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TRAVELER–RELATED MOBILE APPLICATION FOR INFECTIOUS DISEASE SELF–MONITORING

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Мобильное приложение путешественников для самоконтроля инфекционных заболеваний

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Abstract

Traveler apps for mobile devices such as smartphones are becoming more widely available. This study aimed to identify traveler infectious disease self-monitoring implementation strategies on a mobile application. It analyzed 73 journals from the PubMed database using the descriptive-analytic method. The records used in this exploration study were those released between 2018 and 2023 that were collected based on the keywords "travelers' application," or "infectious disease". Data analysis was conducted using the VOS viewer software analytical tools.

According to the findings, studies on traveler application domination with pandemic COVID-19 travel apps used. The study on mobile applications for traveler applications on infectious disease revealed four clusters of dominant themes: information about the COVID-19 outbreak, application related to diagnosis for travelers, measurement community mortality and risk, and respondent risk assessment. This study also looked at research patterns throughout time. Current research themes concern travel risk applications that can raise people's knowledge of endemic areas, health risk avoidance, and early identification of infectious illness signs to recommend beginning management. Through bibliometric analysis and network visualization, the researchers summarized current developments in infectious disease for traveler's research to shed light on their research frontier, trends, and hot themes. These findings could be useful for future research and views in this quickly evolving subject.

Резюме

Приложения для мобильных устройств, предназначенные для использования во время выезда в различные географические зоны, становятся все более доступными. Целью данного исследования было определение основных стратегий, используемых в мобильных приложениях, разработанных с целью снижения риска заражения инфекционными заболеваниями среди путешественников. Для этого был проведен анализ 73 журналов из базы данных PubMed с применением описательно-аналитического метода. В исследование включены записи, опубликованные в период с 2018 по 2023 г., собранные по ключевым словам «Приложение для путешественников» или «Инфекционные заболевания». Анализ данных проводился с помощью аналитических инструментов программы VOS viewer.

Учитывая события анализируемого в нашем исследовании периода, приложения, вошедшие в исследование, в основном были связаны с контролем распространения SARS-CoV-2-инфекции. Было выделено 4 основных тематических кластера приложений: получение и распространение информации о вспышке COVID-19, приложения для самодиагностики заболевания среди пользователей, оценка смертности и риска в конкретных сообществах, а также оценка индивидуального риска. Также была рассмотрена динамика паттерна существующих исследований с течением времени. Актуальные темы исследований включают приложения для оценки рисков при путешествиях, которые могут повысить осведомленность людей о эндемичных районах, предотвращение рисков для здоровья и раннее выявление признаков инфекционных заболеваний для раннего начала лечения. С помощью библиометрического анализа и методики визуализации сетей мы обобщили текущие достижения в сфере выявления и контроля инфекционных заболеваний у путешественников, чтобы выделить текущие тренды, тенденции и актуальные задачи данного направления. Полученные результаты могут быть полезны для грядущих исследований в рассмотренной предметной области.

Key words: *developments in infectious disease; mobile devices; traveler apps; VOS viewer.*

Ключевые слова: *разработки в области инфекционных болезней, мобильные устройства, приложения для путешественников, VOS viewer.*

Introduction

Thus, the present work provides a bibliometric analysis of the progress made in traveller infectious disease self-monitoring research. It aims to evaluate the strength and prominence of scientific research issues on this new phenomenon, explicitly focusing on traveller infectious disease self-monitoring. To support advanced prospective research ideas and offer recommendations for creating traveller infectious disease self-monitoring applications, this article intends to provide primary data, identify traveller infectious disease self-monitoring strategies on a mobile application, and so forth.

The practice of travel medicine is crucial in the prevention and management of diseases that are associated with travel. Travel medicine in Europe encompasses a broad range of recommendations at both national and municipal levels. It is overseen by a varied group of healthcare professionals, such as nurses, general practitioners, travel clinics, and chemists [1]. Ensuring travelers health relies on preventative measures such as immunizations, prophylaxis, travel safety information, insect bite prevention, and other strategies. Equally important is the guardians against illness and in monitoring imported diseases linked to travel. Travel medicine must adapt to the evolving environment of travel, which includes a growth in both the quantity and variety of travelers, as well as the expansion of locations [2].

