Review Article

Impact of COVID-19 infection by federative entity in Mexico: a focus on economicinequalities and vulnerability.

Abstract

In December 2019, China announced a SARS CoV-2 virus in the Wuhan market, later announced by the WHO as the COVID-19 pandemic with a global impact on public health. The **aim** of this review was focused on determining if there are disparities in the impact of COVID-19 associated with the average salary.

Methodology. A documentary review of information detected in the network [Data México] among other sources was carried out, usingthe keywords; covid-19 pandemic, confirmed cases of covid-19, socioeconomic status and covid-19, socioeconomic disparity and covid-19 as well as cross-checking of confirmed casesof COVID-19, the number of deaths from this cause and salary average of each of the federativeentities.

The **results** denote marked socioeconomic disparities, the impact of covid-19 does notreside in the biology of the virus, but in particularities of the patient, social environment, and other predictors such as marginalization and comorbidities.

Conclusion. Economic disparities, municipal marginalization constitute a predictor of presenting severe forms of COVID-19, an independent association of other predictors such as age and cardio-metabolic comorbidities.

Keywords: socioeconomic status and covid-19, confirmed cases of covid-19, socioeconomic disparity and covid-19, covid-19 pandemic.

Introduction

In December 2019 a virus from the region of Wuhan in China, revolutionized the world causing the disease called COVID-19. Seven types of coronaviruses are known that can cause disease in humans: four of them can generate mild colds and diarrheal diseases in infants and three viruses of this family, among which is the SARS Co-V-2 that passed from an animal and mutated to humans, these viruses are responsible for the most severe respiratory diseases (Maguiña et al., 2022). On January 30, 2020, following the recommendation of the Emergency Committee, the Director General of the World Health Organization (WHO), declared the outbreak of the new coronavirus as a public health emergency of international concern or Pandemic (WHO, 2020).COVID-19 disease is transmitted directly and by contact.

The symptomatic phase is characterized by cough, fever, and myalgias, but may cause arthralgias, temporary anosmia, and respiratory failure. Prevention and immunization, as well as isolation, are the most effectivestrategies so far for community containment (Umakanthan et al., 2020).

The pandemic caused a collapse in the health services of many countries, due to the exponential increase in the first months of 2020. A large number of patients admitted with fever and/or respiratory symptoms, exceeding the capacity of intensive care units (ICU) and showing the insufficiency of mechanical ventilation devices, (Tarazona-Santabalbina, 2021).

Since its appearance, SARS-CoV-2 has had mutations called variants that attack different age groups, the evidence reported on COVID-19 has shown that age is one of the main risk factors for lethality of this pathology (Fantin R., 2021). Non-health social determinants of health influence the differences between population groups in the incidence, severity and mortality associated with COVID-19.

The impact caused by COVID-19 is unequal in countries around the world, manifesting itself more among the poorest and least developed countries, affecting mostly vulnerable populations, and inequalities caused by the health system itself, which are less visible but no less important (López-Valcárcel, 2021). In this sense, Trías et al. (2021) point out that the burden of disease varies by area within the same country, highlighting the poorest provinces and neighborhoods among the most affected, even where there has been a greater decrease in life expectancy at birth.

In Latin America and the Caribbean, the situation was particularly worrisome due to the characteristics and conditions of the health systems and the scarcity of care policies for the elderly, as well as the macroeconomic situation and poverty in most of the countries of the region (ECLAC, 2020). Because the pandemic occurred later in the countries of the region, compared to countries in Asia and Europe, the governments of Latin American nations adopted early and energetic measures that prevented the pandemic from advancing. The main sanitary strategies were based on the declaration of a state of sanitary emergency (or state of emergency due to catastrophe), closure of international borders, suspension of international flights, mandatory quarantine of travelers coming from abroad, promotion of more rigorous personal hygiene measures, search and contact of suspected cases, social isolation measures (physical separation of infected people from those who are healthy), social distancing (physical

separation between people, preventing contact). These strategies were adopted to a greater or lesser extent in the countries of the Latin American and Caribbean region (Wilder A., 2020).

Researchers around the world have described the etiology of the disease in a very precise manner, and have also conducted comparative studies with respect to various demographic variables such as age, socioeconomic status, marital status, among others, as well as health variables such as comorbidities such as diabetes, hypertension, obesity and others such as smoking, COPD (Pérez-Sastré et al. 2020). Similarly, a large number of studies have been conducted on the effects of the pandemic on the mental health of the population.

