

Factors Affecting the Health of Ethnic Minorities in China: Enhancing their Ability to Counter COVID-19



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ABSTRACT: Coronavirus disease 2019 is a serious public health emergency, and the virus is still mutating and has not yet ended. The global impact of the COVID-19 pandemic is not only limited to the economy, but also includes many other areas, including the lives and health of individuals.

The purpose of this study was to investigate the impact of the COVID-19 pandemic on the health of ethnic minorities in China. Due to the lack of relevant literature examining the impact of the COVID-19 pandemic on the health of ethnic minorities in China, this paper attempts to analyse the common factors associated with the increase in the rate of infection and the increase in the mortality rate of ethnic minorities in other countries during the pandemic, including healthcare resources, by using a qualitative analysis approach and by reviewing a large amount of literature and data from questionnaires that have impacted on the health of aboriginal populations during the neo-new crown epidemics in other countries, health facilities, income levels and government policies to waive treatment costs, etc., in order to gain insight into the correlation between these factors and the health status of ethnic minorities and their impact on the epidemic, in order to summarise the common factors affecting the health of ethnic minorities in China during the New Crown epidemic.

The study found that most indigenous peoples in other countries suffer from a lack of medical resources due to their remote location, a lack of healthy water sources and sanitation facilities that makes them more susceptible to infection with the New Coronary Virus, as well as a combination of poor income levels and unhealthy diets that lead to kidney disease and hypertension that add to the mortality rate of the New Coronary condition, and even in a small number of cases, serious mental health problems. And China's ethnic minorities also have similar social and economic marginalisation and similar living conditions as minorities in other countries. In order to better address this problem, it is recommended that the Government increase investment in medical resources for ethnic minorities, raise income levels, improve living environments and dietary structures, reduce the probability of kidney disease and hypertension complications by subsidising regular medical check-ups for ethnic minorities in China, and help ethnic minorities in China to improve their resistance to the new coronary epidemic, which will be important for improving the health of ethnic minorities in China.

KEYWORDS: COVID-19, health, ethnic minorities in China, economic marginalisation, kidney disease, healthcare resources, mortality rate

1.0 INTRODUCTION

The new coronavirus is mainly transmitted between people through respiratory droplets and is highly contagious. The incubation period is about 5.2 days, after which patients usually develop symptoms such as fever, cough and shortness of breath (Li Q et al., 2020). "COVID-19 does not discriminate" was a common phrase in the early days of the epidemic. Coronavirus reports classified about 95% of the 315,000 deaths by race. They reported that the COVID-19 pneumonia mortality rate for blacks, Aboriginal, Pacific Islanders and Latinos is more than 2.7 times higher than that of whites. Blacks and Aboriginal communities were hit the hardest, with COVID-19 pneumonia causing nearly 1 death in every 800 blacks or indigenous people (Li Q et al., 2020). These data reveal racial/ethnic health inequities (Pirtle, 2020; Williams and Cooper, 2020). However, it was soon discovered that indigenous communities across North America suffered higher COVID-19 pneumonia infection rates, hospitalization rates and mortality rates than other populations. (Makam, F., Smith, D., & Morphy, F. 2021).

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Ibarra-Nava et al. found that indigenous people in Mexico were at higher risk of death during the COVID-19 pandemic. This indicates that there are significant differences in access to health care and health resources for indigenous people in Mexico, and that there is a high degree of health inequality among indigenous people in Mexico. The COVID-19 pandemic has had a disproportionate impact on the black community in Michigan, USA. Among 6,065 COVID-19 pneumonia-related deaths in Michigan, the death rate for black people was found to be 3 times higher than that for white people. 6 times ($p(0.001)$). It was also found that black people have a higher prevalence of chronic diseases such as asthma, diabetes, and nephropathy, and these diseases make the situation of black people infected with COVID-19 more severe (Alyssa S et al., 2020). This indicates that racial discrimination exacerbated health inequalities during the epidemic. Yashadhana et al. found that indigenous Australians face a higher risk of COVID-19 pneumonia explosion, mainly due to long-term unhealthy diet, poor living conditions, and socioeconomic inequalities. They called on the Australian government to increase medical resource support for indigenous communities, improve housing conditions, and reduce the impact of racial health inequalities. A study on the multi-ethnic country of Malaysia showed that the impact of COVID-19 pneumonia on vulnerable groups is particularly severe, including the elderly, people with nephropathy, people with diabetes, and Chinese groups. (Table 8) shows that the total mortality rate for Malaysia as a whole is 1.3%. The mortality rate of Chinese people in Malaysia is even higher (Goh BL et al., 2020). Therefore, in a study of a group of patients with COVID-19 pneumonia in South Korea, (Kim, So Young et al., 2020) found that low income levels are closely related to the risk of COVID-19 pneumonia infection, and economic inequality has a significant impact on the increased infection and mortality rates of patients with COVID-19 pneumonia, but government exemptions from medical fees significantly reduce this risk. 3 According to this study, elderly people and diabetic patients in China are at higher risk of COVID-19 pneumonia infection than Chinese people.

Until now, the relevant literature has only studied the impact of the COVID-19 pandemic on indigenous peoples in other countries and has conducted large general studies on the Chinese population, but not on the impact of the epidemic on specific groups of ethnic minorities in China. As a special group of society, China's ethnic minorities have had their health status tested in many aspects during the COVID-19 pandemic. Using qualitative analysis methods, this text attempts to analyse a large amount of literature and questionnaire data on the health impact of the indigenous people during the COVID-19 epidemic in other countries, with the aim of investigating the impact of the COVID-19 epidemic on the health of ethnic minorities in China. Investigate and analyse the general factors associated with the increased COVID-19 infection and mortality rates among ethnic minorities in other countries during the epidemic, e.g. government policies on medical resources, medical facilities, income levels and exemption from treatment costs, to better understand the relationship between these factors and ethnic minority relations health status and the impact of the epidemic, Use this information to summary the general elements of the impact of the new coronavirus epidemic on the health of ethnic minorities in China.

