

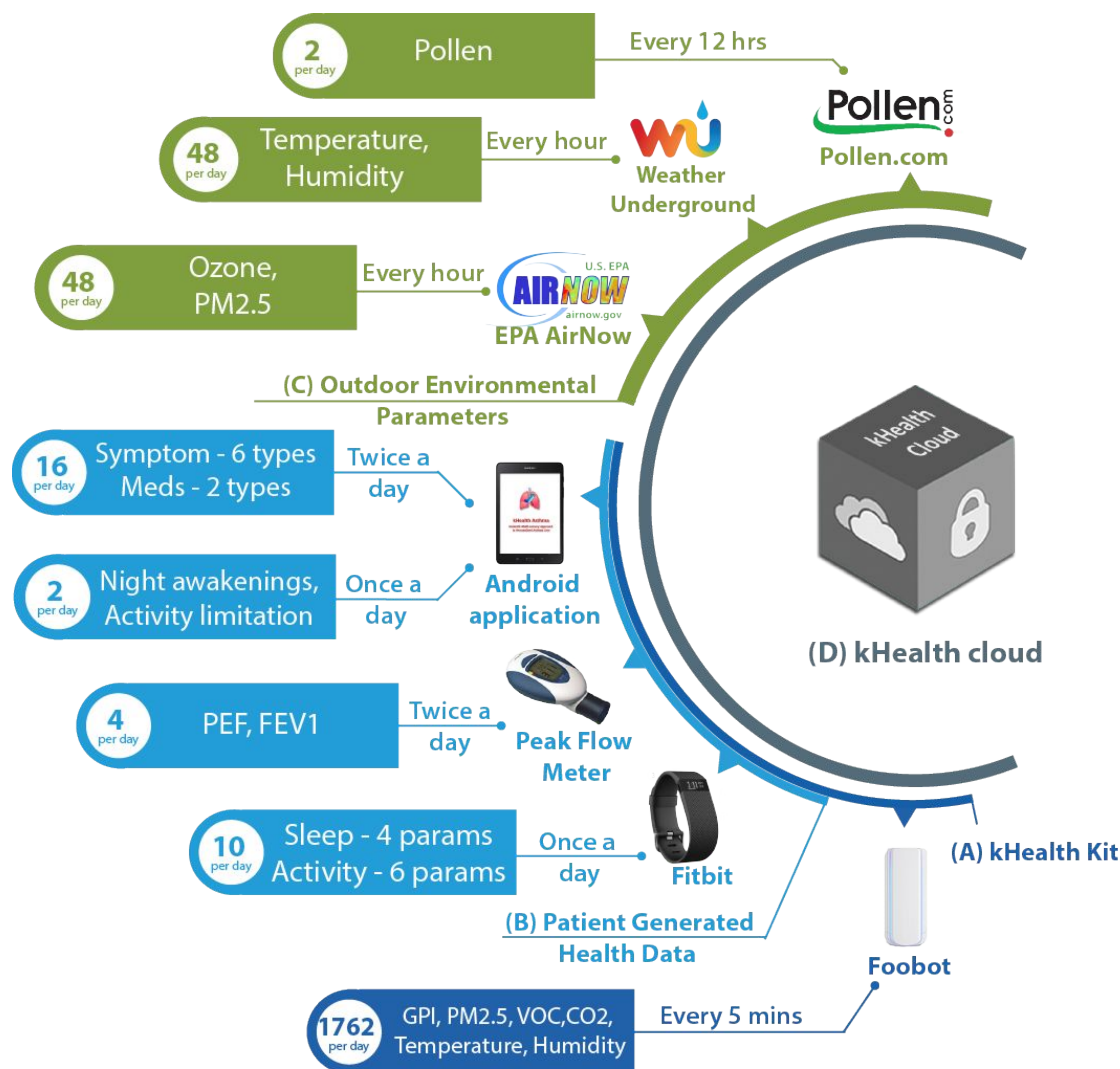
# kHealth: A Personalized Healthcare Approach for Pediatric Asthma

U Jaimini<sup>1</sup>, H Y Yip<sup>1</sup>, R Venkataraman<sup>1</sup>, D Kadariya<sup>1</sup>, V Sridharan<sup>1</sup>, T Banerjee<sup>1</sup>, K Thirunarayan<sup>1</sup>, M Kalra<sup>2</sup>, A Sheth<sup>1\*</sup>

<sup>1</sup>Ohio Center of Excellence in Knowledge-enabled Computing (Kno.e.sis), Wright State University, Dayton, OH, <sup>2</sup>Dayton Children Hospital, Dayton, OH

## kHealth

A knowledge enabled analytical framework for **continuous monitoring** of chronic disease, its **progression**, and the **patient's health**.