According to this analysis, privacy emerges as the foremost ethical concern for travel medical applications. This can be partially attributed to the worries of researchers and developers on adherence to privacy and security rules. These worries are valid, as there is a lack of explicit ethical norms and data governance on a global scale. With the exception of the General Data Protection Regulation in Europe, there are currently no universally established minimum worldwide criteria for the keeping and sharing of personal data for secondary purposes how the general data [3]. Medical travel applications, like any health apps, are required to adhere to the privacy laws of each specific nation [4]. It shown that placing trust in the organizations responsible for creating and executing health applications helps alleviate user concerns regarding the security and confidentiality of their data [5]. Another factors influence the utilization of these apps such as age, language proficiency, health literacy, and residing in a lower-middle-income nation [6][7] . The presence of selection bias, caused by the diversity in mobile phone ownership or user proficiency with mobile technology, has a direct impact on the quality of data. This might lead to inaccurate or deceptive feedback for users, which is especially troublesome for travel medical applications, as it involves the health of the users [8].

In recent years, there has been a significant increase in the quantity and variety of health apps. These advancements include applications designed for leprosy screening [3], TB treatment [4], HIV prophylaxis adherence [5], as well as a range of apps for COVID tracking and reporting [6,7]. Additionally, there exist applications specifically designed for monitoring and tracking outbreaks. However, the majority of these applications concentrate solely on one particular illness, such as influenza, or exclusively serve the needs of healthcare professionals [8]. The smartphone application was created in the prevention of influenza-like diseases (3) to implement lifestyle improvements during Hajj. This feature ensures compliance and provides a user-friendly interface with the program. The program was specifically built to operate offline, enabling convenient usage. The application is now undergoing copyright and patent procedures [8]. Some applications prioritize addressing the risks and behaviors of travelers related to diseases that are not caused by infections [9] [10] .

The development of questionnaire to assist travellers in mitigating the risk of developing COVID-19 by methodical preparation. This questionnaire aims to precisely characterise the hazards involved and suggest optimal strategies to minimise them. This questionnaire as a baseline to develop a tool for reviewing local and national COVID-19 guidelines. Additionally, it is unlikely to require regular updates in order to accurately estimate the danger of travel. Providing the detailed for users, the participants were presented with a brochure detailing the mobile app. The brochure included information on the app's objectives, key features and functions, benefits, screenshots of the app interfaces, supported platforms, and the app's name for downloading from the Google Play or App Stored [18] .

As a result, this study provides a bibliometric overview of the developments in infectious disease self-monitoring mobile applicationWith a clear focus on traveller self-monitoring. It aims to evaluate the strength and prominence of research subjects around this new phenomenon in the scientific community. This paper aims to present primary data, identify techniques for implementing traveller self-monitoring on a mobile application to use advanced research ideas, and offer suggestions for creating applications for traveller infectious disease self-monitoring.

Method

This research approach applied a qualitative literature review study. Research data were collected by searching the PubMed database (https://pubmed.ncbi.nlm.nih.gov), an internationally recognized database of peer-reviewed journals. The keywords were "traveller application," or "infectious disease" applied to the Pubmed database with publication dates from 2018 until 2023.

All data were taken during the same period, November 2023, to eliminate the bias caused by the increase in the database. The steps taken in this investigation are depicted in Figure 1 to give a clear picture of the study conducted. The step of collecting data was based on Nobanee et al. study [24]. Data was exported to RIS file format to distribute research map information. Then, the bibliometric leadership map was determined using two types of analysis: Pubmed menu search results analysis and VOS viewer software analysis (Figure 1).

