We conducted a systematic review of outbreak response modelling of human vaccine-preventable diseases (HVPDs) and foot-and-mouth disease (FMD) to identify patterns in collaborative modelling practices. Included studies were grouped into two collaboration types: academic (studies with academic affiliations), and mixed (other affiliation combinations). Their distribution was explored in terms of variables including model design, parametrization, and validation. Academic collaborations dominated the HVPD studies, and mixed collaborations increased during 2013 - 2019, suggesting increased uptake of modelling by decision-makers. Compared to HPVDs, FMD models included more heterogeneity, and stochasticity. Mixed collaborations are encouraged to help ensure that models suit their contexts.