demographic Yearbooks*, 1961 to 1964.

tation and communication assure the availability of medical assistance, thus tending to minimize mortality differences between the two types of areas. It is perhaps not possible to generalize as to the area in which mortality is lower, and it may be preferable to consider each country individually.⁵

In Type B countries at the present time, it is more likely that urban mortality will be found to be lower than rural,⁶ because almost everything concerned with medical care and hygiene is available mainly in cities. Health and sanitary conditions in rural areas have not been much improved.⁷ Medical services, preventive medicine, and hospitals are concentrated in urban areas; people living in rural areas are often a step behind in mortality decline.⁸

⁵ For England, Wales, and Scotland, where urban mortality seems to be lower than rural mortality, see D. V. Glass, "Some Indicators of Differences between Urban and Rural Mortality in England, Wales and Scotland," *Population Studies*, XIV (March, 1964), 263-67.

⁶ See the following studies: Miguel Gomez and Ricardo Jimerez, *Tabla de Vida abreviada para el Area metropolitana de San Jose (Costa Rica), 1949-51* (Santiago de Chile: Centro Latinoamericano de Demografía, 1962). Expectation of life for San José was 60.8; for the whole country, 55.5. Vilma Medica, *Mortalidad en la Ciudad de Panamá 1950-60* (Santiago de Chile: Centro Latinoamericano de Demografía, 1964). Expectation of life in Panama City, 1959-61, was 70.0; for the whole country, 61.5. Zulma Camisa, *Table abreviada de Mortalidad de la Region Pampeana de la Republica Argentina 1946-48* (Santiago de Chile: Centro Latinoamericano de Demografía, 1964). The Pampean Region is the most urbanized of this country. The expectation of life was 63.1; for the whole country, 60.8.

⁷ Gwendolyn Johnson, "Health Conditions in Rural and Urban Areas of Developing Countries," *Population Studies*, XVII (March, 1964), 293-309.

⁸ However, the situation may change in the future. It is observable that the principal cities in countries of Type B are growing rapidly, with an annual growth rate of over 50 per thousand. If this trend continues without adequate amplification of public health services, poorer sanitary conditions could be anticipated and, as a result, an increase in the mortality rate.

URBAN-RURAL STATISTICS

Despite the argument above that countries of Type B would show a lower mortality rate for urban areas, the few countries that publish mortality data by urban-rural residence generally show the opposite. In this paper we shall try to show that the statistics are wrong.

A first analysis of the data can be made by a simple observation concerning rural death rates published for areas of certain states (Table 2). The figures for rural areas are unacceptably low in comparison with those for the whole country. This could be explained because of one or more of the following: (a) differences in the age structure; (b) possible registration of rural deaths as urban deaths; (c) overenumeration of rural population; or (d) underregistration of deaths in rural areas.

In order to test the first hypothesis, we computed urban-rural standardized mortality rates with constant age-group specific mortality for Mexican states. The standardized rates found for urban and rural areas were almost the same for every state. Therefore, we concluded that, in the case of Mexico at least, the age distribution of the rural versus the urban population is not the cause of the observed differences between urban and rural mortality rates.

Since it is still true that the rural populations in most states of Type B countries are larger than or equal to their urban populations, the expected number of deaths in rural areas should be larger than or equal to urban deaths. Therefore, if the main irregularity in registration is due to counting rural deaths as urban, states which present an extremely low rural death rate should also present an unusually high urban death rate in relation to that of the countryside. Since this has not been observed, hypothesis *b* can be dismissed. Hypothesis *c* is also difficult to accept; the contrary would be more likely to be true. Therefore, it can be concluded that the principal factor causing these apparently low death rates is most likely

to be the underregistration of deaths in the rural areas.

Underregistration of deaths in rural areas may arise from numerous causes—an inadequate mechanism for registration of vital statistics,⁹ an unco-operative attitude on the part of the people, or a variety of social and cultural characteristics of the society.