Pubmed search results were analysed using the descriptive method based on the year of publication, co-occurrence of research theme, and research topic. The collected data was refined several times to obtain the best information related to traveller mobile app. The VOS viewer software was also used to map the most prevalent terms when examining traveller related mobile app for infectious disease—the title or author keyword used as the basis for the traveller self-monitoring context.

The researchers employed mixed citations for the bibliometric investigation and sorted the dimensions of analysis and units using bibliometric searches. Co-authorships, which aided in analyzing the social structure of the study field, co-occurrences to understand the document set patterns that support the research, and a bibliographic coupling that employed multiple references shared by two documents as a comparative measure were among the citations.

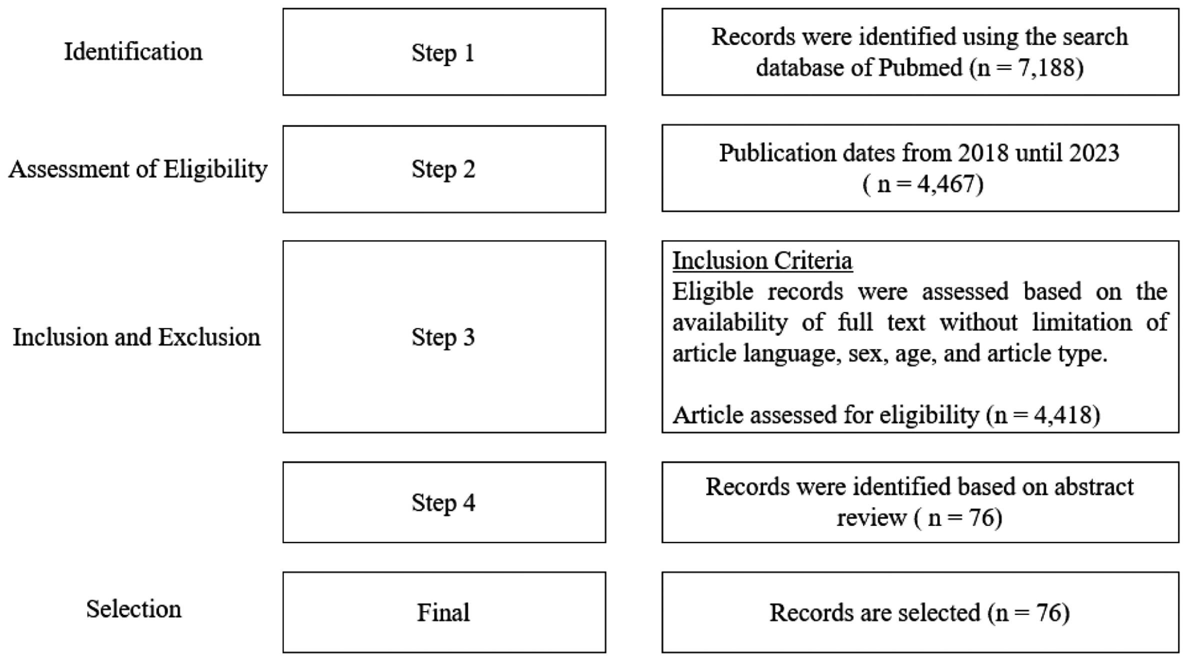

Fig. 1. The steps of searching selecting articles

Result and Discussion

3.1. Publication by Year

In Figure 2, complete bibliometric research was led using the VOS viewer software and PubMed. The analysis of this study contained 73 documents from the year 2018 to 2023. Figure 2 also illustrates the annual trend in publications related to traveller application. Data for this study were collected from 2018 to 2023. In the previous years, research studies on traveller application have shown an increase in trend of the number of articles, especially in 2022.