Most indigenous peoples in other countries suffer from kidney disease and hypertension. Their remote location, lack of medical resources and lack of healthy water sources and sanitation facilities make them more susceptible to the disease COVID-19, which can exacerbate COVID-19 mortality rates and cause serious mental health problems in a smaller number. Ethnic minorities in China are socially and economically remote and their living conditions are similar to those of minorities in other countries. To better address this problem, China Government has increased its investment in minority health care resources, increased their income levels, improved their living environment and menu components, conducted regular health check-ups, reduced the incidence of nephropathy and hypertension complications, and improved the ability of Chinese minorities to protect the country from the new coronavirus epidemic Helped.

2.0 LITERATURE REVIEW

The coronavirus (COVID-19) epidemic poses a serious health threat to indigenous people all over the world. Indigenous communities are facing the problems of lack of health care services, a significant increase in the incidence of infectious and non-communicable diseases, and a lack of basic services, sanitation facilities and other key preventive measures (such as clean water, soap, disinfectants, etc.) (UN. 2021). Similarly, most local medical institutions nearby are often under-equipped and understaffed. This epidemic has seriously affected indigenous people, and at the same time, it has highlighted the social and economic marginalization of indigenous people, which has aggravated the impact on them compared with the general population.

The evidence published in the pandemic documented in the past proves that compared with other groups, ethnic minorities are particularly affected and their health status is worse. Poor health may be due to limited access to medical care, poor living conditions

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and educational and language barriers when taking preventive measures (Abuelgasim E et al.,2020). Moreover, the proportion of ethnic minorities injected with COVID-19 vaccine is lower than that of non-ethnic minorities. The disproportionate influence of Covid-19 on ethnic minorities may be due to the BCG vaccination policy and immune effect in the country where it was born. Because of the nonspecific immunity of COVID-19, the incidence and mortality of COVID-19 in countries that adopt COVID-19 vaccination policy are lower (Miller A et al.,2020). The study found that the mortality rate of COVID-19 was 16.39/ million compared with that of middle-and high-income countries with the same income but no vaccine policy in COVID-19 (0.78/ million). In addition, among the countries with universal COVID-19 vaccine policy, those countries with more mature policies have lower mortality (Miller A et al.,2020).

Compared with whites, black, Asian and ethnic minority (BAME) communities are more likely to suffer from cardiovascular diseases (CVD) such as hypertension and diabetes, and are affected by adverse medical care differences. Many studies have confirmed that the most common complications associated with severe cases of COVID-19 are hypertension, diabetes and cardiovascular disease (CVD)(Wu C et al.,2020).

There is a lack of literature on COVID-19 in China minority groups. The epidemic also poses a serious health threat to them. However, the ethnic minorities in China and other countries have similar social and economic marginalization and similar living environment. China Minority in China refers to the ethnic groups other than the main ethnic groups in a multi-ethnic country. In People's Republic of China (PRC), except the Han nationality, the other 55 legal ethnic groups are all ethnic minorities (Uradyn E. Bulag.,2024). According to the results of the seventh national census in China, as of 0: 00 on November 1, 2020, the population of ethnic minorities was 125,467,390, accounting for 8.89%. Compared with the sixth national census in 2010, the population of ethnic minorities increased by 11,675,179, an increase of 10.26% (The Central People's Government of the People's Republic of China, www.gov.cn, 2020).

China is a country with many religions, including Buddhism, Taoism, Islam, Catholicism and Protestantism. Most ethnic minorities in China have religious beliefs, and some ethnic groups believe in a certain religion on a mass basis. Most ethnic minorities who believe in the same religion will gather in the same ethnic autonomous region, which is convenient for protecting their national culture and making them live in a more comfortable environment. Although the proportion of ethnic minorities in the total population of China is less than 10%, they are widely distributed, and the area of ethnic minority autonomous areas accounts for more than 60% of the whole country. Due to China's history and geography, the population density gap between ethnic minority areas and inland coastal Han areas is wide. For example, the population density of Xizang Autonomous Region where ethnic minorities live in compact communities is only 1.8 people per square kilometer.

Poverty and health inequality of ethnic minorities in China is a long-standing but still existing problem. According to the minimum income line published by the National Bureau of Statistics of China, nearly one-third of ethnic minorities in China experienced poverty in the three years of research. Nevertheless, so far, most poor people in rural areas of China belong to ethnic minorities. The poverty rate of rural minorities in China is relatively high, and the ethnic poverty difference can be largely attributed to regional differences. At the same time, the temporary and persistent poverty in rural areas of China has very obvious spatial characteristics. Poverty is mainly concentrated in the western region and villages with low average income. The determinants of persistent poverty and temporary poverty in rural areas of China vary according to geographical location and family characteristics (suggested citation: Gustafsson, BJRN; Sai, Ding .2008) 。 In terms of the impact of income inequality on health outcomes, since 1970s, a large number of documents have studied the negative impact of income inequality on population health. Uneven distribution of health care resources and poor health services have worsened the health status of poor and vulnerable ethnic groups in China. Relevant research shows that the probability of chronic diseases among ethnic minorities in China is higher than that of non-ethnic minorities (Wang, Y.J et al.,2020). These factors may have aggravated the impact of the epidemic on their health.

