Use Big Data Analytics and Interventions to Promote Early Detection and Enhance Resilience of Family Caregivers at Risk

Prof. Agnes Tiwari –The University of Hong Kong

Dr. Amanda Chu – The Education University of Hong Kong

Prof. Mike So – The Hong Kong University of Science and Technology

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Agenda

1. The Awarded HCPF Project

2. A Large-scale Community Project

3. Big Data Analytics – Human Level

4. Big Data Analytics – Global Level

1. The Awarded HCPF Project

- "Becoming Parents: A hospital-community partnership to enhance transition to parenthood" (HCPF Project No. 03200205).

- It focused on a specific group of clients (expectant parents) with a particular life event (transition to parenthood).

1.1 The Awarded HCPF Project - Research Highlights

- Transition to parenthood is potentially a stressful event for many new parents. Research has shown that the stress associated with the transition can lead to declined marital satisfaction, increased partner conflict and experience of depressive symptoms.

- Interventions have been developed worldwide to help couples make their transition to parenthood with varying effects.

1.1 The Awarded HCPF Project - Research Highlights

- A specially designed programme, known as the **Becoming Parents programme**, was developed for Chinese expectant couples. The programme aimed to enhance the couples' transition to parenthood through partnership between the hospital and the community with the involvement of expectant couples, health and social services professionals, and trained volunteers.

1.1 The Awarded HCPF Project - Research Highlights

- Evaluation of the programme in a group of 150 Chinese expectant couples has shown that it can be used as a model for supporting couples in their transition to parenthood during the prenatal-postnatal period.

- The involvement of trained volunteers in providing support to the couples was beneficial not only to the couples but also to the volunteers as well. Capacity building through **peer support** and **experiential learning** was evident and sustainability of hospital-community partnership in enhancing transition to parenthood was feasible.

1.2 The Awarded HCPF Project - Research Reflection

> The findings and impact of the project went beyond what was anticipated and provided compelling evidence for the need to study **capacity building** in the community. Particularly, the role played by **family caregivers** in the face of adversities raised more questions that it provided answers.

2. A Large-scale Community Project

"Moving Ahead – Fostering Changes"

Project on Enhancing Resilience for Addressing Adversities in At-risk Families

(*funded by Hong Kong Jockey Club Charities Trust*)

2. A Large-scale Community Project

"Moving Ahead – Fostering Changes"
Project on Enhancing Resilience for Addressing Adversities in At-risk Families

- Aimed to enhance the resilience of at-risk families in Kwai Tsing district
- Through a comprehensive programme of evidence-based interventions at the individual, family, or community level
- Community partner: HKSKH Lady MacLehose Centre
- A total of 400 at-risk families were targeted

2.1 A Large-scale Community Project – Research Highlights

“Moving Ahead – Fostering Changes”
Project on Enhancing Resilience for Addressing Adversities in At-risk Families

- Based on their interests and continuous review on the effectiveness of the interventions, participants were suggested to join intervention activities at different levels (e.g.,武術修身班 at individual level,礦村親子半天遊 at family level,義工愛心之旅 at community level).

- We collected pre-test and post-test statistics of participants’ **resilience** and **stress burden scores**

2.1 A Large-scale Community Project – Research Highlights

"Moving Ahead – Fostering Changes"
Project on Enhancing Resilience for Addressing Adversities in At-risk Families

- Family caregivers may take on a caregiver role for which they do not feel prepared, leading to stress. Our research has shown that the any type of family caregiving can result in negative effects on caregivers' physical and psychological health *(Chu et al., 2022)*.

- Our research also examined the association between caregivers' burdens and their individual characteristics and **identified characteristics**, including caring for older adult(s), educational level, employment status, place of birth, financial situation, and need for non-profit organizational support were significant predictors of the burden level of caregivers *(So et al., 2021a)*.

2.1 A Large-scale Community Project – Research Highlights

"Moving Ahead – Fostering Changes"
Project on Enhancing Resilience for Addressing Adversities in At-risk Families

- Post-intervention, participants' **resilience** and **stress burden scores improved**

- The project was renewed for 3 more years with additional funding.

2.2 A Large-scale Community Project – Research Reflection

“Moving Ahead – Fostering Changes”
Project on Enhancing Resilience for Addressing Adversities in At-risk Families

> Early detection of high stress among caregivers is important to provide more room for social workers and/or counsellors to follow up and intervene.

