

We thank Reviewer for the thorough and constructive evaluation of our manuscript and for recognizing the methodological rigor and public health relevance of our stochastic modeling framework. We have carefully revised the manuscript to improve clarity, structure, transparency, and policy relevance in accordance with the Journal of Public Health Issues and Practices guidelines. The major revisions are summarized below.

### **Abstract (clarity, quantitative findings, and policy implications)**

We revised the Abstract to reduce excessive technical language, explicitly report key quantitative findings, and state clear public health and policy implications. The revised Abstract now reports baseline extinction probability and comparative extinction probabilities under intervention-strength scenarios, and it highlights the policy-relevant takeaway that population-wide interventions (particularly those strengthening measures in the larger low-risk group) can substantially increase the likelihood of early extinction even when the basic reproduction number exceeds one.

### **Introduction (objective and public health relevance)**

We strengthened the Introduction by adding a concise concluding paragraph that clearly states the study objective and its public health relevance. This paragraph explicitly frames extinction probability as a policy-relevant endpoint that complements the basic reproduction number by translating transmission conditions into the practical likelihood of early outbreak fade-out, and it summarizes the key comparative finding regarding intervention targeting across low-risk and high-risk subpopulations.

### **Structure and separation of Methods, Results, and interpretation**

To improve structural clarity and ensure a clearer separation between results and interpretation, we reorganized the manuscript into a standard public-health format with distinct sections for Methods, Results, Discussion, Limitations, and Public Health Significance/Policy Implications. Deterministic model specification, CTMC formulation, and the multi-type branching process approximation are presented in Methods, while numerical findings and extinction probability comparisons are consolidated in Results. Interpretation and policy translation are now presented primarily in the Discussion and the Public Health Significance/Policy Implications section.

### **Figures, tables, equations, and captions**

We improved consistency in formatting and presentation across equations, figures, and tables, and we substantially expanded table and figure captions to be self-contained and informative. Captions now clearly define what is reported (e.g., estimated versus computed extinction probabilities), specify scenario definitions (including scaling relative to baseline intervention parameters), and describe the simulation design used to estimate extinction probabilities.

### **Transparency and mandatory journal sections**

To meet journal transparency requirements, we added the required statements on ethics approval/consent, data availability, funding, conflicts of interest, and author contributions. These declarations clarify that the analysis uses publicly available, de-identified aggregated incidence data and includes a funding statement indicating that no internal or external funding supported the work.

### **Discussion expansion, limitations, and actionable policy translation**

We expanded the Discussion to better contextualize the findings within existing public health and infectious disease modeling literature, including work on stochastic epidemic dynamics and non-pharmaceutical interventions. We also added and expanded a dedicated Limitations section that explicitly addresses key modeling assumptions (e.g., early-phase branching-process approximation, mixing assumptions, time-invariant intervention effects, and unpropagated parameter uncertainty) and data-source limitations (e.g., reporting delays and under-ascertainment in aggregated incidence data). Finally, we strengthened translation to actionable policy by expanding the Public Health Significance/Policy Implications section to provide practical guidance for early outbreak response and intervention targeting.

### **Minor typographical and reference formatting corrections**

We corrected typographical errors and improved reference formatting consistency throughout the manuscript. We also added additional references to strengthen the public health and methodological grounding of the work, particularly in relation to stochastic epidemic modeling, branching-process theory, and non-pharmaceutical intervention evidence