Because of their remote geographical location and single income level (Wang, Z., Zhong, M., & Liu, J. 2023), the ethnic minorities in China, a rural area in China, lack sufficient medical resources to cope with the occurrence of diseases, and this gap may vary among different ethnic groups. Compared with the majority of Han people, many ethnic minority areas in China lack clean water and food, which leads to a higher proportion of them suffering from kidney diseases, hypertension, diabetes and cardiovascular diseases than non-ethnic minority groups. Related studies show that kidney diseases and hypertension will increase the illness and mortality of patients. Income inequality caused by ethnic differences may also be the main reason why these ethnic minorities are

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more susceptible to COVID-19's disease.

Although the China government will provide free treatment services to ethnic minority patients, it is difficult to implement the policy in some remote areas, resulting in higher infection rate and mortality rate. By sorting out the related factors that affect the health of indigenous people during the COVID-19 epidemic in other countries, it is of great significance to improve the ability of ethnic minorities in China to resist the COVID-19 epidemic and improve the health status of ethnic minorities in China.

3.0 METHODOLOGY

This paper uses the list-category summary method of qualitative analysis, a systematic analytical approach, to collate and summarise the extensive literature on qualitative analysis. The steps involved in using the list-category-summary approach are outlined below.

(1) Identify research themes and objectives.

The impact of the New Crown Pneumonia epidemic on the health of ethnic minorities in China and related factors.

(2) Literature search and collection.

The main search was for literature related to how the New Crown epidemic in other countries has affected the health of individuals and indigenous peoples and the factors affecting it. It is recommended that the search be conducted using appropriate keywords and a defined timeframe. It is necessary to collect relevant papers.

(3) Reading and Screening.

Go through the title, abstract and conclusion sections of each paper to confirm relevance to the research topic. And exclude irrelevant literature.

(4) Categorise and summarise.

Categorise the papers according to the established categories and provide a summary of key findings, research methods and conclusions for each category.

4.0 RESULTS AND DISCUSSION

4.1 To analyze the mortality difference between Mexican indigenous people and non-indigenous people during the COVID-19 epidemic (Ibarra-Nava et al., 2021) .

Ibarra-Nava and others mainly conducted a cross-sectional study through the public data of the Mexican Ministry of Health to analyze the mortality difference between indigenous and non-indigenous people in Mexico during the COVID-19 epidemic. These data cover all the confirmed cases of COVID-19 in China. The study sample included 416,546 adult patients diagnosed from February 28th to August 3rd, 2020, among whom 4,178 were indigenous people. Table 1) shows that the COVID-19 mortality rate of indigenous people of any age is significantly higher than that of non-indigenous people (16.5% vs 11.1%), and the incidence of male patients is higher than that of female patients. Table 2 shows that the mortality rate of indigenous people is higher than that of non-indigenous people when they suffer from complications such as diabetes and hypertension. The main reason is that the quality of medical services received by indigenous people is low, and they are more likely to die in the absence of medical resources, so the quality of medical services for indigenous people should be improved.

4.2 Racial health differences in Britain, the United States and Brazil: the mortality rates of blacks, Hispanics, whites and other races during the COVID-19 epidemic (Abuelgasim E et al., 2020) .

Abuelgasim et al. conducted a systematic literature search on the relevant databases, and the time was chosen to report the prevalence, hospitalization and death of COVID-19 by ethnic group from January 1, 2020 to April 15, 2021. This paper divides the racial categories of Britain, the United States and Brazil into black, Hispanic, white and others for data comparison. DerSimonian and Laird methods are used to fit the random effect model, and the forest map of each racial category is given. It was found that blacks and Hispanics were most seriously affected by COVID-19, and their clinical results were worse than those of whites. Table 3 shows that the standardized hospitalization rate (SHR) of blacks has reached 1.87, and Table 4 shows that the standardized mortality rate (SMR) of blacks has reached 1.68, which is the highest among several people. Followed by Hispanic (SHR : 1.32, SMR : 0.94). There are also differences between countries in the hospitalization rate and mortality rate of COVID-19. (Table 5) shows that the average difference of hospitalization rate of COVID-19 between Brazil and Britain is 0.67(0.24, 1.09; $P < 0.001$), the average difference of mortality rate of COVID-19 was 0.27(95% CI=0.01,0.53; $P=0.04$), which proves that the hospitalization rate

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and mortality rate of black people in Britain are higher than those in Brazil. Racial differences in hospitalization rates and mortality rates can be attributed to several reasons. Blacks, Hispanics and other ethnic groups may face higher socio-economic disadvantages. Ethnic minorities in urban environments often live in more crowded environments and are more likely to engage in public-oriented occupations (such as services and transportation), so it is almost impossible to keep social distance, thus increasing their risk of being infected with COVID-19. And the systematic policies of racism, discrimination and racial repression in western countries make ethnic minorities more disadvantaged.

4.3 To analyze the racial differences in mortality of COVID-19 in Michigan, USA (Parpia et al.,2021).

The COVID-19 epidemic has had a disproportionate impact on the black population in the United States (Parpia et al.,2021). Although previous studies have shown that demography and health status are the main driving factors, this study is a cross-sectional study, and all COVID-19-related deaths are analyzed based on Michigan's death certificate and COVID-19 monitoring system data. Covers all deaths of COVID-19 from March 16th to October 26th, 2020. Among the 6065 COVID-19 related deaths in Michigan, the mortality rate of black individuals was 3.6 times that of white individuals ($p < 0.001$). (Figure 1) shows that the mortality rate of black individuals under the age of 65 without comorbidity is 12.6 times that of white individuals ($p < 0.001$). The study also found that the prevalence of chronic diseases, such as asthma, diabetes and chronic kidney disease, was higher among black people, while the prevalence of cardiovascular disease, cancer and chronic lung disease was higher among white people. Although the age, sex and burden of comorbidity were controlled, the mortality rate of black population during COVID-19 epidemic was still significantly higher than that of white population. It is suggested that policy measures should be taken to reduce this health difference, including improving medical services and socio-economic conditions in black communities.