Use of Big Data Analytics for Early Detection

3. Big Data Analytics – **Human Level**

- In the face of tremendous surge in demand for psychosocial services, and with limited resources in the already over-stretched healthcare system, a novel strategy for psychosocial assessment is needed.

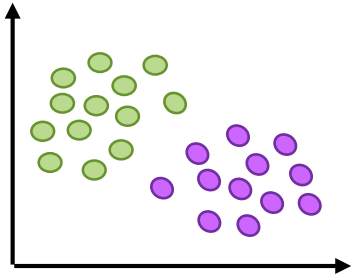
- An accurate, efficient, and cost-effective psychosocial assessment strategy that can facilitate early detection of psychosocial problems.

- Hence the development of **automatic speech analytics programme**.

3. Big Data Analytics – Human Level

- Aims to auto-detect psychosocial problems based on clients' speech.

- "***What we say***" in a conversation is the conscious component, containing messages that we intend to convey.
- "***How we say***" in a conversation is the unconscious component, reflecting our psychosocial status that we do not intend to reveal *(Chandler, 2008).*
- When people are talking about certain topics, they would subconsciously include certain **keywords** in their speech *(Horvath, 2012)*.

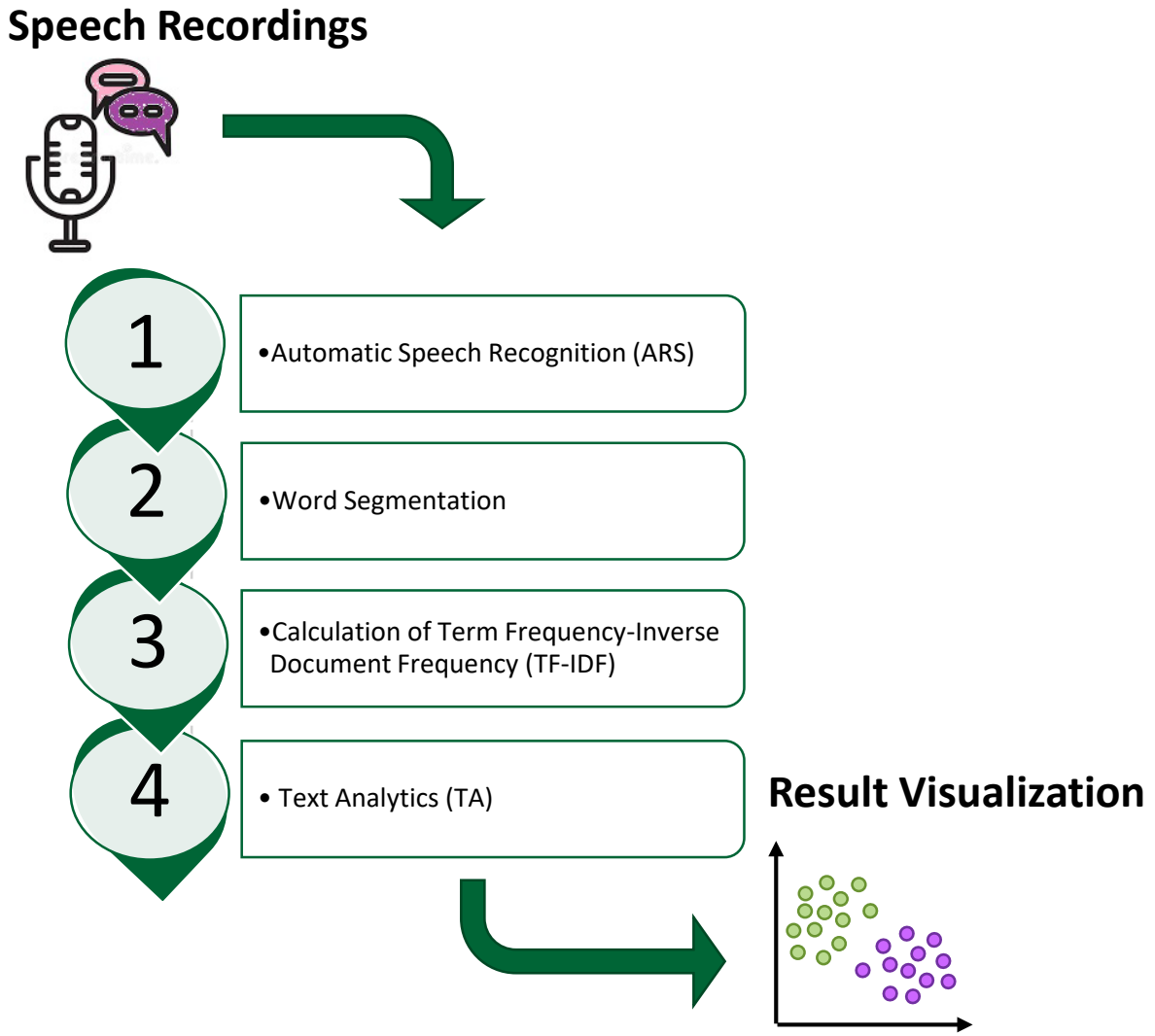


3.1 Big Data Analytics – Human Level – Pilot Study

- We analyzed the speeches of 20 family caregivers.
- It was possible to group family caregivers into two clusters (i.e., Clusters A and B) based on the **types and frequency of keywords** in their speech.
- The results also indicated a **significant correlation**:
  - between high-stress burden caregivers and cluster A; and
  - between low-stress burden caregivers and cluster B.
- Accuracy rate of distinguishing between high and low caregiver stress burden was 70%.

3.2 Big Data Analytics – Human Level – Future Research

- The programme has great potential for further development.
- We plan to upgrade it by strengthening its **text analytics ability**.
- And further enhance its assessment of caregiver stress burden.



4. Big Data Analytics – Global Level

- In response to the COVID-19 pandemic, we have developed methodologies to **visualize, detect, and assess pandemic risk**.
- Using publicly available data.
- For policymakers to better optimize timely containment strategies to mitigate further outbreaks.
- Our research, **based on network connectedness ideas**, helps to **detect early signals** of and **predict** the COVID-19 pandemic risk.

4.1 Big Data Analytics – Global Level – Research Highlights

- Network connectedness can reveal pandemic risk.

