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Acute Respiratory Illnesses at Kilauea Volcano (Hawai`i, USA)

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Three decades of eruption along the east rift zone of Kilauea Volcano intensified in 2008 with the concurrent eruption at the summit crater Halema`uma`u. Subsequently, downwind ambient levels of SO2 and fine particles have increased due to the location of the additional summit vent and the new plume dispersal pattern. Prior to 2008, ambient SO2 averaged 20 ppbv/day. In contrast, during 2008-2010 exposure increased 3-fold to an average 68 ppbv/day with noteworthy pollution events >1,000 ppbv. Sulfurous air pollution is a known respiratory irritant, yet few studies exist of exposure-associated illnesses. A 7-yr community-based cohort study (2004-2010) measured and compared incidence rates (IR) of acute respiratory illnesses in residents from exposed and unexposed geographic areas on the island. IRs, standardized for age and gender, estimated relative risks (RR) with 95% confidence intervals for statistical significance. Case reviews of 10,215 medical visits revealed significantly increased RRs in exposed residents for medically-diagnosed acute exacerbation of asthma (+222%; +579% in children), acute bronchitis (+73%; +444% children), acute pharyngitis (+139%; +220% children), and upper respiratory infections (+83%; +234% children). The magnitude of risks increased with the higher exposure since 2008, as well as between exposed sub-cohorts categorized by distance from source.

Kilauea's continuing eruption and resultant air pollution are associated with an increased burden of disease for exposed Hawaiian communities. This study provides an evidence base for public health efforts by interdisciplinary teams, health policy initiatives, and planning for adequate delivery of health care.