REVIEWER COMMENTS  
  
REVIEWER #1: Thank you for the opportunity to review this paper. This paper is well-written and addresses the critical question of whether equity-based policies can mitigate disparities. The authors conduct a rigorous evaluation of the equity-based COVID-19 vaccine allocation policy implemented in California in early 2021. The policy allocated 40% of the vaccine supply to 25% of the ZIP codes with the most disadvantage. The authors compared vaccination rates before and after the policy in Zip codes targeted by the policies vs. not. They also used a comprehensive set of sensitivity analyses to examine the impact of various potential threats to validity. The authors also clearly state the limitations of the data and contextualize the results to inform policy. I recommend the publication of the paper in its current form.  
  
I saw only one minor typo: in line 4, page 15 - the letter "u" in the word "used" is missing.

We appreciate the thoughtful summary and recommendation and have fixed the typo on page 14.  
  
REVIEWER #2: Overall  
- I think this is a well done and very important paper; CA was a pioneer in applying such a high impact equity-focused policy for allocation of limited resources in a crisis situation and examining the effects of those efforts is incredibly valuable to inform future efforts to proactively prevent disparities not only in future public health crisis' but also to potentially combat long-standing inequities   
- The authors have presented a very thorough analysis with balanced description of the counterfactual assessment of impact on COVID-19 outcomes as a central point; the supplemental materials are well done and thorough   
- Overall I enjoyed this well-written paper and feel that is will have significant impact on future public health policy

We thank the reviewer for the kind feedback

Background  
- Well done  
  
Data Used  
- It would be helpful to have more description of the data sources

We have added some additional description of the data sources, which were derived from mandatory reporting of SARS-CoV-2 tests and associated outcomes to CDPH as part of routine public health surveillance  
- It would help to have more description of the VEM; what was the outcome for the predictive model (i.e. probability of vaccine access? Probability of hospitalization? Etc) and how was that captured/quantified? Or was this a way of enriching the HPI score to be able to rank zip codes based on need?

Yes, the VEM was developed to supplement the HPI to facilitate the vaccine equity allocation since the HPI excluded some census tracts and since vaccine allocation was done at the zip rather than census tract level. The HPI is calibrated to life expectancy at birth and models used to derive VEM scores in ZIPs lacking an HPI score were trained on known HPI. We have edited the description of the VEM in an attempt to make this more clear.

- Did the VEM take into account disproportionate burden of outcomes? For example, we know that the elderly, some race/ethnicity groups and lower income individuals had a higher rate of hospitalization and death from COVID-19 and allocating vaccine to those with disproportionate outcomes is an important approach to mitigating the disproportionate impact

While the VEM itself did not incorporate COVID-19 outcomes, the motivation for the vaccine equity allocation was an observation that 40% of outcomes were occurring in VEM Q1 communities, thus the policy was implemented to send 40% of available vaccines to these areas. This disparity was likely due to underlying differences in prevalence of comorbidities and social determinants of health. This reasoning for the policy is described towards the end of the background section on page 4.  
- Did the policy include any verification of residence in a given zip code given that those in more affluent zip codes may travel to the zip codes with more vaccine supply for access when access is limited in their own area?

This is an important point and California’s online COVID-19 vaccine appointment system did include some restrictions based on zip code at the same time the policy was implemented. This did not entirely restrict individuals in neighboring, more advantaged areas from receiving vaccinations in VEM Q1 areas, but it did help to reserve more appointments for individuals residing in the targeted areas. We have added a sentence on page 6 to highlight this important point.  
- When the data from the statewide immunization database was merged with the VEM data, was residence (zip code of residence) assessed to examine if access truly was improved for residence within a given zip code?

Yes, the merge to VEM was based on zip of residence and we have edited the methods to clarify this as we admit that it previously sounded as though the merge was based on zip code of vaccine administration rather than zip of residence of the person receiving a vaccine. Although such an analysis was outside the scope of our work, we do have colleagues who are also using the zip of vaccine administration to investigate if patterns of distance traveled to get vaccinated changed because of the policy.   
- For the hospitalization data, what were examples of the supplementary data and how complete/reliable were these data sources in general (i.e. for cases, hospitalizations and/or death); were death records obtained or were death rates reported via a different mechanism from CDPH? I think it would help to better understand the data because there are some potentially notable challenges -for example, a known challenge had been a lack of patient-level race/ethnicity data attached to public health data; would be important to describe these to aid in interpretation of the results  
Supplementary hospitalization data submission was mandated for all hospitals in California throughout the COVID-19 pandemic. Hospitals were required to submit daily counts of suspected and confirmed SARS-CoV-2 patients via STPF to CDPH, but there were no patient demographics. Hospitalization and death status among patients was supplemented through a variety of means including linkage to death certificates, LHJ death submissions, and linkage to hospitalization discharge records. We agree that accurate race/ethnicity reporting in such records is often lacking, but we did not incorporate any analysis of race/ethnicity into this manuscript

