beta nu **SEIR with Hospitalization and Death** VE VE sigma exposed infected recovered susceptible gamma  $\gamma_H$  gammaH develop infection recovery E R  $\delta$  delta  $\sigma$  $\delta_{H}$  deltaH died death tau severe vaccination D U -VEparameters unprotected 9 equations recovery H RH hospitalized recovered died  $d_{eath} \delta_{H}$ vaccinated DH