Diagnosis is based on the presence of specific SARS-CoV-2 RNA sequences in the samples. The protocol used for virus detection in our country is one of those authorized by WHO and recommended by the Pan American Health Organization (PAHO). In Mexico, the method was validated by the Instituto de Diagnóstico y Referencia Epidemiológicos (Martínez Anaya, Ramos Cervantes & Vidaltamayo, 2020).

Among the top priorities for facilitating public health interventions is reliable laboratory diagnosis. In acute respiratory infection, RT-PCR is routinely used to detect causative viruses in respiratory secretions. The feasibility of introducing real-time RT-PCR in public health laboratories during international health emergencies through coordination between public and academic laboratories has been previously demonstrated (Corman et al., 2020).

6,624,263 people have lost their lives due to COVID-19 in Mexico in the period from September 2022 (Coronavirus: Resource Center, 2022).

The first case in Mexico of COVID-19 was detected on February 27, 2020 in Mexico City was a case imported from Italy (Suarez, 2020).On April 30, 64 days after this first diagnosis, the number of patients increased exponentially, reaching a total of 19 224 confirmed cases and 1 859 (9.67%) deaths (Suarez et al, 2020).

In Mexico, there are disparities associated with the stratification of socioeconomic variables, ethnicity, geographic region and medical services in the progression of COVID-19. In Mexican people, severity indicators prevail in people with greater marginalization due to a large number of factors among which is the lack of social security and medical care which favors deaths. (Ortiz-Hernández L, Pérez-Sastré MA. 2020) it is also possible to speak of ethnic groups due to the cultural diversity of the different regions.

Vulnerable social groups are at greater risk of falling ill and dying, due to the characteristics of their environment that make them more exposed to risk factors while having fewer protective factors or resources to cope with diseases (Ortiz-Hernández et al., 2015). These vulnerable groups include children, pregnant women, the elderly, people living on the streets, and people

belonging to indigenous groups, among others.

The study by Ortíz-Hernández et al. (2020) where differences were estimated according to geographic region, municipal marginalization, services and belonging to an indigenous group, the researchers analyzed the data recorded by the General Directorate of Epidemiology of the Secretariat of Health of the Federal Government of Mexico regarding confirmed cases of SARS-CoV-2 infection. The analysis was limited to adults aged 20 years or older registered through July 10, 2020, obtaining with these criteria a sample of n=234, 870. The COVID-19 severity indicators were hospitalization, development of pneumonia, requirement of intubation or admission to the intensive care unit, and death. Using multilevel regression models, prevalence ratios (PR) were estimated and the researchers concluded that the effects of COVID-19 are not only due to the biological characteristics of SARS-CoV-2, but also to the particularities of the patient and the social environment, such as the distribution of resources (or lack thereof) to deal with it. They found that municipal marginalization is a predictor of presenting severe forms of COVID-19 and this association was independent of other well-established predictors such as age and cardio-metabolic comorbidities . A directly proportional relationship was observed with belonging to an indigenous group, living in the southern region of the country, and having some comorbidity being associated with an increase in the time to receive medical care.

The recessionary tendency of the economy is the gross domestic product (GDP), this indicator reflects the performance of the economic system as a whole, the behavior of specific activities at different subnational levels is heterogeneous. In Mexico, the unprecedented economic context tested the resilience of the affected populations during one of the phases of the pandemic, but also implied new challenges (OECD, 2020).

Objective. Determine if there are disparities in the impact by COVID-19 associated with the average wage.

Methodology

A documentary review of information detected in the [Data Mexico] network, among other sources, was carried out using the keywords; covid-19 pandemic, confirmed cases of covid-19, socioeconomic status and covid-19, socioeconomic disparity and covid-19, as well as cross-referencing data on confirmed cases of COVID-19, the number of deaths due to this cause and

the average salary in each of the states.

Results

The results reported by Ortíz-Hernández et al. (2020) show marked socioeconomic disparities, the impact of ovid-19 does not lie in the biology of the virus, but in the particularities of the patient, the social environment, and other predictors such as marginalization and comorbidities. Economic disparities and municipal marginalization constitute a predictor of presenting severeforms of COVID-19, an association independent of other predictors such as age and cardio- metabolic comorbidities.