It is difficult to prove a quantitative effect due to lack of communication between the people and the administration. Nevertheless, it is possible to get an idea

⁹ Included here are such factors as organization of national registry systems, number of primary units, period since the registry law was put into effect, requirement for the registration of vital events, and so forth. In general, all the countries called Type B have passed the law of registration of vital statistics in this century, in some cases very recently (e.g., Bolivia in 1940). (See United Nations, *Handbook of Vital Statistics Methods*, Series F, No. 7 [New York, 1955], pp. 20-21.) A fee required for the registration of deaths (as in Venezuela, Haiti, and Bolivia) can contribute to underregistration, principally in rural areas (United Nations, *op. cit.*, pp. 81-82).

of the obstacles facing ordinary citizens when they wish to report vital events. If the obstacles are known, it may be possible to see how these can be quantitatively measured in each area. A first question to take into account is whether the responsibility to report vital statistics resides in a specific official or in the citizenry itself. India is an example of the first case. There, the "watchman" has the responsibility of collecting information about any events, including vital statistics, and of reporting to the police station. Each watchman has his own area in which to operate. A disadvantage of this system is that the watchman often does not realize the importance of these statistics and is untrained for his job. Also, because vital statistics are reported together with other statistics, the police station gives more attention to the other statistics related to public order.¹⁰

¹⁰ Indian Administrative Service, Superintendent of Census Operations, *Census of India, 1961*, Vol. XV, Part I-B: *Report on Vital Statistics*, p. 3.

Table 2—CRUDE DEATH RATES FOR SELECTED COUNTRIES AND SELECTED STATES IN THOSE COUNTRIES

Countries and states	Crude death rates		
	Total	Urban	Rural
India 1961.....	10.3	11.5	10.0
Assam.....	2.7	7.2	2.5
Bihar.....	5.0	6.0	4.9
El Salvador 1962.....	12.1	15.4	10.1
La Union.....	6.6	11.5	5.0
Cabanas.....	7.2	11.1	6.4
Dominican Republic 1949-51...	10.0	12.7	9.2
La Altagracia.....	9.9	15.2	8.0
Mexico 1959-61.....	11.5	11.1	11.9
Baja California T.N....	8.0	9.3	4.2
Tamaulipas.....	8.7	11.2	5.1

Sources: INDIA: Central Statistical Organization, Department of Statistics, *Statistical Abstract of the India Union 1962*, p. 543.

For the other countries, crude death rates were calculated from:

EL SALVADOR: *Ministro de Economía, Dirección General de Estadística, Anuario Estadístico 1962 and Avance, Tercer Censo de Población, 1950.*

DOMINICAN REPUBLIC: *Dirección Nacional de Estadístico de la República Dominicana, 1949, 1950, 1951; and Oficina Nacional del Censo, Tercer Censo Nacional de Población, 1950.*

MEXICO: *Secretaría de Economía, Dirección General de Estadística, Anuario Estadístico 1960-61, 1962-63; and VIII Censo General de Población 1960.*

When the responsibility to report rests with the citizens themselves, a specific adult or the head of the household is charged with reporting to a registry office. In these cases it is possible to try to obtain an index in order to detect approximately in which rural areas people encounter more obstacles in the way of their reporting. One of these obstacles is often the difficulties people have to overcome in order to reach the registry office. Accessibility of the registration office will vary with the number and condition of roads and the distance from the registry office of the place where the vital events (deaths in this case) occur. In any country the relative differences in accessibility among its states can be measured by considering the number of registry offices and miles of roads per square mile of habitable area in each state. Thus, it is possible to consider as an index of accessibility the product of both densities.

An index made in this way will provide an idea of which rural areas have difficulty in the reporting of vital events due to inaccessibility of the registry office. It would therefore permit us to judge the vital statistics more accurately. In some cases, other indicators of the problems facing the population in reporting vital events could be employed to make similar indices. These indicators would depend not only on the available information but also on the registry system.

