

Diabetes and Comorbidities Risk Assessment in Hospitalization and Fatalities from the Mexican COVID-19 Surveillance System

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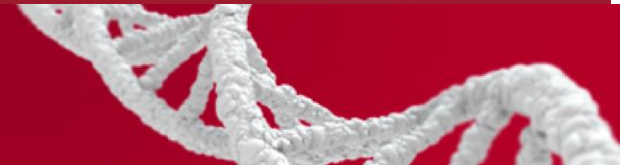


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BACKGROUND / OBJECTIVE

Background

The burden of non-communicable diseases (NCDs) has increased globally in recent years, particularly in Mexico, and there is a strong relation between NCDs and the severity and mortality of SARS-CoV-2 infection. However, the separation of health care resources for NCDs versus infectious disease in Mexico has created a situation where a syndemic of chronic NCDs and COVID-19 may thrive if not addressed.

The timely and correct management of chronic diseases such as Diabetes is essential during the COVID-19 pandemic. Several studies have reported an association between the severity of COVID-19 and Diabetes, as well as hypertension, cardiovascular disease and obesity.¹⁻⁶

Though current evidence does not suggest an increased risk of COVID-19 infection for those with Diabetes (type 1 and 2 Diabetes), studies do describe that Diabetes is related to a poor prognosis for the COVID-19 disease.^{3, 5-7}

The risk of severe COVID or death in those with Diabetes has been described since the beginning of the pandemic in Wuhan. However, prognosis depends on different factors such as age, sex, other comorbidities like hypertension and obesity, and pro-inflammatory and pro-coagulative states.⁷

Aggressive metabolic control in patients with Diabetes and hypertension can decrease the risk of severe acute respiratory syndrome due to the COVID-19 virus. Therefore, it is essential to improve the management of NCDs at all levels of health service delivery to reduce mortality from COVID.

Objective

This work evaluates the association between Diabetes and main comorbidities (Obesity, hypertension and Chronic Kidney Disease) on COVID-19 outcomes (prevalence, hospitalization, lethality and hospital fatality) in the Mexican population.

Methodology

We used available public data released by the Mexican COVID-19 surveillance system from January 1 to December 31 of 2020.⁸

We assessed hospitalization and fatality risk for people with self-reported Diabetes and comorbidities, using a multiple logistic regression model adjusted for age, sex, smoking status, and marginalization of residence.

