

## MEMORANDUM

**To: Population Reference Bureau, United States of America**

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**Date: 24 Oct, 2021**

**Subject: COVID-19 Health Equity & Justice Dashboard: A step towards countering Health disparities among Seniors and minority population**

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### Executive Summary

The Population Reference Bureau (PRB) requested us to design a data visualization tool, that can help PRB and other relevant stakeholders to identify the negative impact of COVID19 pandemic which disproportionately affects the vulnerable segment of the population, particularly the seniors (age 65+) and the minority groups across United States. By combining dataset from PRB, and third-party Covid-19 and public health data, we developed a Health Equity & Justice Dashboard, to ascertain the impact of pandemic on targeted population, and disaggregate useful information on various health (death rates, vaccination rate, obesity, hesitancy to vaccinations etc.) and demographic (i.e. race, ethnicity, age) related indicators, which can assist in informed decision making process.

Our analysis shows significant state and county level health and racial disparities. We found that the distribution of COVID-19 deaths differs by race, ethnicity and age. Previous studies confirm our results as similar findings are reported on the disproportionate burden of COVID-19 deaths among some racial/ethnic minority groups<sup>i,ii</sup> and age groups, particularly senior (65+) people<sup>iii</sup>. A study of selected states and cities with data on COVID-19 deaths by race and ethnicity showed that 34% of deaths were among non-Hispanic Black people, though this group accounts for only 12% of the total U.S. population<sup>iv</sup>. Likewise, we also found significant variation on age and other health-related indicators i.e. covid-19 vaccination, hesitancy to vaccinate, bed availability with respect to states, which can have severe impact on health and coping strategies for covid-19.

Therefore, based on these finding, this policy memo suggested five priority areas of concern for the relevant stakeholders to develop appropriate state and county-specific programmes and policy interventions in bridging health disparities, particularly ensuring seniors, women and particularly from minorities are identified, reached, and listened to address vulnerabilities, and systematic discrimination against elder and minority groups, enhance community trust deficit through social cohesion, consultation, dialogue, and giving them leadership role, engage community and student-led groups, increase hospital capacity, build socio-economic empowerment, harness knowledge and scientific advancement in tele-health to increase vaccination rate, medic-aid/health insurance, and psycho-social support to uplift these communities to counter negative impact of the Covid-19.

### Background:

The COVID19 pandemic brought biggest health crises, and further exposed deep-seated inequities in health care for vulnerable communities and minority groups across the United States<sup>v,vi</sup>. It also further amplifies social<sup>vii</sup> and economic factors<sup>viii</sup> that contribute to poor health outcomes. Recent news and reports indicate that the pandemic disproportionately impacts young, elder, women and on the account of longstanding racial disparities, affected communities of color more than white<sup>ix</sup>. Similarly, elder people from minority groups often face discrimination to access medical aid<sup>x</sup> and those who have higher rates of underlying health conditions, such as diabetes, asthma, hypertension, and obesity were more susceptible to covid19 related complications<sup>xi</sup>, and mental ailment<sup>xii</sup>. Hence, considering this disproportionate impact of pandemic on these communities, and inadequacy of disaggregated data for policymakers, we employed PRB, CDC and other third-party health [dataset](#) and built a COVID19

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Health Equity & Justice Dashboard—an innovative tool which can ascertain vulnerability of these various groups on the basis of demography and health indicators, identify pattern of vulnerability, and provide meaningful analysis for informed decision making process. The dashboard can help in developing program and policy intervention in bridging health disparities, particularly related to economic empowerment, medic-aid/health insurance, and psycho-social support to uplift these groups to counter Covid19. The details of the dashboard and its robustness are outlined in the technical part of the memo.

### **Main Analysis:**

Seniors (age 65+) and those from minority groups are disproportionately affected by Covid-19, as our regression analysis shows a positive correlation between age and death rate due to Covid-19 in all states in the US. In order to see whether there is a difference between death rates due to Covid-19 among young and older population (65+) and we also employ a t-test and based on t-statistic results, we rejected our null hypothesis, since there is a significant difference between death rates among two population groups (young and senior 65+) due to covid-19 related death rate. We also found state-level variations among death related to Covid-19, with higher deaths among Black seniors (65+) than their white peers and less vaccination rates among minority senior population than their white peers.

