To solve problems like the budgeted vaccination and restricted disease problems, many researchers make significant assumptions about the behavior of disease diffusion to make the problems more mathematically tractable. In Chapter 4 we consider a number of graph optimization problems to act as surrogates for solutions to the budgeted vaccination and restricted disease problems. We show that the quality of the solutions provided by the surrogate optimization problems lead to solutions that are poor solutions to the budgeted vaccination and restricted disease problems in general. However, experiments on our HCW contact networks suggest that they may be perfect candidates for these surrogate problems. As a consequence, a simple greedy algorithm that picks the most well connected individuals (i.e., those having high degree) provides a near optimal solution to budgeted vaccination and restricted disease problems. Finally we compare a number of heuristic policies for vaccination on the HCW contact networks we generate. Our results show evidence that vaccinating the most "mobile" individuals may be an effective vaccination strategy.

1.5 Disease Surveillance

Disease surveillance and early detection of outbreaks may be one of the most important disease control strategies [36, 95]. The Emerging Infections Network (EIN) is a network of clinical infectious disease specialists created with the goal of assisting the CDC and other public health authorities with surveillance of emerging infectious diseases and related phenomena (new treatment protocols, possible side effects of new vaccines, etc.). To achieve its goal, the EIN maintains a private listserv of over 1400