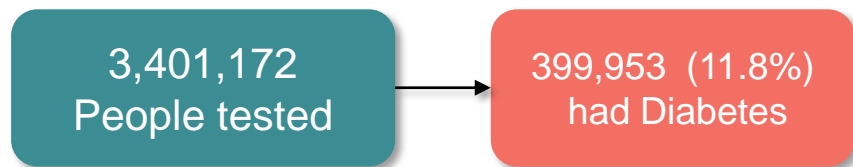
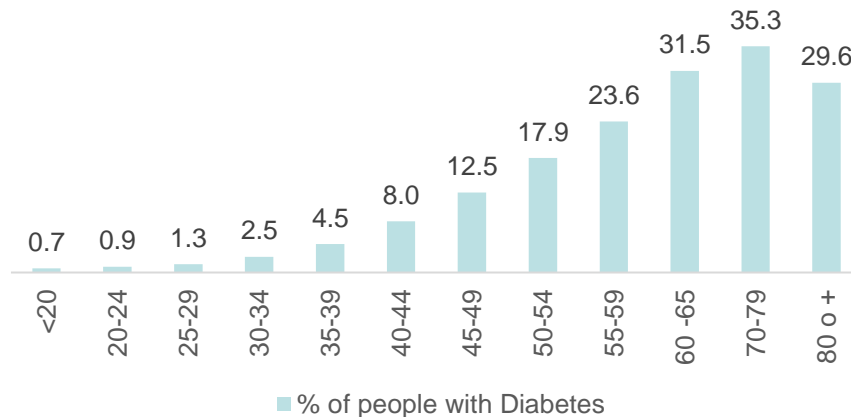
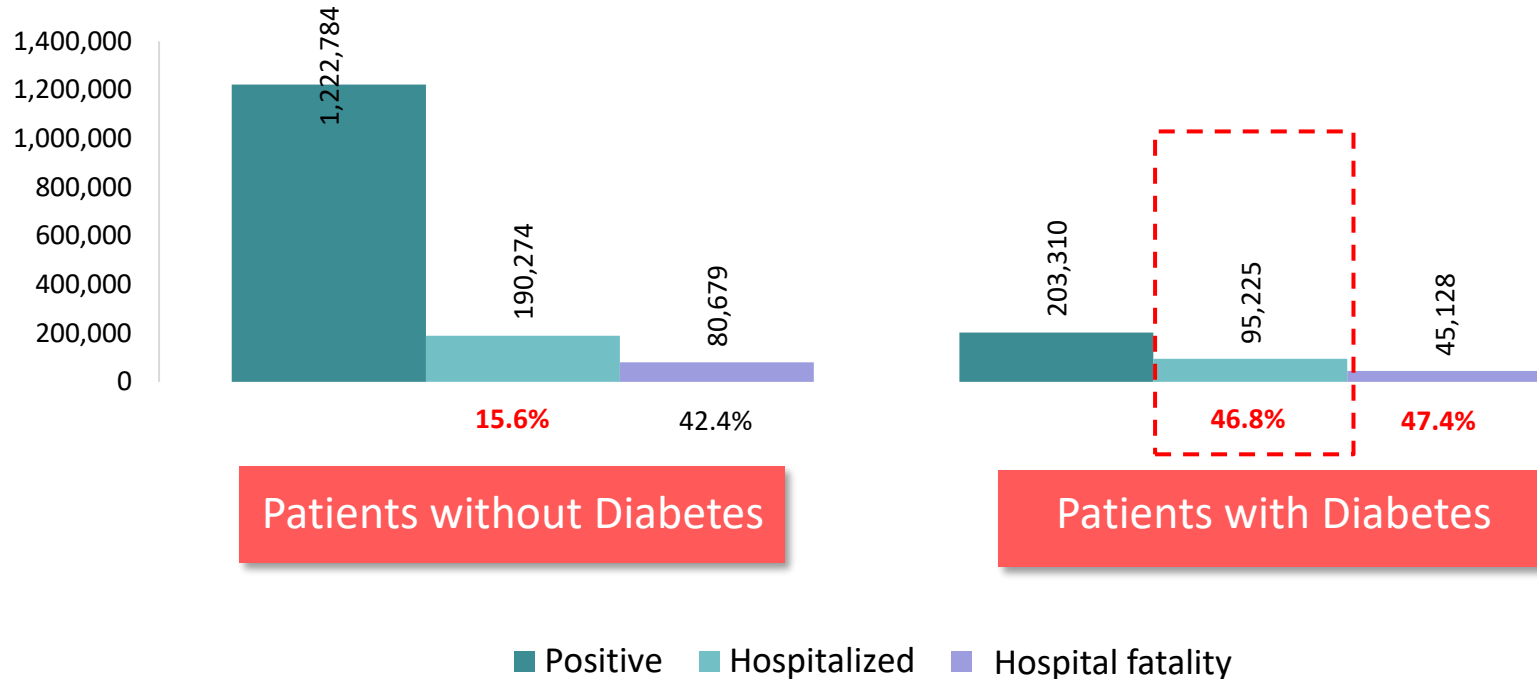


Figure 1. Distribution (%) by category of age of people with self-reported Diabetes tested for COVID-19 between January and December 2020