Analytic Approach  
Vaccination Outcomes  
- I think the DiD design is a strong design for this type of question but I do have some concern with the definition of the "pre-period" (i.e. prior to VEM Q1 prioritization); the authors state that 4 weeks prior to March 1, 2021 was used as the pre-period, but it is unclear when vaccination efforts at the population level in CA began and what supply looked like at that period compared to the post-period, consistency in distribution across zip codes etc which may be important considerations to ensure that the pre and post period were comparable in terms of probability of vaccination for people within a given zip code (assuming no VEM Q1 intervention); was there a check for possible violation of the parallel trends assumption?   
These are important considerations and we appreciate the reviewers careful attention to these details. While vaccine supply was still constrained at the time of the vaccine equity allocation, widespread vaccination in the general population had commenced and the policy was implemented after more than 10 million doses had already been administered in California (additional details in [this press release](https://www.gov.ca.gov/2021/03/04/california-leads-with-public-health-and-vaccine-equity-to-safely-and-sustainably-reopen/#:~:text=Using%20data%20to%20inform%20vaccine,each%20additional%20case%3B%20and%2C%20perhaps)). We have expanded supplementary table 1 to include results of the negative controls sensitivity analysis that also consider a two week pre/post policy period and an eight week pre/post policy period. The results remain robust regardless of this contracted or expanded time period considered before and after the policy was implemented. The parallel trends assumption is another important consideration for the DiD analysis and we have added an additional figure (Supplementary Figure 1) showing that the pattern of vaccinations administered by VEM quartile was consistent across VEM quartiles leading up to the policy period.  
- I appreciate the additional analyses to examine exchangeability for the VEMQ1 zip codes  
Excellent!  
Discussion  
- Per my comment above, and allocating vaccine to those with disproportionate outcomes is an important approach to mitigating the disproportionate impact; may consider adding this consideration to the discussion how CDPH approach may have been even more effective at reducing disparities and the potential for joining EHR/healthcare data with area indexes as a means of informing future equity efforts; also see [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8309415/](https://urldefense.com/v3/__https:/www.ncbi.nlm.nih.gov/pmc/articles/PMC8309415/__;!!AvL6XA!x2xhcMgwOCS4I2g8ubbj2jzA0RWlRDpnXsas4d6HggmsiCX14IGjX3DE9_iYYZ1zro5tayXhoDYRe3C-ugfEct4EHdRJweXg$).

We appreciate the additional reference and have expanded the discussion to incorporate it and other area based measures that could be used to facilitate similar equity-focused resource allocation policies.  
- Page 15 typo "sed" on line 4

Fixed, thank you for bringing to our attention.  
- One limitation of the policy was that it focused on HPI quartile by zip code where there is known variability within zip codes and at the census tract level that, if not considered, could mast inequities in many vulnerable communities; please consider addressing this

We agree this is an important consideration and have added additional commentary in the discussion to address sub ZIP code level disparities.  
- Page 16 - the authors mention possible "spillover" effects for Q1 and Q2 zip codes, but do not address the potential spill over for those with high resources accessing vaccine in low HPI zip codes

We agree this is an important consideration and have added commentary to the discussion about individuals from more affluent areas traveling into prioritized VEM Q1 ZIP codes seeking vaccinations. This topic is also being explored further in the analysis of ZIP code of residence and ZIP code of vaccine administered to see if distance traveled to receive a vaccine increased among VEM Q4 residents in particular.

COMMENTS FROM THE EDITOR  
We agree with both reviewers that the analysis is thorough. We also found the writing very accessible, especially for a paper with a heavy focus on the methods and analysis. That said, it will be important for the revised paper to pare down and streamline some of the most technical information about the model specification and fitting and to tailor the discussion a bit more to a health policy audience by making the implications of this work more prominent.  
  
Specifically, I think that some of the description about the supplemental analyses and candidate models is probably more detailed than it needs to be for the main paper, especially given our limitations with the word count. Please consider moving some of this material to the appendix. I might also take a look at pages 19-20 in the discussion where you critique the analytic approach and models. I wondered if some of this discussion could actually be synthesized and moved to the methods instead? Here, the goal is to free up some space in the discussion to address reviewer 2’s comments regarding how the findings can be used to inform future work.

We appreciate these concrete suggestions and have moved some of the more technical details on page 9 to the supplementary material to free space for further discussion of how this type of equity-focused resource allocation policy could be implemented in other areas.

EXHIBITS  
Can you please prepare (and resubmit) Exhibit 2 and Exhibit 3 in Excel? Please submit each figure in a separate file, with the images dynamically linked to the data presented in each file and the appropriate labels. We can keep the PDFs on file for reference, but we prefer Excel so that the underlying data is intact.

Unfortunately we are not well versed in making figures in excel and would need some technical assistance to accomplish this. We are happy to help here how we can, but feel that sharing the code and underlying data to produce the figures in the GitHub repository is adequate for reproducibility.  
  
APPENDIX  
Wherever you mention the appendix or supplementary material in the paper (i.e., first mention on page 8), there needs to be a corresponding “call out” that looks and functions just like a regular endnote. Please create an endnote that reads, “To access the appendix, click on the Details tab of the article online.” Add a call out in the text to this endnote each time you refer to the appendix (use the same number throughout). Specific descriptions of the relevant appendix component (for example, “Appendix Exhibit 1A”) are most useful to readers. If you have any questions about this, please let me know. See guidance on referring to appendix material: [https://www.healthaffairs.org/help-for-authors/help-faqs#journal](https://urldefense.com/v3/__https:/www.healthaffairs.org/help-for-authors/help-faqs*journal__;Iw!!AvL6XA!x2xhcMgwOCS4I2g8ubbj2jzA0RWlRDpnXsas4d6HggmsiCX14IGjX3DE9_iYYZ1zro5tayXhoDYRe3C-ugfEct4EHe6C-Gcs$)   
We believe we have appropriately followed the guidance for calling out the appendix, but please advise if further edits are needed