AN EPIDEMIC MODEL WITH VACCINATION FOR THE WORST CHOLERA OUTBREAK IN THE HISTORY

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We revisit the cholera mathematical model analysed in [1], adding a vaccination class. We show that the proposed model is epidemiologically and mathematically well posed and it only has two equilibrium points: a disease-free and an endemic. The basic reproduction number is determined and the local asymptotic stability of equilibria is studied. The worst cholera outbreak began on 27^{th} April 2017 and it has occurred in Yemen. Between 27^{th} April 2017 and 15^{th} April 2018 there were 2275 deaths due to this epidemic [3]. A vaccination campaign began on 6^{th} May 2018 and ended on 15^{th} May 2018 [2]. Through numerical simulations, we show that the model fits well this outbreak and observe that if a vaccination campaign had begun earlier the number of infected individuals would have been significantly lower.

References

[1] Lemos-Paião, A. P., Silva, C. J. and Torres, D. F. M. An epidemic model for cholera with optimal control treatment. *J. Comput. Appl. Math.*, 318:168–180, 2017.

[2] World Health Organization, Yemen crisis: Fighting the world's largest cholera outbreak: oral cholera vaccination campaign begins in Yemen, 06^{th} June 2018, `http://www.emro.who.int/pdf/yem/yemen-news/oral-cholera-vaccination-campaign-in-yemen-begins.pdf?ua=1`.

[3] World Health Organization, Yemen: Weekly Epidemiological Bulletin W15 2018, 21^{st} May 2018, `http://www.emro.who.int/images/stories/yemen/week_15.pdf?ua=1`.

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