4.4 An analysis of the health inequality among Australian aborigines (Yashadahanae et al, .2020).

This paper investigates the high-risk factors of Australian aborigines in COVID-19 epidemic through the public data of Australian College of Public Health and Community Medicine, School of Social Sciences and Medical Education Office (including the prevalence rate of chronic diseases, smoking rate and housing conditions of aborigines and non-aborigines, etc.), and analyzes the health and socio-economic inequalities that lead to this phenomenon. (Table 6) shows that the existing health and socio-economic inequalities (including high incidence of chronic diseases, poor living conditions and accessibility of medical services) among Australian aborigines have led to higher mortality and disease severity in the COVID-19 epidemic. At the same time, Australian aborigines live in remote areas, far from hospitals, food insecurity, lack of healthy water resources and reliable sanitation facilities. These factors make them more susceptible to the virus and increase the mortality rate in the epidemic. And the epidemic may lead to great mental health problems of indigenous people and increase their suicide rate. Call for measures to be taken for indigenous people in Australia, including increasing medical resources support for indigenous communities, improving housing conditions and reducing the impact of racism. And through psychological counseling to reduce the adverse impact of the epidemic on mental health.

4.5 Influence of income level of Korean patients on infection risk, morbidity and mortality in COVID-19 (Kim, So Young et al.,2020).

In this paper, 7943 COVID-19 patients and 118,914 negative PCR test participants diagnosed from January 1, 2020 to June 4, 2020 were taken as samples to conduct a cross-sectional study to explore the influence of income level of Korean patients on infection risk, morbidity and mortality in COVID-19. It is found that the risk of COVID-19 infection among low-income people in South Korea is significantly higher than that among middle-and high-income people.

The results show that the income level of Korean people is negatively correlated with the infection rate of COVID-19 (Table 7). Compared with the low-income group, the COVID-19 infection rate of middle-and high-income people is lower than that of low-income people (OR(aOR)=0.78, 95%CI=0.74-0.83, middle-income $p < 0.001$, and high-income group AOR = 0.79,95). COVID-19's death rate of middle and high income people is 0.43 times lower than that of low income people. Since the Korean government exempted COVID-19 patients from medical expenses after the outbreak of the epidemic, the later income level had no significant impact on the severity of the disease and mortality. This shows that the impact of economic inequality on health outcomes can be alleviated to a certain extent when medical resources are sufficient. We can reduce the risk of COVID-19 infection among poor people by ensuring adequate medical resources, so as to deal with the problem of health inequality.

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4.6 mortality rate of infected patients of different races in Malaysia (Goh BL et al.,2020).

In this paper, the data of patients (6078 patients) from different ethnic groups in Malaysia were collected for observational study to explore the mortality rate of COVID-19's disease among different ethnic groups and the influence of kidney disease on mortality rate. It is found that COVID-19 has a particularly serious impact on vulnerable groups, including the elderly, patients with kidney disease, diabetics and Chinese ethnic groups. (Table 8) indicates that the overall average mortality rate in Malaysia is 1.3%. The mortality rate of Chinese patients in Malaysia is higher (Malaysian Chinese 3.7%, Malays 1.3%, Indians 1.4%, and other races 0.7%). This situation may be caused by the existence of complications such as older age and kidney disease. The research results emphasize the importance of detection and treatment of renal diseases.

5.0 CONCLUSION

To sum up the above, ethnic differences and health inequalities have emerged in Covid-19 for ethnic minorities in different countries, including the lack of medical resources and health facilities, chronic diseases caused by low income level, health risks caused by social and economic marginalization and a significant increase in mental health problems. However, the relevant literature shows that ethnic minorities in China also have the same racial differentiation and health inequality. Because of the remote geographical location and insufficient medical resources and health facilities, residents in some ethnic areas in China are more susceptible to Covid-19 infection and face higher mortality. Due to the low income level, their diet structure and health status are generally lower than those of non-China ethnic minorities, and they suffer from chronic diseases, such as kidney disease and hypertension, which will be aggravated by post-infection conditions. Social and economic marginalization makes China ethnic minorities face higher health risks during the epidemic, resulting in higher infection rate and mortality.

In order to improve the ability of ethnic minorities to resist the COVID-19 epidemic, it is suggested that the China government should increase the investment in medical resources of ethnic minorities in China, establish more hospitals and health stations in ethnic minority areas in China, and update and upgrade the existing medical equipment. Set up a mobile medical team to introduce more professional medical experts to provide short-term medical services in remote areas, and at the same time improve the professional level and skills of medical staff in minority areas through these services. Regularly carry out publicity activities on the prevention of COVID-19 epidemic, popularize health knowledge and disease prevention measures, enhance the health awareness and self-protection ability of ethnic minorities in China, and ensure that ethnic minority areas can resist the impact of COVID-19 epidemic.

Improve the living environment and sanitary conditions in China minority areas, such as drinking water supply, sewage treatment and garbage disposal systems, and reduce the occurrence and spread of infectious diseases. Strengthen the construction of infrastructure such as roads, food supply and communication networks in China minority areas. We will carry out the renovation of old houses and the construction of new houses, and provide housing subsidies to help ethnic minorities in China obtain comfortable housing and clean living environment, so as to reduce the risk of ethnic minorities in China being infected with Covid-19.