EXAMPLE OF THE INDEX: MEXICO

To illustrate the value of the index presented here, let us take Mexico, because of the type of registry system and because it is possible to obtain information about places with registry offices and length of roads by states.¹¹

According to the United Nations *Demographic Yearbook*, Mexico's death registration is complete. For the whole country, rural mortality was, according to the official data, similar to urban mortality

¹¹ Unfortunately, the habitable area for each state is not available. Thus, for the construction of the index, the total area of each state is used.

during 1949-51 and 1959-61. However, the mortality rates by state for both areas present irregularities which give rise to doubt as to the completeness of these statistics (Table 3).

In estimating the *number of places* with registry offices,¹² we know that in Mexico there is *at least* one registry office (*oficina de registro civil*) in each *municipio*.¹³ Each *municipio* has a principal town or city where at least one registry office is located. It happens, however, that in some *municipios* there exists, besides the principal city, another city which may also have a registry office. Hence, for the purpose of estimating the *number of places* with registry offices in each state, we took the number of *municipios* or the number of cities of over 2,500 inhabitants, whichever was greater.

As for roads, the total number of kilometers in each state was used.¹⁴ Given the number of places with registry offices, the length of roads, and the total area, the following densities were calculated for each state:

$$D_p = 1,000$$

$$\times \frac{\text{Number of places with registry offices}}{\text{Area (Km}^2\text{)}}$$

and

$$D_r = 1,000 \times \frac{\text{Kilometers of road}}{\text{Area (Km}^2\text{)}}$$

By multiplying both densities, an index of accessibility was calculated:

$$I_a = D_p \times D_r .$$

The greater the index, the more accessible are the registry offices. Assuming the index has explanatory value, the

¹² In this connection, it makes no difference that a place may have more than one registry office.

¹³ One of the smallest political divisions in Mexico, similar to a United States county.

¹⁴ Mexico, Secretaría de Economía, Dirección General de Estadística, *Anuario estadístico de los Estados Unidos Mexicanos* (for the years 1951-52, 1960-61, and 1962-63) and *Censo general de Población* (1950 and 1960).

registered rural mortality rate should be found to be very low when the value of the index is small. This would imply that a low official death rate is due to omission in the registration of deaths, caused by the difficulty that rural people have in traveling from the place where the death occurred to the registry office and/or because distance makes the reporting more dubious.¹⁵

Taking as a point of reference the value of the index for the whole country, we find (see Tables 3 and 4) that a majority of

¹⁵ It is not advisable to correlate index values and death rates, for a high index value does not necessarily imply a high mortality rate, even in rural areas. Living and sanitary conditions may be favorable, and medical treatment may be provided in the rural areas themselves. Or there may exist convenient means of transportation to nearby cities, which enable the rural people easily to obtain good medical care, as, for example, in the rural areas near the Federal District of Mexico.

states with values lower than the index for the whole country have rural death rates lower than the rural average for the country and rural death rates lower than urban death rates. These two findings confirm our hypothesis. For better comparison a summary of Tables 3 and 4 is presented in Table 5.

It was mentioned originally that a higher death rate can be expected in rural than in urban areas. If our hypothesis with respect to the meaning of the values of the index of accessibility is correct, the rural mortality for a group of states that present an index value higher than the average for the country should be at least higher than urban mortality. Urban and rural mortality rates were calculated for a group of states with this characteristic; the findings were as expected. A group of remaining states was treated similarly (those states in which the index was lower