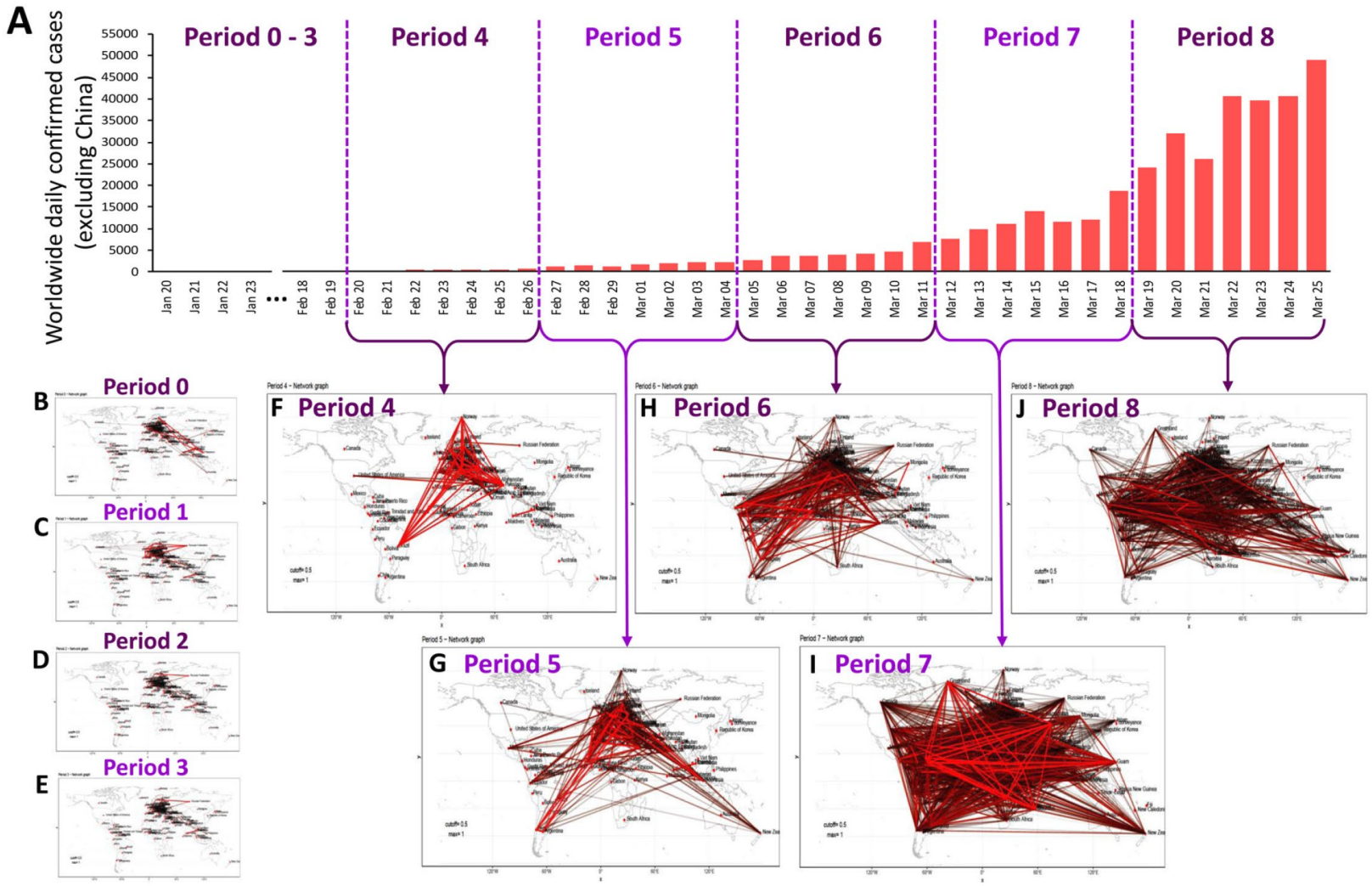
