Combining digital trends and scientific literature: a case study on Social Determinants of COVID-19
Joao Bettencourt-Silva

J Bettencourt-Silva1, C Cullen2, N Mulligan1, A Di Bari3, M Glieze1
1IBM Research Europe, Dublin, Ireland
2IBM Watson Health, Dublin, Ireland
Contact: jh.bettencourt@gmail.com

Background:
Digital sources such as Internet-based search tools have created prospects for augmenting traditional public health surveillance. These can support the identification of emerging public health concerns, intervention evaluation or policy making. Social Determinants of Health (SDoH) are key factors linked to health outcomes yet they are poorly recorded and seldom used. Scientific papers have reported SDoH impacts on various outcomes yet this data has not been explored for population trend analyses. We present an analysis of our approach to combining insights mined from PubMed with online search trends.

Methods:
PubMed-2019 database was used to build a knowledge graph (KG) of connected health and social concepts based on relative co-occurrences found throughout the abstracts. We then observed Google search trends for 10 SDoH concepts at the outset of the 2020 pandemic (March-May) and compared them with the previous 4 years. For concepts with increasing trends, the KG was used to identify other potentially relevant concepts. Subsequently we continued observing online trends for a further 12 months in order to examine the KG concepts’ trends.

Results:
Our analysis showed Food Security and Unemployment trended the highest compared to previous years. These became the seed concepts used to traverse the KG, where the top 20 relevant concepts were identified for each seed. An analysis of the 8 concepts overlapping both seeds showed 6 with increasing trends during follow-up. Correlation coefficients were computed and positive relations observed (Unemployment+Anxiety, r=.72; Distress+Food Security, r =.62). Data will be discussed.

Conclusions:
Positive correlations were observed between data from a 2019 PubMed KG and online search trends during COVID-19. These preliminary results suggest value in combining these digital sources to strengthen public health systems. This is important to understand the interactions between health and social factors and identify emerging trends.

Key messages:
- Combining data from scientific research papers with online search trends yielded interesting results that may further complement traditional surveillance systems and clinical case ascertainment.
- Social determinants of health data should play an increasingly important part in complementing public health surveillance systems and in strengthening population trend analyses.