Table 3.—CRUDE DEATH RATES BY RESIDENCE AND STATE, MEXICO, 1949-51 AND 1959-61

States	1949-1951			1959-1961		
	Total	Rural	Urban	Total	Rural	Urban
Mexico	17.1	17.4	16.7	11.5	11.9	11.1
Aguaascalientes.....	19.0	17.6	20.2	12.3	12.2	12.3
Baja California Territorio Norte...	14.4	9.9	18.3	8.0	4.2	9.3
Baja California Territorio Sur.....	11.8	8.1	19.0	8.1	5.3	13.0
Campeche.....	12.6	11.4	13.7	9.8	8.8	10.5
Coahuila.....	15.7	13.5	17.5	11.1	9.6	11.8
Colima.....	17.2	15.3	19.5	12.6	9.5	14.6
Chiapas.....	15.9	15.4	18.4	12.2	11.9	13.2
Chihuahua.....	14.3	11.6	18.2	10.0	8.8	10.8
Distrito Federal.....	17.3	26.7	16.7	10.0	11.7	10.0
Durango.....	13.1	11.1	18.9	9.4	7.4	13.0
Guanajuato.....	21.6	21.8	21.5	13.5	12.8	14.2
Guerrero.....	14.1	13.6	16.9	10.0	9.2	12.6
Hidalgo.....	20.3	20.7	19.1	14.7	15.3	12.5
Jalisco.....	17.3	15.3	19.8	10.9	10.3	11.4
Mexico.....	22.9	24.6	18.0	15.1	18.5	9.4
Michoacan.....	15.3	13.5	19.6	9.6	8.7	11.0
Morelos.....	17.1	16.1	19.9	10.3	10.0	10.5
Nayarit.....	14.3	11.2	20.8	10.8	8.6	13.8
Nuevo Leon.....	12.8	10.2	15.4	8.3	7.7	8.5
Oaxaca.....	21.6	22.2	19.9	15.8	16.6	13.3
Puebla.....	22.8	24.8	18.7	16.1	18.8	12.0
Queretaro.....	20.2	20.6	20.3	14.0	14.9	11.9
Quintana Roo.....	10.1	8.2	15.6	5.0	4.8	5.4
San Luis Potosi.....	17.1	16.2	19.9	12.6	12.6	12.7
Sinaloa.....	11.3	9.4	17.0	8.4	7.2	10.3
Sonora.....	13.6	11.8	16.9	10.0	8.9	10.8
Tabasco.....	12.9	12.7	14.1	10.4	10.2	11.1
Tamaulipas.....	12.2	7.9	16.7	8.7	5.1	11.2
Tlaxcala.....	23.9	26.5	19.6	15.6	18.3	12.1
Veracruz.....	13.9	12.1	17.7	10.3	9.3	11.7
Yucatan.....	16.3	16.9	15.9	12.5	13.4	12.0
Zacatecas.....	18.1	17.6	19.7	11.1	10.4	12.7

Sources: Crude death rates were calculated from: Secretaria De Economia, Direccion General De Estadistica: Anuario Estadistico 1950-52, 1960-61, 1962-63; and Censo General De Poblacion 1960.

Table 4.—INDEX OF ACCESSIBILITY FOR MEXICO, 1950 AND 1960

States	Index	
	1950	1960
Mexico	32.56	36.58
Aguascalientes.....	108.48	124.10
Baja California Territorio Norte.....	1.00	2.84
Baja California Territorio Sur.....	1.93	1.93
Campeche.....	3.64	4.19
Coahuila.....	4.31	4.31
Colima.....	123.40	123.40
Chiapas.....	42.98	42.98
Chihuahua.....	2.18	2.27
Distrito Federal.....	1970.29	4974.00
Durango.....	4.87	5.02
Guanajuato.....	77.18	94.15
Guerrero.....	28.10	29.35
Hidalgo.....	380.64	380.64
Jalisco.....	74.28	74.28
Mexico.....	213.61	213.61
Michoacan.....	92.99	98.32
Morelos.....	814.41	916.21
Nayarit.....	23.93	26.36
Nuevo Leon.....	21.85	21.85
Oaxaca.....	171.55	171.55
Puebla.....	379.99	385.50
Queretaro.....	103.23	103.23
Quintara Roo.....	1.03	1.03
San Luis Potosi.....	18.45	19.12
Sinaloa.....	9.86	14.09
Sonora.....	6.70	7.14
Tabasco.....	34.11	38.06
Tamaulipas.....	11.41	11.88
Tlaxcala.....	13.73	14.39
Veracruz.....	136.45	136.95
Yucatan.....	75.70	76.32
Zacatecas.....	15.12	15.56