To improve the income level of ethnic minorities in China, we can develop industries with local characteristics through some special policies, such as attracting enterprises to invest in ethnic minority areas, promoting ethnic minority areas to become tourist attractions, encouraging small families to engage in traditional handicrafts, and popularizing advanced planting techniques. At the same time, improve the education level in China minority areas and provide more educational resources and opportunities. Encourage ethnic minorities in China to go out to work to increase family income and provide more employment opportunities for ethnic areas. Through these measures, the poverty vulnerability of ethnic minorities in China will be reduced, and the impact of the epidemic on them will be reduced.

To help ethnic minorities in China have regular physical examinations to reduce the incidence of complications of kidney disease and hypertension, the China government can give additional medical subsidies to ethnic minorities, promote medical insurance in ethnic minority areas to ensure their health, and reduce the incidence of diseases such as kidney disease and hypertension. Prevent the condition of patients who will be re-crowned with these diseases.

To help ethnic minorities in China improve their ability to resist the COVID-19 epidemic, and to improve the health status of ethnic minorities in China.

REFERENCES

- 1) Goh BL, Shanmuganathan M, Peariasamy K, Misnan NA, Chidambaram SK, Wong EFS, Pathmanathan MD, Ang KL, Wong HS, Yeap LLL (2022). COVID-19 death and kidney disease in a multiracial Asian country. *Nephrology (Carlton)*. Jul;27(7):566-576. doi: 10.1111/nep.14045. Epub 2022 May 7. PMID: 35438223; PMCID: PMC9115296.
- 2) Kim, So Young, Dae Myoung Yoo, Chanyang Min, and Hyo Geun Choi (2021). "The Effects of Income Level on Susceptibility to COVID-19 and COVID-19 Morbidity/Mortality: A Nationwide Cohort Study in South Korea" *Journal of Clinical Medicine* 10, no. 20: 4733. <https://doi.org/10.3390/jcm10204733>.
- 3) Miller A., Reandelar M., Fasciglione K., Roumenova V., Li Y., Otazu G (2020). Correlation between universal BCG vaccination policy and reduced morbidity and mortality for COVID-19: An epidemiological study. *MedRxiv*.
- 4) UN. (2021). The Impact of COVID-19 on Indigenous Peoples. United Nations Department of Economic and Social Affairs.
- 5) Li Q, Guan X, Wu P, et al (2020). Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med*.382(13):1199-1207.
- 6) Abuelgasim E, Saw LJ, Shirke M, Zeinah M, Harky A (2020). COVID-19: Unique public health issues facing Black, Asian and minority ethnic communities. *Curr Probl Cardiol*. 2020 Aug;45(8):100621. Epub 2020 May 8. PMID: 32448759; PMCID: PMC7207142. doi: 10.1016/j.cpcardiol.2020.100621.
- 7) Wu C., Chen X., Cai Y., J., Zhou X., Xu S (2020). Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in wuhan, china. *JAMA Intern Med*. 2020 Mar 13.
- 8) Yashadhana, A., Pollard-Wharton, N., Zwi, A. B., & Biles, B(2020). Indigenous Australians at increased risk of COVID-19 due to existing health and socioeconomic inequities. *The Lancet Regional Health -WesternPacific*, 1,100007. <https://doi.org/10.1016/j.lanwpc.2020.100007>.
- 9) Parpia, A. S., Martinez, I., El-Sayed, A. M., Wells, C. R., Myers, L., Duncan, J., Collins, J., Fitzpatrick, M. C., Galvani, A. P., & Pandey, A (2021). Racial disparities in COVID-19 mortality across Michigan, United States. *EClinicalMedicine*, 33, 100761. <https://doi.org/10.1016/j.eclinm.2021.100761>
- 10) Mude W, Oguoma VM, Nyanhanda T, Mwanri L, Njue C (2021). Racial disparities in COVID-19 pandemic cases, hospitalisations, and deaths: A systematic review and meta-analysis. *J Glob Health*. 2021 Jun 26;11:05015. doi: 10.7189/jogh.11.05015.
- 11) Ibarra-Nava, I., Flores-Rodriguez, K. G., Ruiz-Herrera, V., Ochoa-Bayona, H. C., Salinas-Zertuche, A., Padilla-Orozco, M., & Salazar-Montalvo, R. G (2021). Ethnic disparities in COVID-19 mortality in Mexico: A cross-sectional study based on national data. *PLOS ONE*, 16(3), e0239168. <https://doi.org/10.1371/journal.pone.0239168>
- 12) Wang, Y.J., Chen, X.P., Chen, W.J. et al (2020). Ethnicity and health inequalities: an empirical study based on the 2010 China survey of social change (CSSC) in Western China. *BMC Public Health* 20, 637 (2020). <https://doi.org/10.1186/s12889-020-08579-8>.
- 13) UN (2021). UN/DESA Policy Brief #70: The Impact of COVID-19 on Indigenous Peoples. United Nations Department of Economic and Social Affairs.
- 14) Markham, F., Smith, D., & Morphy, F(2021). How Indigenous communities have battled COVID-19. *UBC Arts*.
- 15) Gone, J. P., & Hartmann, W. E(2021). Cultural Sources of Strength and Resilience: A Case Study of Holistic Wellness Boxes for COVID-19 Response in Indigenous Communities. *Frontiers in Public Health*, 9, 617120. <https://doi.org/10.3389/fpubh.2021.617120>
- 16) UN(2020). Indigenous Peoples and the COVID-19 pandemic: a Global Overview. UNESCO.
- 17) Crooks K, Casey D, Ward JS. First Nations people leading the way in COVID-19 pandemic planning, response and management. *Med J Aust*. 2020;213:151-152.
- 18) Robertson R, Mian M, Sreedharan S, Lau P (2021). The Impact of COVID-19 on First Nations People Health Assessments in Australia. *Asia Pacific Journal of Public Health*. 2021;33(5):595-597. doi:10.1177/10105395211011012.
- 19) Akhtar Allana (2020). Filipinos make up 4% of nurses in the US, but 31.5% of nurse deaths from COVID-19. *Business Insider*, 29 September. <https://www.businessinsider.com/filipinos-make-up-disproportionate-covid-19-nurse-deaths-2020-9>.