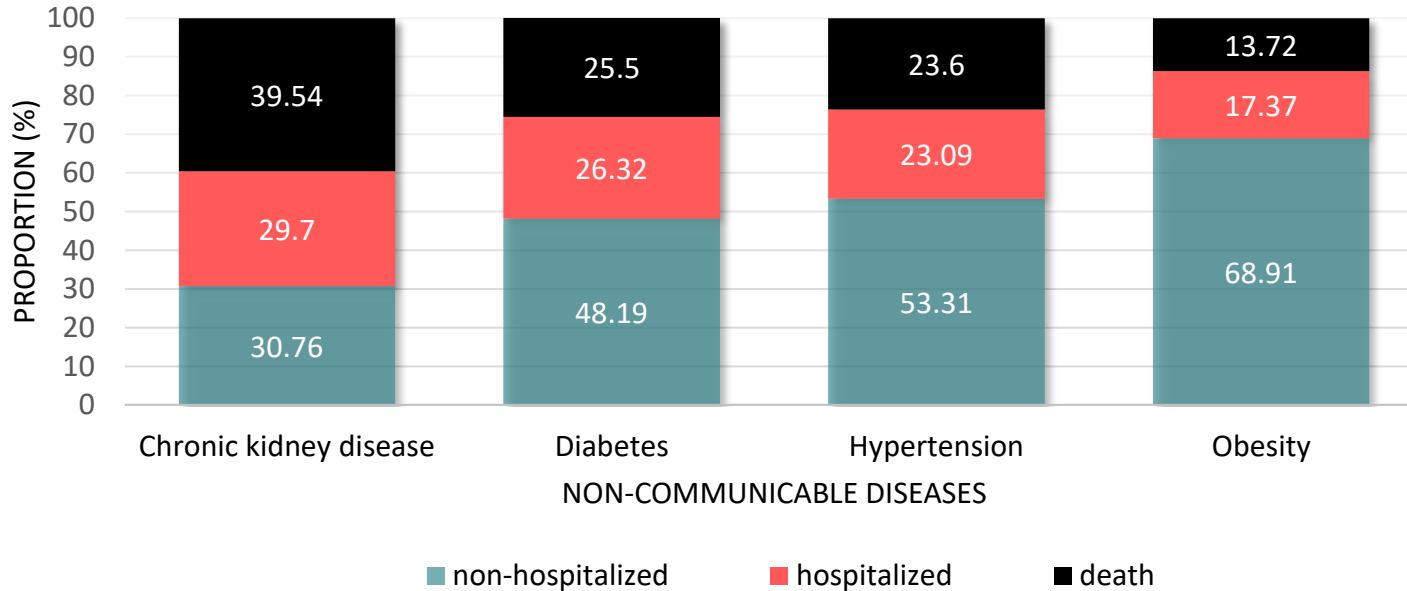
RESULTS

Figure 2. Comparison of hospitalization and hospital fatality of COVID-19 disease between populations with and without self-reported Diabetes (N= 1,426,094).



RESULTS

Figure 3. Comparison of main COVID-19 related outcomes among people with self-reported Obesity, Hypertension, Diabetes and Chronic Kidney Disease (n=1,384,470).



RESULTS

Figure 4. Distribution of deaths per 100 positive COVID-19 cases among people with self-reported Non-Communicable Diseases (n=1,384,470).