Note: The phrase "index of accessibility" is elliptical; it stands for index of accessibility of vital statistics registration offices. The index is defined in the following way:

$$I_a = 10^6 \times \frac{\text{Number of places with registry offices}}{\text{area in square kilometers}} \times \frac{\text{Kilometers of road}}{\text{area in square kilometers}}$$

Sources of data: Secretaria de Economia, Direccion General de Estadistica Anuario Estadistico 1951-52, 1962-63, and Censo General de Poblacion 1950 and 1960.

Table 5.—COMPARISON OF STATE RURAL DEATH RATES WITH THE RURAL DEATH RATE FOR THE WHOLE COUNTRY AND WITH STATE URBAN DEATH RATES FOR ONLY THOSE STATES WITH AN ACCESSIBILITY INDEX VALUE LOWER THAN THE INDEX VALUE OF THE COUNTRY—MEXICO, 1949-51 AND 1959-61

Types of state	1949-51	1959-61
States with an accessibility index lower than the average for the country.....	16	16
States with a rural death rate:		
Lower than rural death rate for whole country....	13	14
Higher than rural death rate for whole country....	3	2
States with a rural death rate:		
Lower than state urban death rate.....	15	14
Higher than state urban death rate.....	1	2

Sources: Tables 3 and 4.

than the average for the country); a rural mortality rate lower than the urban rate was found (see Table 6). An interesting observation is that, while there is no significant difference between urban mortality rates for both groups of states, there is a significant difference between the rural rates. The difference observed in the rural mortality rate is related to the index of accessibility, thus supporting the hypothesis that registered rural mortality is not complete.

Clearly, the frequent observation of extremely low rural mortality rates in Type B countries must be regarded with caution. It is very likely that these low rates are due to omissions in registration and that the omissions are greater in rural than in urban areas—so much so, that rural death rates are, in fact, probably greater than urban death rates.

A SECOND EXAMPLE: TAIWAN

In order to provide additional evidence, an example can be presented of a Type B population with reliable vital statistics—that of Taiwan in 1961.¹⁶ There is information about mortality rates for the principal cities of the island, medium-sized cities (100,000–200,000 inhabitants), small cities (generally fewer than 50,000 inhabitants), and rural areas. As can be observed in Table 7, death rates are inversely correlated with city size, being highest in rural areas.¹⁷

¹⁶ The Provincial Civil Affairs Department, *1961 Taiwan Demographic Fact Book*, December, 1963, pp. 95–153.

It is instructive to compare Mexico, Taiwan, and India, in each of which mortality rates by area and states are available. Table 8 gives the coefficients of variation¹⁸ of death rates between states for rural and urban areas. It is observed that in Taiwan, the coefficients are similar and present almost no variation between areas. On the other hand, the coefficients for Mexico (1949–51 and 1959–61) and India (1961) are substantially greater in rural areas than in urban areas. This pattern confirms the previous hypothesis of less accurate registration in rural areas than in urban areas, since there is no obvious demographic reason for this variation.

CONCLUSIONS

In general, official statistics show a lower mortality in rural than in urban areas for countries of Type B. But these data reflect mortality conditions which are more apparent than real, because registry in rural areas is generally less efficient than in urban areas. In some cases it is possible to construct indices which show in which areas of the country

¹⁷ Standardization of the gross mortality rates using same age-specific mortality rates for Taiwan, 1961, was made. The results show, as in the case of Mexico, that the age structure of the population of rural and urban areas in Taiwan does not cause the gross rates of each area to change significantly. The standardized rates were: big cities, 6.1 per thousand; middle-sized cities, 6.7 per thousand; and rural areas, 6.9 per thousand.