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- 20) APM Research Lab Staff (2020). The color of Coronavirus: COVID-19 deaths by race and ethnicity in the U.S. APM Research Lab. <https://www.apmresearchlab.org/covid/deaths-by-race>.
- 21) Suggested Citation: Gustafsson, Björn; Sai, Ding (2008). Temporary and persistent poverty among ethnic minorities and the majority in rural China, IZA Discussion Papers, No. 3791, Institute for the Study of Labor (IZA), Bonn. <https://nbnresolving.de/urn:nbn:de:101:1-20081126575>.
- 22) Uradyn E. Bulag (2024). The wheel of history and minorities' 'self-sacrifice' for the Chinese nation. Comparative Education 60:1, pages 96-117.
- 23) Liu, S(2023). Research on anti-poverty efforts in China's ethnic minority areas since the 1970s. Int. j. anthropol. ethnol. 7, 17 (2023). <https://doi.org/10.1186/s41257-023-00096-x>
- 24) Yin, X., Meng, Z., Yi, X. et al (2021). Are "Internet+" tactics the key to poverty alleviation in China's rural ethnic minority areas? Empirical evidence from Sichuan Province. Financ Innov 7, 30 (2021). <https://doi.org/10.1186/s40854-021-00236-2>
- 25) Xiang, Linglin, Xiang Deng, and Xiaosong Qu(2013). The spatiotemporal evolution of poverty in Southwest ethnic minority areas: An empirical analysis based on 110 poverty-stricken ethnic minority counties. Journal of Southwest Minzu University (humanities and Social Science) 2: 124–129.
- 26) Zhenyu Qi, Jinghu Pan, Yaya Feng (2024) . Spatial Identification and Distribution Pattern of the Complexity of Rural Poverty in China Using Multisource Spatial Data. Article ID 7012402, Volume 2024, Hindawi. <https://doi.org/10.1155/2024/7012402>

Appendix

Table 1. Sociodemographic characteristics and present comorbidities and risk factors among survivors and non-survivors of all COVID-19 patients, hospitalized patients and non-hospitalized patients (Ibarra-Nava et al., 2021)

	All COVID-19 patients (n = 416546)		Hospitalized patients (n = 113853)		Non-hospitalized patients (n = 302693)	
	Survivors n = 370038 (88.8%)	Non-survivors n = 46,508 (11.2%)	Survivors n = 72566 (63.7%)	Non-survivors n = 41287 (36.3%)	Survivors 297472 (98.3%)	Non-survivors 5221 (1.7%)
Age (years ± SD)	44.1 ± 14.7	61.9 ± 13.8	53.6 ± 15.0	62.0 ± 13.8	41.8 ± 13.6	61.0 ± 14.1
Gender						
Women (n = 195153)	178795 (91.6%)	16358 (8.4%)	29357 (66.8%)	14588 (33.2%)	149438 (98.8%)	1770 (1.2%)
Men (n = 221393)	191243 (86.4%)	30150 (13.6%)	43209 (61.8%)	26699 (38.2%)	148034 (97.7%)	3451 (2.3%)
Ethnic group						
Non-indigenous (n = 412368)	336551 (88.9%)	45817 (11.1%)	71559 (63.7%)	40692 (36.3%)	294992 (98.3%)	5125 (1.7%)
Indigenous (n = 4178)	3487 (83.5%)	691 (16.5%)	1007 (62.9%)	595 (37.1%)	2480 (96.3%)	96 (3.7%)
Sector						
Private (n = 11476)	10911 (95.1%)	565 (4.9%)	2579 (84.2%)	485 (15.8%)	8332 (99.0%)	80 (1.0%)
Public (n = 405070)	359127 (88.7%)	45943 (11.3%)	69987 (63.2%)	40802 (36.8%)	289140 (98.3%)	5141 (1.7%)
Comorbidities						
Diabetes (n = 68137)	50477 (74.1%)	17660 (25.9%)	20773 (56.8%)	15794 (43.2%)	29704 (94.1%)	1866 (5.9%)
COPD (n = 6633)	4394 (66.2%)	2239 (33.8%)	2067 (51.2%)	1972 (48.8%)	2327 (89.7%)	267 (10.3%)
High blood pressure (n = 84577)	64194 (75.9%)	20383 (24.1%)	22992 (55.8%)	18184 (44.2%)	41202 (94.9%)	2199 (5.1%)
Chronic kidney disease (n = 8444)	5264 (62.3%)	3180 (37.7%)	2730 (48.9%)	2852 (51.1%)	2534 (88.5%)	328 (11.5%)
Risk Factors						
Obesity (n = 79635)	68205 (85.6%)	11430 (14.4%)	16846 (62.7%)	10030 (37.3%)	51359 (97.3%)	1400 (2.7%)
Smoking (n = 30818)	27001 (87.6)	3817 (12.4%)	5449 (61.4%)	3426 (38.6%)	21552 (98.2%)	5221 (1.8%)

Table 2. Sociodemographic characteristics and present comorbidities and risk factors among all non-survivors by ethnicity (Ibarra-Nava et al., 2021)