### **Policy Alternatives:**

Although there are several visualization and data analysis tools to forecast disease patterns, especially in the Covid-19 scenario, they are often static and complex in nature. Alternately, we provide a more interactive dashboard that can be used easily by a variety of stakeholders, provide much visible and wide range of indicators (especially disease, demographic, and healthcare-related variations) thereby can inform public health messaging and mitigation efforts focused on prevention and early detection of infection among disproportionately affected groups so as to minimize subsequent mortality rates. It further assists in designing better strategies and in taking county and state-specific productive policy decisions to secure and protect the most vulnerable communities. This dashboard can also integrate other datasets, and we can add a variety of indicators related to health, socio and economic status, vaccination rate, insurance, Medicaid, and psycho-social support. Last but not least, using extensive literature review, and policy papers, we identified five priority areas, which are feasible, scalable, and can be used as guiding principles for state-level policy and programmatic responses to address health disparity among elder and minority groups.

### **Policy recommendation:**

Efforts to protect older persons within and across minorities should not overlook the many variations of impact posed by Covid-19 and should acknowledge their potential within society. Hence, our policy memo also elaborates on these impacts and identifies both immediate and long term policy and programmatic responses needed across five key priorities for action:

- 1) Using this dashboard, ensure that all older persons and those from minorities at risk of acquiring corona infection particularly those with underlying health conditions, living alone or women, are identified, and provided by medic-aid immediately;
- 2) Ensure that state and county tackle health discrimination or abuse seriously. Data related to abuse, discrimination is properly monitored (integrated with this dashboard), reported (i.e. add and build abuse scoring matrix or index w.r.t. state/county)—to take appropriate redressal action(s).
- 3) The state must develop integrated and community-led socio-economic empowerment programs focused on older persons and minorities including quick medical aid, psycho-social support, and fair health insurance;
- 4) Strengthen social inclusion by encouraging the participation of older persons and minority groups, through active engagement and consult community-based and student-led

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organizations, that will increase community trust, vaccination rates, and reduce mortalities related to COVID-19. Moreover, the state must ensure that difficult healthcare decisions affecting older and minorities are guided by a commitment to dignity and the right to health for these vulnerable groups;

- 5) Harness community and scientific knowledge and technology(ies) along with data which is available, and use state-specific intervention, to address health equity and discrimination. The PRB can further develop our prototype, and integrate Machine Learning and ArcGIS techniques to identify social, economic, and quality of health care issues, which can help in developing evidence-based policy and programs. Last but not least, those unable or resistant to receiving health care in-person can be reached through telehealth services, consequently reducing risks of discrimination or those associated with receiving in-person care for them.

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### Technical Appendix [optional]

#### ANOVA Techniques

##### Hypothesis testing:

In order to understand a difference of how COVID influences senior and young people, it was decided to conduct multiple hypothesis testing (each test for each state), where

$H_0$ : there is no difference of death ratios due to the COVID between senior and young people

$H_a$ : death ratio of seniors due to the COVID19 is greater than death ratio of young people

In order to keep  $P(\text{getting at least one false positive result}) = 0.05$ , level  $\alpha$  of each test was set to  $0.05 / (\text{number of all tests conducted})$  - realisation of Bonferroni correction.

During analysis, each senior is treated as a Bernoulli random variable with some probability  $p$  of due to the COVID19 independent of others.

The same idea applies to young people, where each individual is treated as a Bernoulli variable with probability  $q$  of dying due to the COVID19 independent of others.

$$\text{Test statistic } T = \frac{\mu_x - \mu_y}{\sqrt{\left(\frac{\mu_x * (1 - \mu_x)}{m} + \frac{\mu_y * (1 - \mu_y)}{n}\right)}}$$

where  $\mu_x$  is the computed death ratio of seniors,  $\mu_y$  is the computed death ratio of young people,  $m$  is the number of seniors living in the state,  $n$  is the number of young people living in the state.