¹⁸ $d = s/m$, where s is the standard deviation and m is the mean.

Table 6.—URBAN-RURAL CRUDE DEATH RATES FOR SELECTED MEXICAN STATES GROUPED ACCORDING TO THE ACCESSIBILITY INDEX VALUE—MEXICO, 1949–51 AND 1959–61

Types of state	Death rates					
	1949-51			1951-61		
	Total	Urban	Rural	Total	Urban	Rural
States with an accessibility index value higher than that of the average for the country.....	18.2	16.8	19.3	12.1	11.0	13.3
States with an accessibility index value lower than that of the average for the country.....	14.7	16.4	13.6	10.1	11.2	9.1

Source: Crude death rates were calculated from same sources as Table 3.

Table 7.—CRUDE DEATH RATES BY LOCALITY AND RESIDENCE—
TAIWAN, 1961

Locality	Total	Medium sized cities	Small cities	Rural
Taipei.....	6.9	5.6	6.8	7.6
Ilan.....	7.7	7.6	7.3	8.0
Taoyuan.....	6.4		6.0	6.8
Hsinchu.....	7.1	6.1	7.2	7.9
Miaoli.....	6.9		6.7	7.0
Taichung.....	6.9		6.9	6.9
Changhwa.....	7.4	6.1	7.5	7.7
Nantou.....	6.7		6.4	7.0
Yunlin.....	7.6		7.4	7.7
Chiayi.....	6.7	5.7	7.0	7.0
Tainan.....	6.9		6.3	7.3
Kaohsiung.....	6.2		5.4	6.5
Pingtung.....	7.0	5.6	6.9	7.3
Taitung.....	8.3		7.0	9.1
Hualien.....	8.1	6.3	8.5	8.8
Penghu.....	7.9		7.0	8.7
Principal cities				
Taipei.....	4.4			
Keelung.....	6.6			
Taichung.....	5.7			
Tainan.....	5.4			
Kaohsiung.....	5.1			

Note: The political subdivision called "locality" does not include the political unit called "Principal city."

The medium sized cities of Ilan and Hualien are the smallest in this category: 58,839 and 66,205 inhabitants respectively.

Source: Taiwan, Provincial Civil Affairs Department, "1961 Taiwan Demographic Fact Book" (December 1963), p. 95-153

Table 8—COEFFICIENTS OF VARIATION^a OF STATE DEATH RATES BY RESIDENCE FOR INDIA, MEXICO, AND TAIWAN

Coefficients of variation	India 1961	Mexico	
		1949-51	1959-61
State death rates for urban area..	.21	.12	.16
State death rates for rural area..	.32	.36	.37
Locality death rates for:			
Five principal cities.....		.12	
Medium size cities.....		.11	
Small cities.....		.10	
Rural area.....		.10	

a Coefficient of variation $d = \frac{s}{M}$ where s is the standard deviation and M is the mean.

Sources: Coefficients of variation were calculated from:
India: Central Statistical Organization, Department of Statistics, Statistical Abstract of the India Union 1962 p. 543.

Mexico: Table 3.
Taiwan: Table 7.

difficulties in registration may occur. This was done in Mexico, and, by taking a selection of states, it was found that rural mortality is higher than urban. This fact is to be expected not only in Mexico but in any country where public health services, medical facilities, and hospitals are still lacking in rural areas and where communication does not permit rural people to reach the cities quickly and easily. This was found in Taiwan, a country with reliable statistics. In Mexico and

India, indirect procedures (because of poor statistics) indicate the same thing. Therefore, it is concluded that currently underdeveloped countries have a higher rural mortality than urban at the present time. This is a generalization, and, of course, in some selected areas of a given country the opposite could be the case. But if this should occur, it would be useful if, before accepting a rural mortality lower than urban, an evaluation of the data were made.