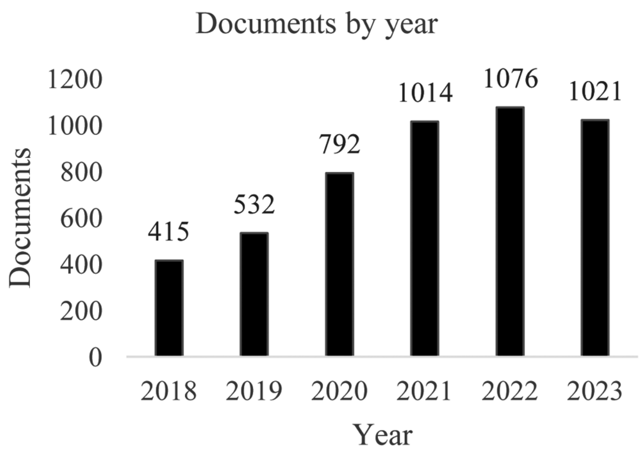

Fig. 2. Publication by year

Besides the number of publications each year, this study also analyses the trends of research topics in this area. The most significant trends occurred from 2020 until 2022. In 2020, the trends were about measurement of covid-19 mortality, measurement related application, traveller diagnosis, SARS COV pandemic diagnosis, diagnosis technology and measurement detection technology. Traveller risk application, detection application for community and COVID -19 application detection were examined in 2021. Moreover, in 2022, travel pandemic application and travel application were explained. Trends in 2022 until now have been developing the travel pandemic application and travel application. This shows that study is improving each year (Figure 3 and Figure 4).

3.2 Keyword Analysis

The author's keywords were diagrammed with VOS viewer, a software tool for constructing and visualizing bibliometric networks. Figure 3 presents a network visualization and overlay visualization. The figure applies color coding to show how each cluster's network is visualized. The hues employed in this instance are navy, green, yellow, blue, and purple. The network visualization depicted in Figure 3 represents all publications with underlying themes that frequently appeared in this study. The VOS viewer software found a total of 2949 keywords, 73 of which met the