Table 1. ***Description of impact by COVID-19 in Mexico 2022***

Variables	N	Minimum	Maximum	Media	Standard deviation
Confirmed cases	**32**	42959	1747014	222265.75	306126.170
Number of deaths	**32**	2242	47919	10325.31	10450.280
Proportion of confirmed cases	**32**	0.73%	31.51%	7.0444%	6.67688%
Proportion of deaths	**32**	2.21%	8.16%	5.1019%	1.59180%
Average monthly income	**32**	8882	18270	12737.91	2342.480
Total	**32**				

Source: Direct. Coronavirus Resource Center, 2022 and data.org.

Table 2. ***States with the greatest number of deaths***

Entity	Confirmed cases	Deaths	Total population	Proportion of confirmed cases	Proportion of deaths	Average monthly salary
Michoacán	**109,972**	**8,974**	**4748846**	**2.32%**	**8.16%**	**$12,260**
Puebla	**208,484**	**16,661**	**6583278**	**3.17%**	**7.99%**	**$11,331**
Veracruz	**224,515**	**17,037**	**8062579**	**2.78%**	**7.59%**	**$10,604**
Baja California	**165,550**	**12,423**	**3769020**	**4.39%**	**7.50%**	**$16,213**
State of Hidalgo	**120,440**	**8,550**	**6166934**	**1.95%**	**7.10%**	**$12,299**

Source: Direct. Coronavirus Resource Center, 2022 and data.org.

Of the 32 states of the Mexican Republic, the minimum number of confirmed cases is 42959 and the maximum 1747014 with a mean of 222265.75 with a standard deviation of 306126.170.

A high proportion of deaths is observed in the states of Michoacán, Puebla, Veracruz, Baja California and the State of Hidalgo, even though the proportions of confirmed cases are not as high as in other states and the average salary is not among the lowest in the country. In this sense, the state of Baja California is also among the five states with the highest average monthly salary. Likewise, the state of Hidalgo, which is among the five with the lowest proportion of confirmed cases, shows a high mortality rate.

Table 3. States with lower number of deaths

Entity	Confirmed cases	Deaths	Total population	Proportion of confirmed cases	Proportion of deaths	Average monthly salary
Baja California Sur	124,998	2,767	798447	15.66%	2.21%	$17,469
Mexico City	1,747,014	43,606	5543828	31.51%	2.50%	$18,270
Tabasco	213,457	6,129	2402598	8.88%	2.87%	$10,964
San Luis Potosi	241,296	7,609	2822255	8.55%	3.15%	$14,072
Colima	67,375	2,242	9209944	0.73%	3.33%	$13,336

Source: Direct. Coronavirus Resource Center, 2022 and data.org.

It can be observed in states that are among the five with the highest average monthly salaries, such as Mexico City and Baja California Sur, in both cases there is a high proportion of confirmed cases, however, in both cases the proportion of deaths is the last and penultimate in the list. It is also noteworthy that in the state of Colima there is a disparity between the low proportion of confirmed cases and the number of deaths, which, although low, may indicate other circumstances not studied here, such as the comorbidities of the infected population or the deficiencies of the health system.

Table 4. ***Entities with the highest monthly income***

State	Confirmed cases	Deaths	Total population	Proportion of confirmed cases	Proportion of deaths	Average monthly income
Mexico City	1,747,014	43,606	5543828	31.51%	2.5%	$18,270
Baja California Sur	124,998	2,767	798447	15.66%	2.21%	$17,469
Nuevo León	401,777	15,361	5784442	6.95%	3.82%	$17,267
Baja California	165,550	12,423	3769020	4.39%	7.50%	$16,213
Querétaro	177,320	6,343	2368467	7.49%	3.58%	$15,932

Source: Direct. Coronavirus: Resource Center, 2022 and data.org.

Mexico City, despite having a high proportion of infectious diseases, has a lower mortality rate, which is associated with a higher monthly income.

Table 5. ***Entities with the highest monthly income***

State	Confirmed cases	Deaths	Total population	Proportion of confirmed cases	Proportion of deaths	Average monthly income
Morelos	91,574	5,341	1971520	4.64%	5.83%	$10,475
Chiapas	52,644	2,434	3146771	1.67%	4.62%	$10,162
Oaxaca	149,835	6,344	4132148	3.63%	4.23%	$10,171
Tlaxcala	56,518	3,123	1342977	4.21%	5.53%	$9,548
Guanajuato	351,757	15,102	3082841	11.41%	4.29%	$8,882

Source: Direct. Coronavirus: Resource Center, 2022 and data.org.