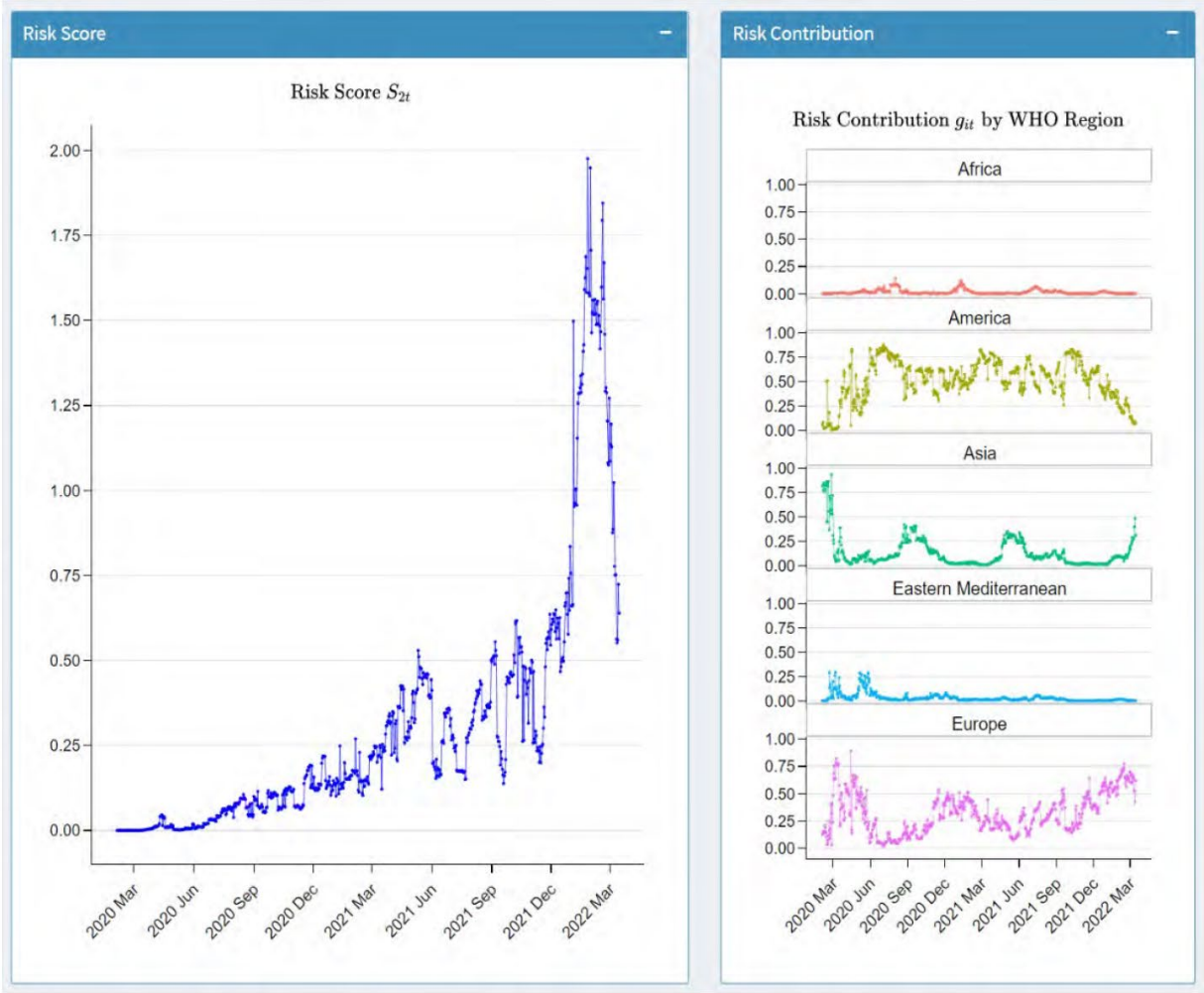