	Indigenous n = 691	Non-Indigenous n = 45817
Age (years ± SD)	63.4 ± 13.0	61.9 ± 13.8
Age group		
18–39	28 (2.3%)	2724 (1.7%)
40–49	73 (8.8%)	5828 (6.2%)
50–59	153 (18.0%)	10705 (14.0%)
60–69	94 (13.6%)	12599 (26.4%)
70 or older	243 (39.6%)	13961 (39.2%)
Gender		
Female	230 (13.6%)	16128 (8.3%)
Male	461 (18.5%)	29689 (13.6%)
Sector		
Private	4 (12.1%)	561 (4.9%)
Public	687 (16.6%)	45256 (11.3%)
Comorbidities		
Diabetes	258 (28.7%)	17402 (25.9%)
COPD	47 (34.6%)	2192 (33.7%)
HBP	270 (29.6%)	20113 (24.0%)
CKD	40 (44.4%)	3140 (37.6%)

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Table 3. Standardized hospitalization rate (SHR) COVID-19 forest map by race, country, year and research design (Abuelgasim E et al.,2020) .

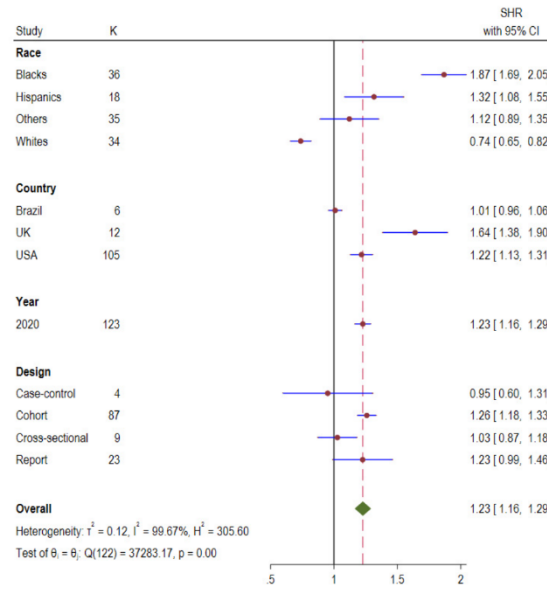
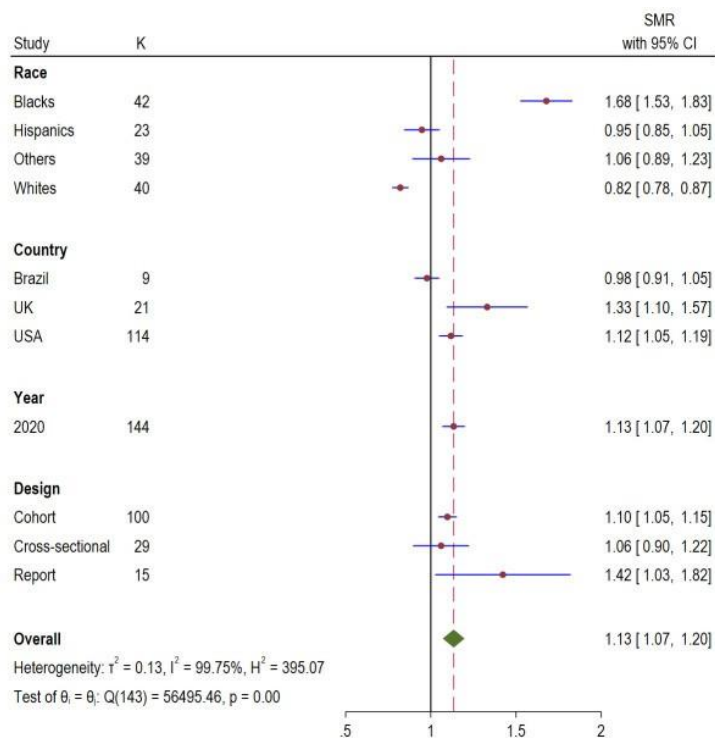


Table 4. Standardized Mortality Rate (SMR) COVID-19 Forest Map by Race, Country, Year and Research Design (Abuelgasim E et al.,2020).



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Table 5. Meta-regression of the average difference between hospitalization rate and mortality rate (Abuelgasim E et al.,2020).

Hospitalisation ratio				Mortality ratio			
Race	Black	Ref	.	Race	Black	Ref	.
	Hispanics	-0.49 (-0.73, -0.24)	<0.001		Hispanics	-0.65 (-0.83, -0.47)	<0.001
	Other	-0.77 (-0.97, -0.56)	<0.001		Other	-0.60 (-0.75, -0.44)	<0.001
	White	-1.11 (-1.31, -0.91)	<0.001		White	-0.82 (-0.97, -0.68)	0.00
Country	Brazil	Ref	.	Country	Brazil	Ref	.
	UK	0.67 (0.24, 1.09)	<0.001		UK	0.27 (0.01, 0.53)	0.039
	USA	0.11 (-0.26, 0.49)	0.558		USA	0.13 (-0.10, 0.35)	0.276
Design	Case-control	0.00 (0.00, 0.00)	.	Design	Cohort	Ref	.
	Cohort	0.30 (-0.12, 0.72)	0.158		Cross-sectional	-0.07 (-0.21, 0.07)	0.318
	Cross-sectional	0.11 (-0.42, 0.63)	0.691		Report	0.26 (0.05, 0.46)	0.014
	Report	0.21 (-0.24, 0.65)	0.366				

Table 6. Chronic conditions known to impact COVID-19 severity and fatality prevalence among Aboriginal & Torres Strait Islander Australians. Table compiled from publicly available data from the Aboriginal & Torres Strait Islander Health Performance Framework 2017 published online by the Australian Institute of Health & Welfare. (I=Indigenous NI=Non-Indigenous)(Yashadahanae et al, .2020).