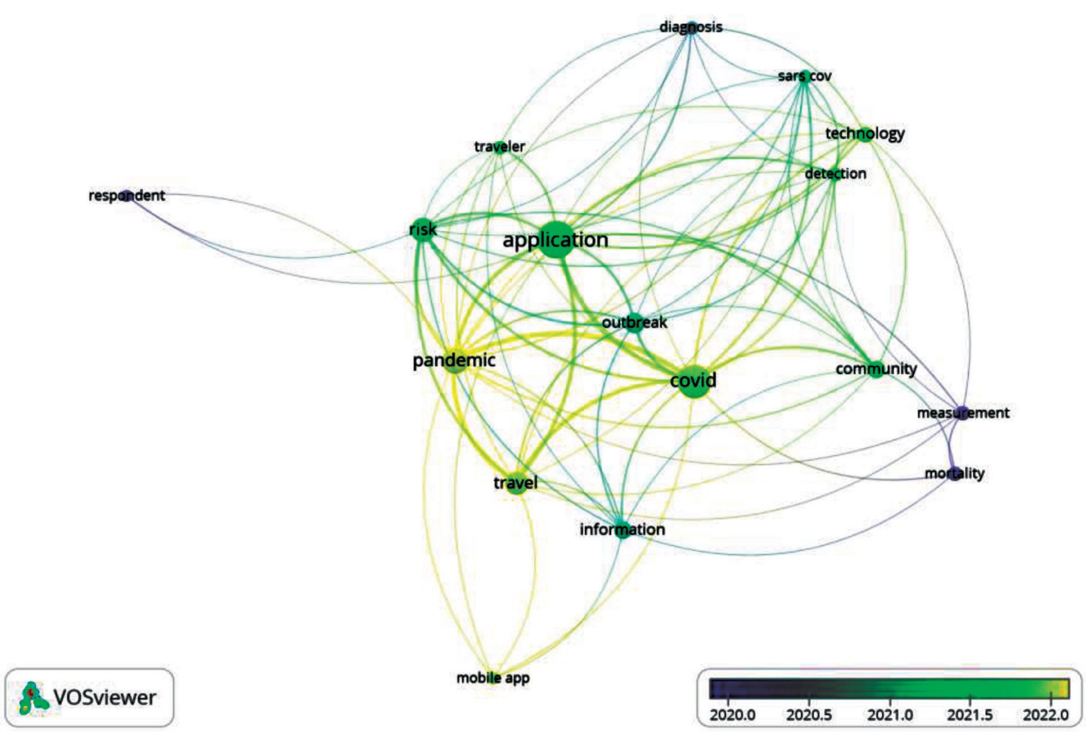

Fig. 3. Network Visualization

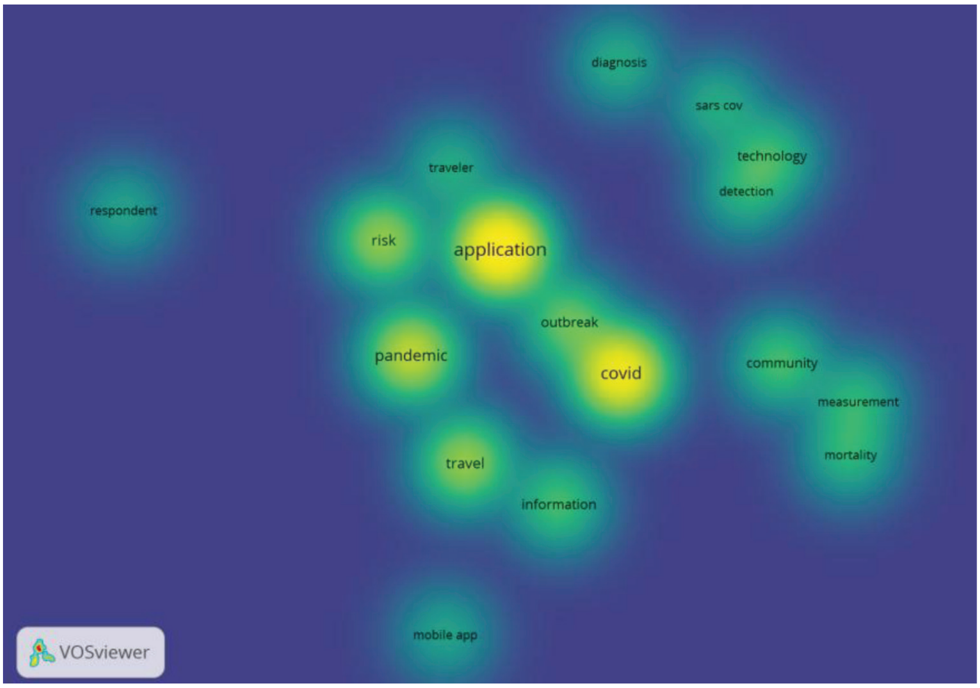

Fig. 4. Density visualization

data analysis criteria from 76 Pubmed-indexed documents published between 2018 and 2023. VOS viewer was used for bibliometric mapping of traveller application, divided into 4 clusters, as shown in Table 1.

Cluster 1 is expected to contain the documents related to topics of interest in covid, information, mobile app, outbreak, pandemic and travel. Meanwhile, application, detection, diagnosis, SARS COV, technology, traveler are located in Cluster 2. Cluster 3 deals with community, measurement, mortality while Cluster 4 relates to respondent, risk. Table 1 can be the key to the theme of each cluster.

The researchers chose two themes that are related to the present study: application related to diagnosis for travelers and respondent risk assessment (Table 2). These two themes are the most similar to this research topic. A reported study by K. Y.-L.Yap et.al., 2020 and J.Wu et.al., 2020 were develop the CoV-SCR web-app as a bottom-up, proactive approach by allowing individuals to maintain a personal log of their close contacts and symptoms on a daily basis. This enables them to provide precise and pertinent information to healthcare professionals and during the contact tracing process. It offers them a structured method to observe themselves and their families, evaluate their daily routines, and promptly seek medical assistance, if needed. Moreover, this recording technique not only minimizes the healthcare resources required, but also enhances the dependability of contact tracing and can serve as an early detection method for suspected cases. This enables individuals or health authorities to promptly implement interventions such as isolation and medical treatment. Healthcare experts and health authorities will have the ability to access the user's symptoms and close connections through the emails sent by the web-app, with the user's agreement. The CoV-SCR web-app serves as a valuable supplementary public utility tool to augment existing contact tracing applications. It improves the monitoring of community transmission of COVID-19 by enabling users to manually document their close contact details in a tailored manner [11]. In addition to offering contact tracking and symptom monitoring, the CoV-SCR web app combats the infodemic by compiling data on the