It is observed that states with a lower income have a higher percentage as opposed to those with a higher income.

Table 6. ***Entities with the highest proportion of confirmed COVID-19 case***

Federal State	Confirmed cases	Number of deaths	Total population	**Proportion of confirmed cases**	Proportion of deaths	**Average monthly income**
Mexico City	**1.747.014**	**43.606**	**5543828**	**31,51%**	**2,50%**	**$18.270**
State of Mexico	**703.565**	**47.919**	**3540685**	**19,87%**	**6,81%**	**$12.494**
Chihuahua	**165.514**	**10.145**	**731391**	**22,63%**	**6,13%**	**$15.245**
Baja California Sur	**124.998**	**2.767**	**798447**	**15,66%**	**2,21%**	**$17.469**
Guanajuato	**351.757**	**15.102**	**3082841**	**11,41%**	**4,29%**	**$8.882**

Source: Direct. Coronavirus Resource Center, 2022 and data.org.

The states with the highest number of confirmed cases are Mexico City, State of Mexico, Chihuahua, Baja California and Guanajuato.

Table 7. ***Entities with lower proportion of COVID-19 confirmed cases.***

Federal State	**Confirmed cases**	**Number of deaths**	**Total population**	**Proportion of confirmed cases**	***Proportion of deaths***	***average monthly income***
Colima	**67.375**	**2.242**	**9209944**	**0,73%**	**3,33%**	**$13.336**
Guerrero	**116.023**	**6.847**	**8348151**	**1,39%**	**5,90%**	**$11.118**
Chiapas	**52.644**	**2.434**	**3146771**	**1,67%**	**4,62%**	**$10.162**
Jalisco	**284.788**	**19.989**	**16992418**	**1,68%**	**7,02%**	**$12.618**
Estado de Hidalgo	**120.440**	**8.550**	**6166934**	**1,95%**	**7,10%**	**$12.299**

Source: Direct. Coronavirus Resource Center, 2022 and data.org.

A lower proportion of confirmed cases is observed in the states of Colima, Guerrero, Chiapas, Jalisco and the State of Hidalgo.

Discussion

Although the countries that presented the greatest number of confirmed cases and had a negative impact by increasing mortality rates due to COVID-19 correspond to countries with greater vulnerability, it should be noted that one limitation was the lack of knowledge of this disease for its treatment by health personnel and also where the level of marginalization becomes an important predictor associated with COVID-19, In Mexico, the analysis carried out shows a greater impact in vulnerable socioeconomic environments, it is important to pay attention to ethnic groups, in populations or communities where the level of marginalization is decisive for the increase of confirmed cases and cases that unfortunately died. (Coronavirus: Resource Center, 2022).

Another aspect to consider is the impact caused by COVID-19 by age groups (Pontigo et al.,2020), this does not reside only in the type of variant of the virus, it is accessory the socioeconomic status, poverty that even increases priority public health problems such as diabetes, hypertension, obesity among other comorbidities. (Morales and Ruvalcaba, 2018; Salinas et al., 2021).

One of the determinants of health that since Lande, 1974 (Salvatierra et al., 2019; De La Guardia and Ruvalcaba, 2020) announced it as a determinant of health refers to lifestyles, once again it becomes clear that this represents an area of opportunity to influence from public health, in our country the culture of prevention is not observed in the field of everyday life, much more is invested in terms of health systems or health care, which imprints greater cost in health care, lack of activating primary health care (Ruvalcaba et al., 2020) and integrating the health system (Ortiz et al., 2020).) and integrate the health system (Ortiz et al., 2010; Apolonio et al.,2015) and not continue changing names to already established programs or with the assumption of generating new mini health systems, since in our country the health system since its origins in a fragmented, inequitable and inaccessible system.(Ruvalcaba and Cortés., 2012).

Inequality in monthly income in each state reflects a greater impact on COVID-19 case fatality in those with lower incomes.

The macroeconomic situation and the poverty that prevails in most of the states of the Mexican Republic are worrisome due to the characteristics and conditions of the health systems.