Figure 2. Worldwide daily confirmed cases (excluding China) and the network graphs.

4.1 Big Data Analytics – Global Level – Research Highlights

- Starting from network visualization *(So et al., 2020)*,
- generating early warning signals of the pandemic *(Chu et al., 2020a)*,
- analyzing the impact of travel restrictions and cross-country pandemic connectedness *(Chu et al., 2020b, 2021b,c; Tiwari et al., 2021)*,
- building a spatial-temporal database *(Chu et al., 2021a)*,
- to constructing a real-time COVID-19 dashboard in http://covid-19-dev.github.io/ to display the latest risk scores *(So et al., 2021b)*.



4.1 Big Data Analytics – Global Level – Research Highlights

We have also summarized some important findings from our research in four Chinese articles and shared with the general public for community education via a leading local newspaper, *Hong Kong Economic Journal (信報)*.

2021年5月5日

朱文英、羅鳳儀、蘇家培 數裏見真章

【30天免費閱讀】建立網絡關聯性來圖像化COVID-19疫情蔓延風險

隨着2019年冠狀病毒疾病（COVID-19）在國際間傳播，大家都關注如何預測疫情的蔓延風險。我們運用網絡分析（network analysis）這個成熟的科學方法，把COVID-19疫情的蔓延風險圖像化地表達出來。方法是把現成的數據（如COVID-19的確診案例）製成可供目測的地區之間的連接程度，提供了簡單而有力的證據來測度疫情的蔓延風險。

以往網絡分析常用於評估各地金融的互聯性和系統性風險。在金融體系中，一系列具有互利業務關係的相互關聯的機構（例如商業銀行）可能通過在金融危機期間迅速傳播的流動性不足、資不抵債和虧損而迅速崩潰。例如，2008年雷曼兄弟倒閉和2011至2012年的歐洲主權債務危機，表明金融機構之間的業務關係。如果關連程度規模夠大，足以導致全球市場的系統性風險。

2021年5月12日

朱文英、羅鳳儀、蘇家培 數裏見真章

【30天免費閱讀】網絡稠密度可提早警告COVID-19疫情全球蔓延

在2019年嶄新出現的冠狀病毒疾病（COVID-19）已經迅速傳播到世界幾乎每一個角落。其中一個重要的觸發因素是各國之間的人口流動。故此，一個可能引起研究人員關注的問題是，各國之間聯繫的頻密程度能否為我們提供預警來偵測全球病毒的爆發？從我們的研究發現，藉着觀察國與國之間的網絡稠密度（network density）、全球宣告COVID-19確診病例的國家總數及全球COVID-19確診病例的每日數字，其實早在2020年2月下旬已有大流行傳播高風險的蛛絲馬跡。

我們從世界衛生組織（世衛）狀況報告取得數據，計算出在每特定時間t內任何兩個國家在過去14天（所選的日子包括當天及其前13天）的COVID-19確診病例數目變化的相關性（correlation of changes），以此作衡量這兩個國家的聯繫程度。在這研究中，我們採用了從2020年1月21日至4月8日的數據。因此，2020年2月3日

2021年5月19日

朱文英、羅鳳儀、蘇家培 數裏見真章

【30天免費閱讀】疫情蔓延嚴峻程度的風險評分

放大圖片 / 顯示原圖

自世界衛生組織（世衛）於2020年3月11日宣布2019年冠狀病毒疾病（COVID-19）為全球大流行以來，COVID-19疫情不斷蔓延。直至2021年4月30日，全球總

