

KNOWLEDGE-ENABLED PERSONALIZED DASHBOARD FOR ASTHMA MANAGEMENT IN CHILDREN

Vaikunth Sridharan, Revathy Venkataramanan, Dipesh Kadariya, Krishnaprasad Thirunarayan, Amit Sheth, Maninder Kalra
¹Kno.e.sis - Ohio Center of Excellence in Knowledge-enabled Computing, Wright State University, Dayton, OH.
²Dayton Children's Hospital, Dayton, OH, USA
 {vaikunth, revathy, dipesh, tkprasad, amit}@knoesis.org, KalraM@childrensdayton.org



BACKGROUND

Childhood Asthma is a significant public health concern worldwide. Effective management of childhood asthma requires close monitoring of disease triggers, medication compliance and symptom control. The recent growth of the Internet of Things (IoT) based devices has enabled continuous monitoring of patients. kHealth-Asthma is a knowledge-enabled semantic framework consisting of IoT enabled sensors to record patient symptoms, medication usage and their environment. kHealthDash platform enables real-time visual analysis at an individual and cohort level over such high volume and high variety data.

METHODS

100 patients
29 parameters
1852 data points/day
66% kit compliance

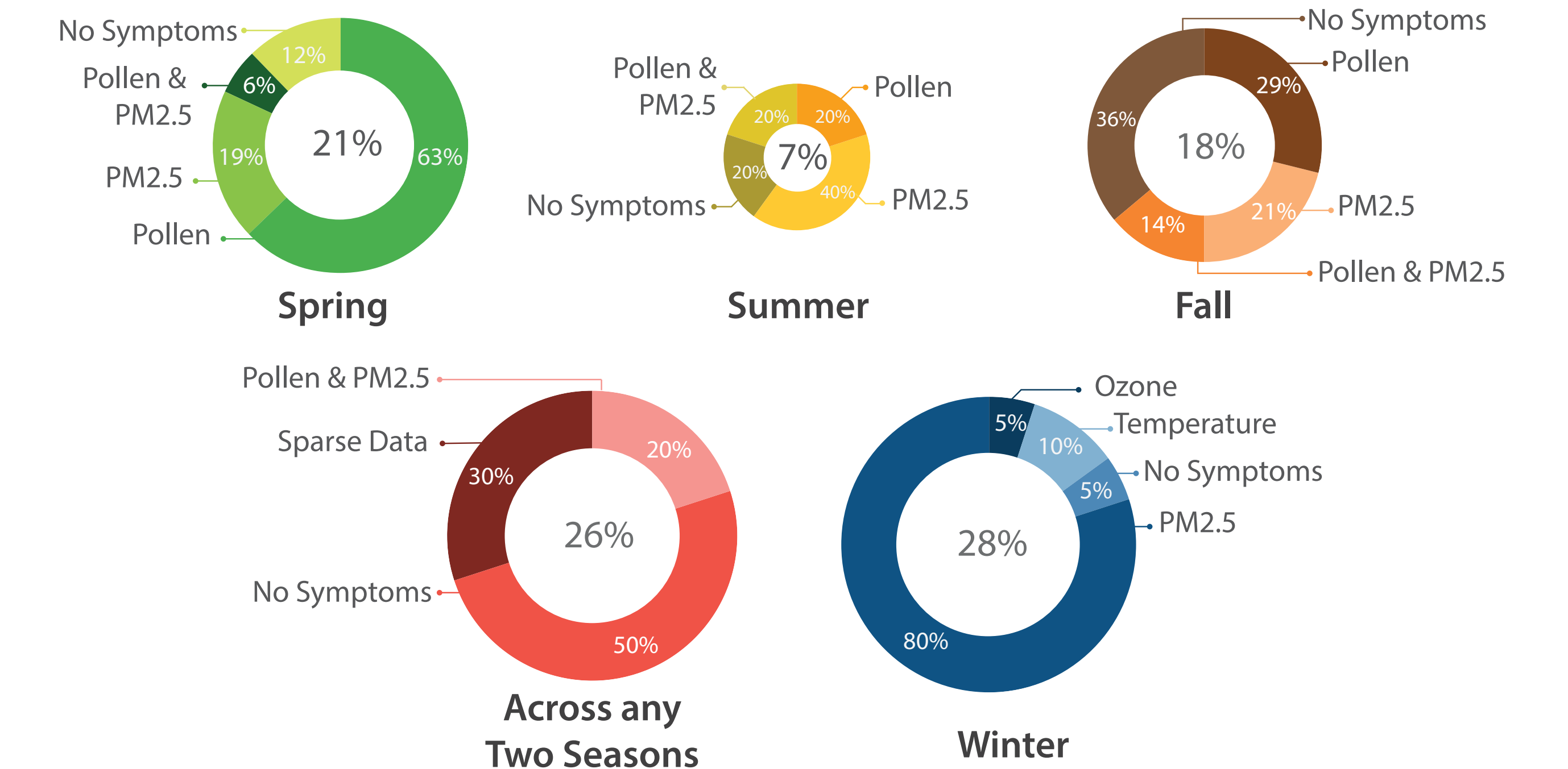
The kHealth kit was given to 100 asthmatic children (5 to 17 years of age) for a period of one or three months each. The kHealth kit consists of:

- An Android app-based questionnaire to record symptoms and medication
- Fitbit to track activity and sleep
- Peak flow meter to measure PEF and FEV1
- Foobot to monitor indoor air quality

Third-party web services are used to obtain outdoor environmental observations. For each patient, 29 diverse parameters with 1852 data points are collected daily at various frequencies. Data collected are pushed to a private cloud storage in near real-time and visualized using kHealthDash web application. The average compliance towards the kit usage is 66% for 100 patients.

FINDINGS

Personalized primary triggers at cohort level is displayed below.



RESULTS

Five healthcare providers evaluated the effectiveness of kHealthDash by answering questions on data interpretation. Providers reported that analyzing data with kHealthDash was 65% easier than using data in tabular format. The System Usability Score for kHealthDash is 80.5 (>68.5 - threshold), implying that kHealthDash is a user-friendly interface.