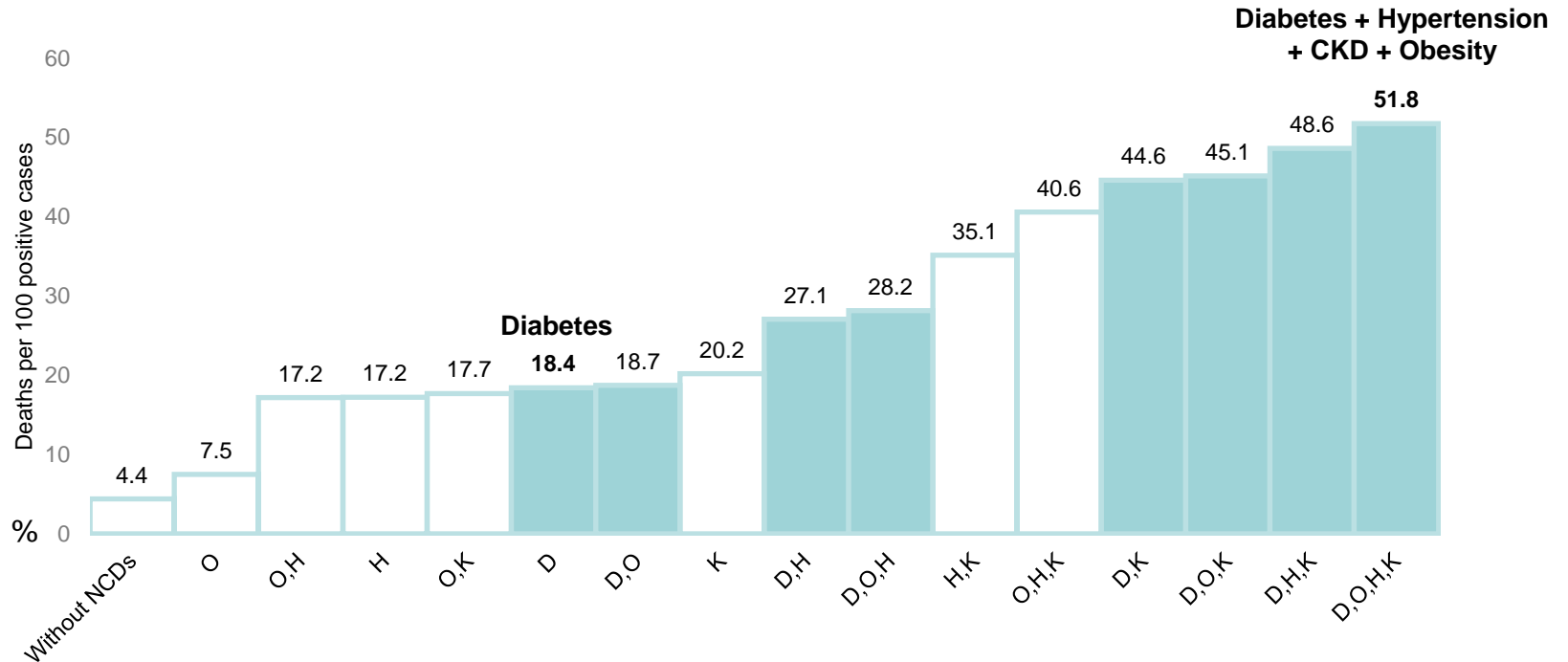


Table 1. Multiple logistic regression model for COVID-19 related outcomes among people with self-reported Diabetes and Non-Communicable Diseases.

Odds Ratios for main COVID-19 related outcomes among people with self-reported Diabetes (N= 3,401,172)	OR (95%CI)
Positivity	1.31 (1.28-1.33)
Hospitalization	2.20 (2.10-2.30)
In-hospital lethality	1.27 (1.27-1.40)
Out of hospital lethality	1.98 (1.90-2.10)

Odds Ratios for COVID-19 lethality among people with self-reported Non-communicable diseases (N=1,384,470)	OR (95%CI)
Hypertension	1.42 (1.40-1.44)
Obesity	1.73 (1.70-1.76)
Hypertension + Obesity	2.08 (2.03-2.13)
Diabetes	2.26 (2.22-2.30)
Diabetes + Hypertension	2.62 (2.57-2.67)
Diabetes + Obesity	3.12 (3.02-3.22)
Diabetes + Hypertension+ Obesity	3.32 (3.23-3.40)
Obesity + Chronic Kidney Disease	3.65 (3.09-4.31)
Chronic Kidney Disease	4.50 (4.21-4.82)
Hypertension + Obesity+ Chronic Kidney Disease	6.41 (5.51-7.46)
Diabetes + Chronic Kidney Disease	7.31 (6.55-8.16)
Diabetes + Obesity + Chronic Kidney Disease	8.02 (6.45-9.97)
Diabetes + Hypertension+ Obesity + Chronic Kidney Disease	8.99 (8.20-9.85)
Diabetes + Hypertension+ Chronic Kidney Disease	9.62 (9.11-10.17)
Hypertension + Chronic Kidney Disease	9.75 (9.08-10.46)

Multiple logistic regression models, adjusted by age, sex and marginalization of the place of residence.

CONCLUSION

- 1 Of the 3,401,172 people analyzed, **Diabetes (DM) was presented in 399,953 (11.8%)**. In this population, DM and hypertension (HT) was present in 191,178 (47.8%), DM and Obesity in 35,996 (9.0%), and DM with Chronic Kidney Diseases (CKD) in 27,997 (7.0 %).
- 2 When comparing the frequency of hospitalization and death due to COVID-19 between people with and without DM, it is important to stress that the frequency of hospitalization in non-diabetics was 190,274 (15.5%), and for death was 80,679 (42.4%); however, **these outcomes had a higher frequency among diabetics, finding a frequency of hospitalization of 95,225 (46.8%), and 45,128 (47.4%) for death.**
- 3 When analyzing the mortality due to COVID-19 per 100 positive cases according to the different combinations of comorbidities [Diabetes, Hypertension, Obesity and CKD], **the proportion of deaths for those with DM, HT and CKD was 51.8%; for DM, Obesity and HT was 18.5%; and for only DM was 18.4%**. These results suggest that the presence of additional comorbidities in patients with DM should be considered of a high risk for death from COVID-19.
- 4 **Finally, people with DM had significant ($p < .005$) higher odds of hospitalization OR:2.2, hospital 1.27 and non-hospital 1.98 fatality. In addition, people with DM and CKD had the highest odds of hospitalization 7.3 died in hospital (2.14) or out of hospital (6.5) compared with cases without DM.**

This analysis points out that Diabetes contributes to the risk of infection and worse outcomes for those infected by SARS-CoV-2. More must be done to prevent and control Diabetes and comorbidities to reduce the burden of COVID-19 outcomes.

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