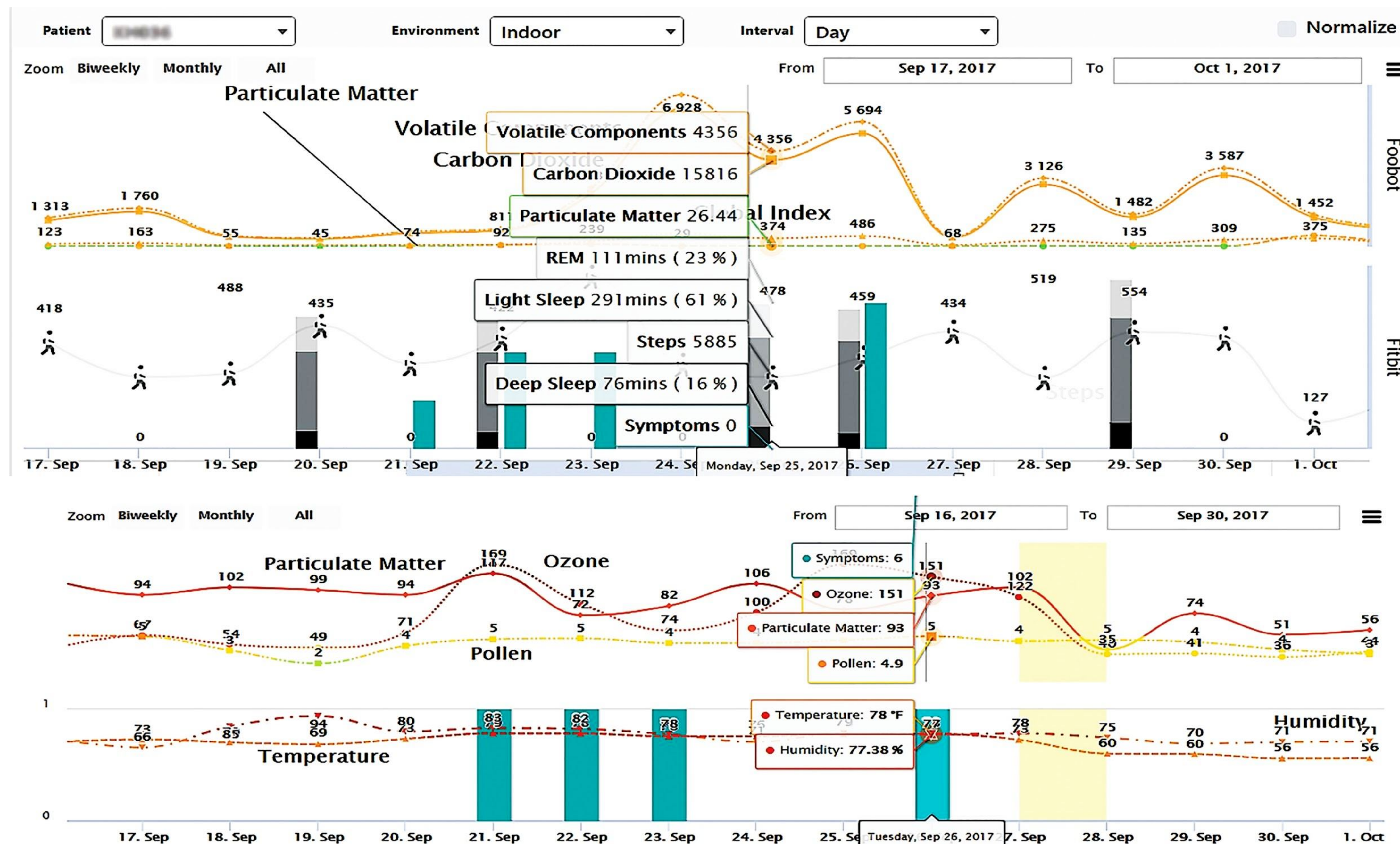


kHealth Kit for Pediatric Asthma involves multi-sensors collecting personalized multimodal data streams (clinical notes, mHealth application, PGHD and outdoor environmental observations); > 30 parameters involving up to 1852 data points/day, collected throughout 1 or 3 month patient participation

### Questions investigated (Goals)

- ❖ Can we assess the asthma control level, determine vulnerability, and medicine compliance for a patient?
- ❖ Can we understand the causal relationship between the asthma symptom and possible factors responsible for it?
- ❖ Can we reduce the number of asthma attacks through continuous monitoring of the patient's health condition?

## kHealthDash (secure, anonymized cloud hosted RT monitoring/analysis)



Visualize Multimodal Data Streams & Patient Data for Correlation Analysis interpreted with the help of knowledge graph (relevant medical knowledge)

## Findings (subset)

From the ongoing trial involving pediatric asthma patients, based on 110 patients out of 150 study cohort, with over 75% patient compliance:

- ❖ At **Cohort Level**: (1) 36.6% of the children's asthma was **Very Poorly Controlled**, 25.6% was **Not Well Controlled**, and 37.8% was **Well Controlled**. (2) Among the *Very Poorly Controlled*, 30% were *Highly Compliant* towards their controller medication intake suggesting their re-evaluation for change in medication/dosage, but 50% were *Poorly Compliant* and candidates for more timely intervention to improve compliance to mitigate their situation.
- ❖ At **Personal Level**: (1) For 28% of the patients deployed in winter - Particulate Matter (PM2.5) was the major contributor for 80% of them. (2) For 21% of the patients deployed in spring - pollen was the major contributor for 63% and PM2.5 for 19% of them. (3) 18% of the patients deployed in Fall - pollen and PM2.5 was the major contributor for 29% and 21% of them, respectively. (4) For 7% of the patients deployed in summer - PM2.5 and Pollen were the major contributors for 40% and 20%, respectively.
- ❖ Insights for **Augmented Personalized Health**: Strategies for Self Monitoring, Self Appraisal, Self Management, and/or Intervention.

## Acknowledgement

This research was sponsored by NICHD/NIH under award "**SCH: KHealth: Semantic Multisensory Mobile Approach to Personalized Asthma Care**" (1R01HD08713201, PI: Amit Sheth\*, amit@knoesis.org). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