2022年1月26日

蘇家培 朱文英 羅鳳儀

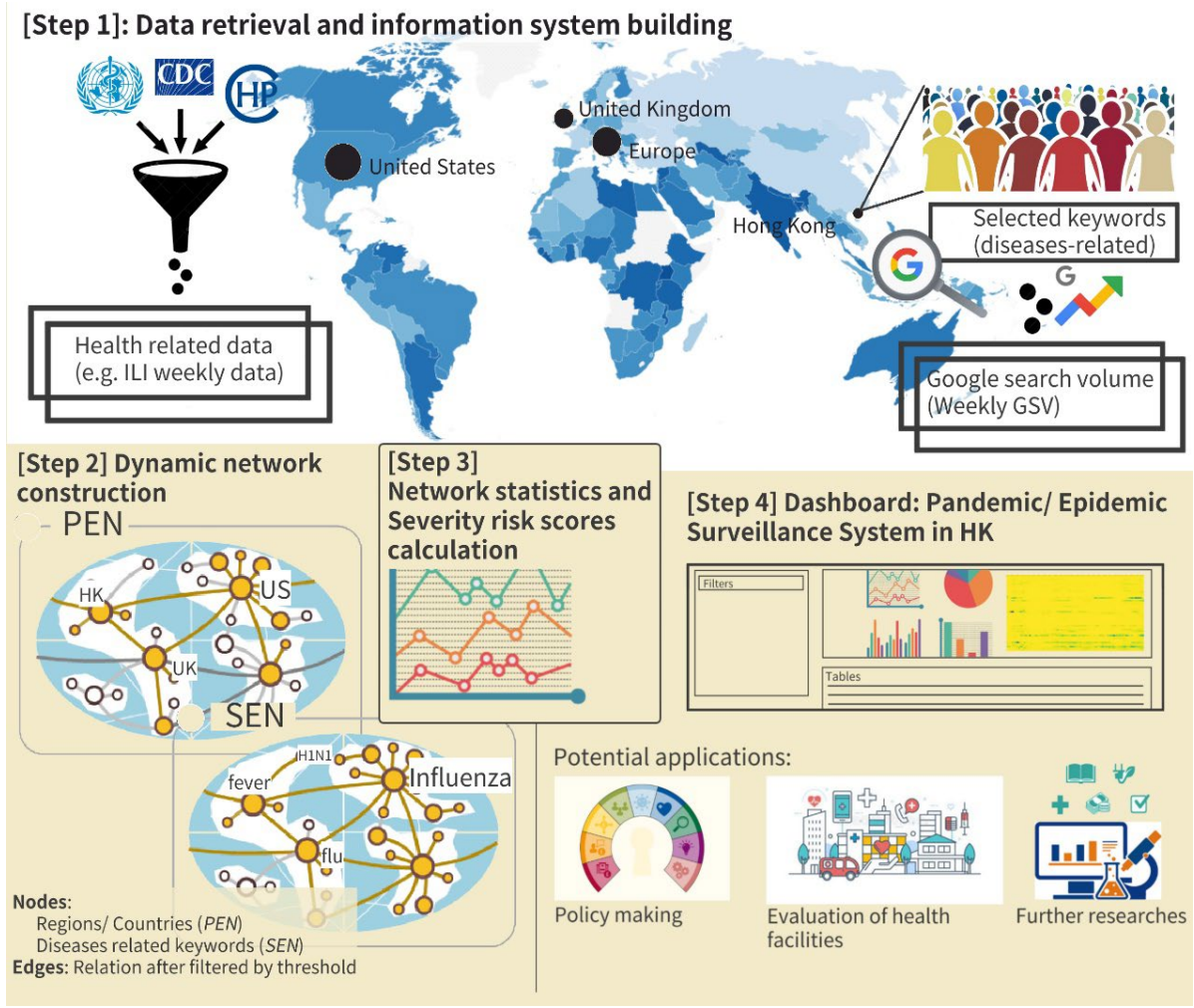
能否預測Omicron影響何時結束

4.2 Big Data Analytics – Global Level – Future Research

- Continued strengthening of **pandemic and epidemic surveillance** is crucial in preparing for existing epidemics and future pandemics.

- We aim to expand our underpinning research to develop an evidence-based, automatic-updated and validated surveillance system using network analysis to help **facilitate pandemic/epidemic risk assessment and risk response**.

- We will **integrate information** from multiple regions, multiple keywords, and different times with prompt update of recent disease status and online search activities for effective pandemic/epidemic surveillance.



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