There is an inequitable strategy in the performance of diagnostic tests: the greater the poverty of the municipalities, the fewer tests are performed and the lower the infection rates, so that in poor municipalities the underreporting of positive cases and deaths can be considerable. Despite the fact that in urban areas the concentration of population implies a greater risk of

infection with COVID-19, in cities there is a better health care infrastructure and accessibility to medical institutions for those who contract the disease (Hernández Bringas, H., 2021).
42% of Mexico's population is below the poverty line, and 9 million are extremely poor (CONEVAL, 2020).

Conclusions

Economic disparities and municipal marginalization are predictors of severe forms of COVID-19, an association independent of other predictors such as age and cardio-metabolic comorbidities.

Social determinants affect the health of the population; therefore, socioeconomic disparities and the level of marginalization are predictors of a greater impact on health, to the extent that they are manifested in a greater number of confirmed cases and deaths.

Investing more in lifestyles, in the culture of prevention and even at the educational level is today an emerging area of opportunity for the generation of people with better health and positive response to shocks such as the covid-19 pandemic and even those that will undoubtedly continue to appear.

References:

Bacon, S.L., et al. (2020). Representations of government action in the context of COVID-19. *Prospects in Psychology.*: https://repositorio.uca.edu.ar/handle/123456789/13417.

*Castañeda-Guillot, C., Castro-Sánchez, F. J., & Verano-Gómez, N. C. (2021). Pandemic Covid-19: impact and health and social challenges. *University and Society Journal*, 13(S3): 8-17. https://rus.ucf.edu.cu/index.php/rus/article/view/2443/2400

ECLAC (2020). Economic Commission for Latin America and the Caribbean Dimensioning the effects of COVID-19 to think about reactivation. . Available at: https://repositorio.cepal.org/bitstream/handle/11362/45445/1/S2000286_es.pdf

Johns Hopkins University (2022). COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) . Retrieved from: https://github.com/CSSEGISandData/COVID-19

Fantin R, Brenes-Camacho G, Barboza-Solís C. (2021). COVID-19 deaths: age distribution and universality of medical coverage in 22 countries. Pan American Journal of Public Health. Retrieved at: https://iris.paho.org/bitstream/handle/10665.2/53770/v45e422021.pdf?sequence=1&i

Government of Mexico (October 10, 2022): What is SARS-CoV-2? https://coronavirus.gob.mx/covid-19/

Jimenez-Sotomayor, MR, Gomez-Moreno C., Soto-Perez-de-Celis E. (2020). Coronaviruses, ageism, and Twitter: an evaluation of tweets about older adults and COVID-19. *J Am Geriatr* Soc. http:// doi: 10.1111/jgs.16508.

Lopez-Valcarcel B. G. (2021). COVID-19 inequalities as a challenge for healthcare management [COVID-19 inequalities as a challenge for healthcare management]. *Journal of healthcare quality research*, *36*(4), 183-185. https://doi.org/10.1016/j.jhqr.2021.07.001sAllowed=y

OECD (2020). *Territorial impact of COVID-19: managing the crisis at all levels of government.* http://www.oecd.org/coronavirus/policy-responses/impacto-territorial-de-la-covid-19-gestionar-la-crisisen-todos-los-niveles-de-gobierno-7d27f7d9/ [Links]

Ortiz-Hernández L, Pérez-Sastré MA (2020). Social inequities in the progression of COVID-19 in Mexican population. *Rev Panam Salud Publica*. 44-106. https://doi.org/10.26633/RPSP.2020.106

Ortiz-Hernández L, Pérez-Salgado D, Tamez-González S. (2015). Socioeconomic inequality and health in Mexico. *Rev Med Inst Mex Seguro Soc*. 53(3):336-47.

Palaniappan A, Dave U and Gosine B.(2020). Comparing South Korea and Italy's healthcare systems and initiatives to combat COVID-19. Rev Panam Salud Publica. 44-53. https://doi.org/10.26633/RPSP.2020.53

Pérez-Sastré, Miguel A., Valdés, Jesús, & Ortiz-Hernández, Luis (2020). Clinical characteristics and severity of COVID-19 in Mexican adults. *Gaceta médica de México*, 156(5): 379-387 .https://doi.org/10.24875/gmm.20000430

Suarez, V., et al. (2020). Epidemiology of COVID-19 in Mexico: from February 27 to April 30, 2020. *Revista Clínica Española*, 463-471.