	Age group (years)			45-54			55+		
	I	NI	Rate ratio (I/NI)	I	NI	Rate ratio (I/NI)	I	NI	Rate ratio (I/NI)
Chronic conditions known to impact COVID-19 fatality									
Respiratory diseases ^a	39.8	34.2	1.16	42.6	30.9	1.38	40.7	30.0	1.35
Diabetes ^a	10.8	2.7	4	20.7	5.3	3.9	37.9	11.6	3.26
Cardiovascular diseases ^a	18.0	10.2	1.76	28.3	19.0	1.49	44.9	46.1	0.97
	Age group (years)			65-74			75+		
Cancer ^b	1023	962	1.06	1926	1717	1.12	2625	2321	1.13
Lung cancer ^b	175.4	81.3	2.16	369.0	196.0	1.88	517.7	283.7	1.82

^a Rate per 100 persons.

^b Rate per 100,000 persons.

Table 7. Crude ratio and corrected ratio of the relationship between income and mortality of patients in COVID-19 (Kim, So Young et al.,2020).

Characteristics	COVID-19	Control	ORs (95% Confidence Interval) for COVID-19			
	(Exposure/Total, %)	(Exposure/Total, %)	Crude	p-Value	Adjusted [†]	p-Value
	Income group					
Low	2836/7943 (35.7%)	35,735/118,914 (30.1%)	1		1	
Middle	2489/7943 (31.3%)	40,700/118,914 (34.2%)	0.77 (0.73-0.82)	<0.001 *	0.78 (0.74-0.83)	<0.001 *
High	2618/7943 (33.0%)	42,479/118,914 (35.7%)	0.78 (0.74-0.82)	<0.001 *	0.79 (0.75-0.83)	<0.001 *
Income level (mean, SD)	10.00 (6.76)	10.75 (6.39)	0.98 (0.98-0.99)	<0.001 *	0.98 (0.98-0.99)	<0.001 *

* Logistic regression model, significance at $p < 0.05$. [†] Adjusted model for age, sex, CCI score and hypertension.

Table 8. Crude ratio and corrected ratio of the relationship between income and mortality of patients in COVID-19. (Goh BL et al.,2020).

CCI scores = 1 (n = 875)

Income group

Low	29/61 (47.5%)	311/814 (38.2%)	1		1	
Middle	13/61 (21.3%)	214/814 (26.3%)	0.65 (0.33-1.28)	0.215	0.69 (0.33-1.43)	.32
High	19/61 (31.1%)	289/814 (35.5%)	0.71 (0.39-1.29)	0.254	0.43 (0.22-0.83)	.01*
Income level (mean, SD)	8.89 (8.04)	9.70 (7.20)	0.99 (0.95-1.02)	0.399	0.96 (0.92-0.99)	.02*

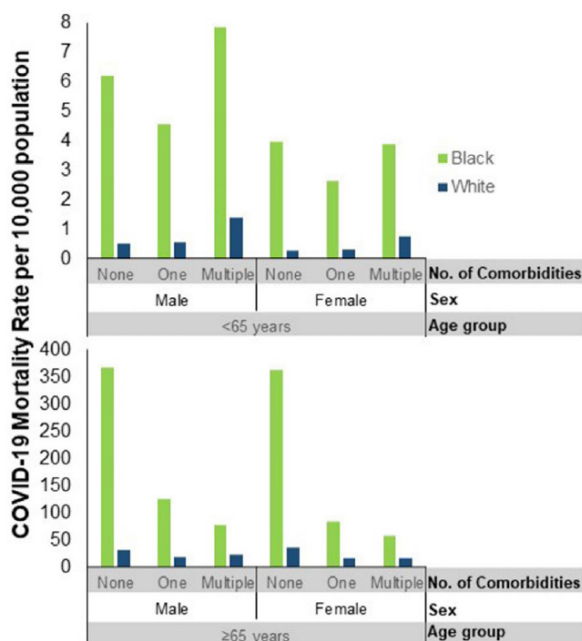
Table 9. A total of 6078 COVID-19 patients have a mortality rate by race and KD (Goh BL et al.,2020).

CFR, %	Unadjusted OR						Adjusted OR					
	Overall		With KD ^a				Overall		With KD ^a			
	Overall	With KD ^a	OR (95% CI)	p value	OR (95% CI)	p value	OR (95% CI)	p value	OR (95% CI)	p value		
Overall	1.28	20.2										
Malay	1.28	18.2	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	
Chinese	3.73	32.4	2.98 (1.65, 5.38)	<.001	2.14 (0.96, 4.78)	.062	3.76 (1.63, 8.68)	0.002	1.61 (0.14, 4.34)	.763		
Indian	1.45	15.4	1.13 (0.27, 4.70)	.867	0.82 (0.17, 3.84)	.797	0.23 (0.03, 2.02)	0.184	1.76 (0.34, 9.03)	.496		
Others	0.73	21.1	0.57 (0.31, 1.03)	.064	1.20 (0.58, 2.48)	.630	1.90 (0.84, 4.28)	0.121	3.80 (0.68, 21.12)	.127		

Abbreviations: CFR, case fatality rate; KD, kidney disease.

^a CKD and AKI.

Figure 1. COVID-19 mortality rate per 10,000 people in Michigan by age, sex, number of complications and race. (First, the population is stratified according to individuals under 65 years old (upper) and over 65 years old (lower), and then stratified according to gender (male and female), number of complications (none, one or more) and race (black and white). These mortality rates are based on 6,065 COVID-19 deaths in Michigan between March 16th and October 26th, 2020. For each comparison, the difference between black and white mortality was statistically significant ($P < 0.001$) (Parpia et al, .2021).



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