Mathematical analysis of a cholera model with control measures

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Cholera is an acute diarrhoeal illness caused by infection of the intestine with bacterium *Vibrio cholera).* The aim of this study is to use mathematical modeling to analyze the dynamics of cholera disease with and without control measures. The mathematical features such as the epidemic threshold, equilibria and stabilities are determined for different sub-models and for the full model (with control measures). A Lyapunov functional approach is used to analyze the stabilities of equilibria. We qualitatively analyze existence and positivity of solutions. The possibility of backward bifurcation is investigated and it is observed that the model does not exhibit such phenomenon. We use the model to study the effects of public health educational campaigns, Vaccination as control strategies in curtailing cholera disease. The education-, vaccination-, treatment-induced reproductive numbers Re, Rv, Rf respectively and combined reproductive number Rc are compared with the basic reproduction number Ro for cholera In the absence of any intervention to assess the possible community benefits of these control measures in order to determine their relative importance to disease transmission and prevalence. We also use numerical simulations to validate the model and qualitatively show the benefits of these control measures, and we investigate the effect of seasonal variation of the contact and contamination rates B and L, respectively. We conclude from the study that in settings where education and vaccination are effective and with reasonable provision of clean drinking water and clean environment, the average number of infected humans may be reduced.