With  $n, m$  approaching to infinity,  $T$  is converging to  $Z \sim N(0,1)$  by CLT and Slutsky theorem, so  $Z$  can be applied here.

The lowest value of Test statistic among all tests conducted is 15.48287 and p-value for this statistics  $3.51992 * 10^{-33}$  and is much lower than level  $\alpha$ . Thus we admit all results to be significant and reject the null hypothesis for each state.

#### End Notes

<sup>i</sup> Price-Haygood EG, Burton J, et al. Hospitalization and Mortality among Black Patients and White Patients with Covid-19. *N Engl J Med*. 2020. DOI: <https://doi.org/10.1056/NEJMsa2011686>

<sup>ii</sup> Wadhwa RK, Wadhwa P, Gaba P, Figueroa JF, Joynt Maddox KE, Yeh RW, & Shen C. Variation in COVID-19 Hospitalizations and Deaths Across New York City Boroughs. *JAMA*. 2020;323(21):2192–2195. <https://doi.org/10.1001/jama.2020.7197>

<sup>iii</sup> Gold, J. A., Rossen, L. M., Ahmad, F. B., Sutton, P., Li, Z., Salvatore, P. P., ... & Jackson, B. R. (2020). Race, ethnicity, and age trends in persons who died from COVID-19—United States, May–August 2020. *Morbidity and Mortality Weekly Report*, 69(42), 1517.

<sup>iv</sup> Holmes L, Enwere M, Williams J, et al. Black-White Risk Differentials in COVID-19 (SARS-COV2) Transmission, Mortality and Case Fatality in the United States: Translational Epidemiologic Perspective and Challenges. *Int J Environ Res Public Health*. 2020;17(2):4322. DOI: <https://doi.org/10.3390/ijerph17124322>

<sup>v</sup> U.S. Centers for Disease Control and Prevention, “Health Disparities: Race and Hispanic Origin: Provisional Death Counts for Coronavirus Disease 2019 (COVID-19),” [https://www.cdc.gov/nchs/nvss/vsrr/covid19/health\\_disparities.htm](https://www.cdc.gov/nchs/nvss/vsrr/covid19/health_disparities.htm).

<sup>vi</sup> Lopez, L., Hart, L. H., & Katz, M. H. (2021). Racial and ethnic health disparities related to COVID-19. *JAMA*, 325(8), 719-720.

<sup>vii</sup> Liana J. Richardson and Tyson H. Brown, “(En)gendering Racial Disparities in Health Trajectories: A Life Course and Intersectional Analysis,” *SSM—Population Health* 2 (2016): 425-35, <https://doi.org/10.1016/j.ssmph.2016.04.011>.

<sup>viii</sup> PRB (same as cited below) and also see Abedi, V., Olulana, O., Avula, V., Chaudhary, D., Khan, A., Shahjouei, S., & Zand, R. (2021). Racial, economic, and health inequality and COVID-19 infection in the United States. *Journal of racial and ethnic health disparities*, 8(3), 732-742.

<sup>ix</sup> Marc A. Garcia et al., “The Color of COVID-19: Structural Racism and the Disproportionate Impact of the Pandemic on Older Black and Latinx Adults,” *The Journals of Gerontology: Series B*,

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*Psychological Sciences and Social Sciences* 76, no. 3 (2021): e75-e80, <https://doi.org/10.1093/geronb/gbaa114>.

<sup>x</sup> Amitabh Chandra, Pragma Kakani, and Adam Sacarny, “Hospital Allocation and Racial Disparities in Health Care,” working paper 28018, National Bureau of Economic Research (NBER) working paper series, October 2020, <https://www.nber.org/papers/w28018>.

<sup>xi</sup> PRB. Key Factors Underlying Racial Disparities in Health Between Black and White Older Americans no. 41/7

<sup>xii</sup> Ibid