Trias-Llimós S, Blanes A, Franco M, Bilal U, Riffe T. (2021). Decline in life expectancy after the COVID-19 pandemic in Spanish provinces. *MedRxiv* .https://doi.org/10.1101/2021.04.15.21255545

Umakanthan, S., Sahu, P., Ranade, A. V., Bukelo, M. M., Rao, J. S., Abrahao-Machado, L. F., Dahal, S., Kumar, H., & Kv, D. (2020). Origin, transmission, diagnosis and management of coronavirus disease 2019 (COVID-19). *Postgraduate medical journal*, *96*(1142), 753-758. https://doi.org/10.1136/postgradmedj-2020-138234.

Wilder A, Freedman D (2020) Isolation, quarantine, social distancing, and community containment: key role of traditional public health measures in the outbreak of novel coronavirus (2019-nCoV). *J Travel Med*. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7107565/pdf/taaa020.pdf

Ortíz Domínguez M., Bañuelos Téllez F., Santana Mondragón R., Villareal Levy G., Garrido Latorre F., González Retiz M. (2010). Mexico: Towards the integration of the National Health System. Mexico: Subsecretaría de Integración y Desarrollo del Sector Salud; 2010.

Ruvalcaba Ledezma JC, Cortés Ascencio SY (2012). The Mexican health care system. Odous Científica. 13 (1):34-42

Apolonio Contreras, J, Arroyo Ramírez, M, Balderrama Diaz, R, Gómez Benumea, R, González Espíndola, J, Hernández Badillo, E, Jiménez Oropeza, S, Mayorga Contreras, B, & Ruvalcaba Ledezma, J.C (2015). Mexican National Health System. *Educación Y Salud Boletín Científico Instituto De Ciencias De La Salud Universidad Autónoma Del Estado De Hidalgo*, *3*(6). https://doi.org/10.29057/icsa.v3i6.819

Ruvalcaba Ledezma JC, Beltrán Rodríguez MG, Benítez Medina A, Santiago Manzano D, García Mendoza F, Toribio Jiménez J, Reynoso Vázquez J, Peña Cisneros EM (2020). A reflection on Primary Health Care and the SARS pandemic COVID-2; COVID-19 in Mexico in the face of communication confusion. JONNPR. 5(6):631-43.
DOI:10.19230/jonnpr.3710

Vega Rivero JA, Ruvalcaba Ledezma JC , Hernández Pacheco I, Acuña Gurrola MR, López Pontigo L. (2020). The Health of Older Adults during the COVID-19 Pandemic. JONNPR. 5(7):726-39.
DOI:10.19230/jonnpr.3772

De La Guardia Gutiérrez MA, Ruvalcaba Ledezma JC (2020). Health and its determinants, health promotion and health education. JONNPR. 5(1):81-90.
DOI: 10.19230/jonnpr.3215

Salvatierra Martínez AM, Lozano Cruz M, Hernández López NA, Ramírez Trejo LM, Olvera Garrido M, Cebrián Vargas CE, Maldonado Mendoza LJ, Mendieta Ramírez V, Cruz Olvera J, Ruvalcaba Ledezma JC (2019). The transcendence of social determinants of health "A comparative analysis between models". JONNPR. 4(11):1051-63.
DOI:10.19230/jonnpr.3065

Morales García LI, Ruvalcaba Ledezma JC. (2018) Obesity, a real and persistent public health problem in Mexico. *JONNPR. 3(8):643-654*.
DOI: 10.19230/jonnpr.2544

Salinas Aguirre JE, Sánchez García C, Rodríguez Sánchez R, Rodríguez Muños L, Diaz Castaño A, Bernal Gómez R. (2021). Clinical characteristics and comorbidities associated with mortality in patients with COVID19 in Coahuila Mexico. ELSERVIER. 2022:288-292.
DOI: 10.1016/j.rce.2021.01.010

Maguiña Vargas C, Gastelo Acosta R, Tequen Bernilla A. (2022). The new Coronavirus and the Covid-19 pandemic. Revista Medica Herediana [Internet]. [citado 23nov.2022];31(2):125-31. Available from: https://revistas.upch.edu.pe/index.php/RMH/article/view/3776

CONEVAL (2020), "Medición de la pobreza" [online] https://www.coneval.org.mx/Medicion/Paginas/ PobrezaInicio.aspx.

Hernández Bringas, H. (2021). COVID-19 in Mexico: a sociodemographic profile. Notas de Población.