Table 1

The clusters of keyword analysis

Cluster	Items	Total	Percentage (%)
Cluster 1	covid, information, mobile app, outbreak, pandemic and travel	6	35.29
Cluster 2	application, detection, diagnosis, SARS COV, technology, traveller	6	35.29
Cluster 3	community, measurement, mortality	3	17.64
Cluster 4	respondent, risk	2	11.7

coronavirus pandemic from reputable sources such as the WHO, national health agencies, and PubMed literature [12].

Research from [13] measured the travel distance of vaccinated individuals using GPS data. The concept of this study using an interrupted time series research design to examine the data from the same person before and after vaccination, which helps reduce the impact of non-time-varying confounders. This study showcases the practicability of gathering large quantities of geolocation data for research purposes and the usefulness of such data in comprehending public health concerns. Another study during pandemic shows the development of a compulsory self-quarantine system that utilizes wearable devices, contact tracking technologies, and AI face recognition. The suggested wearable device may also identify post-vaccination symptoms and collect health data, including heart rate and blood oxygen saturation, from the vaccinated individual. This data can then be used for additional medical interventions and home healthcare monitoring [14]. WhatsApp effectively facilitated the remote management of several patients, thereby eliminating the need for needless hospital visits. Future research necessitates gathering data on patient satisfaction during teleconsultations and promoting the utilization of widely-used social networking programs as alternate means for consultations in a pandemic scenario [15].

Teleorthodontics has proven advantageous for both patients and orthodontists. It has several benefits, such as a decreased likelihood of transmitting infections. In conventional dentistry clinics, ensuring infection control is consistently a priority as it is an exceptional method to increase patient care and boost the availability of dental treatments [16]. Multiple studies in the literature have examined the correlation between the transmission of COVID-19 and the mobility and travel patterns of inhabitants. Beck and Hensher discovered that as individuals get older, their perception of travel danger tends to rise, but this impression diminishes when travel frequency increases [17].

During a situation such as a pandemic, there is a quandary about the gathering of data to align with activity-based travel demand models for emerging behaviors, while also considering the potential hazards of conducting extensive travel surveys within an unpredictable period. Hence, the suggested modeling framework provides a viable approach by adjusting a pre-existing model utilizing a limited-scale benchmarking survey conducted during the epidemic. Furthermore, the agent-based simulation step incorporates behavioral guidelines. This method enables the microstimulator to produce activity-travel patterns that are associated with rules established during the epidemic, such as mandatory student telecommuting. The developing of Contact Tracing Apps (CTA) enables the country that uses it to recover from the pandemic faster [18], and therefore many countries utilized different technological approaches to design CTA that adapts to their own nations' conditions [19][20][21][22].Most existing research on such issues focuses on privacy and security in use, visitors' willingness to use, and public value in use [23, 24].

The findings demonstrated that foreign travel increased steadily between 1999 and 2004, with high-risk travel accounting for 53.4% of all travel and low-risk travel accounting for 46.6% with the highest destination to sub-Saharan Africa (14.9%) [25].

The mobile application prototype that was presented, along with COVID-19 data visualizations, serves as a foundation for developing a practical solution that could be marketed to assist individuals in locating straightforward, organized information regarding current travel restrictions and statistics. Finding a single, well-organized source of information about travel restrictions worldwide is currently challenging [26]

A big data mobile health application, built on a design science framework to preventing and treating health issues related to the Hajj pilgrimage. The most advanced method for tackling health concerns associated to Hajj in the future will be found in our proposed plan for developing and implementing a mobile health application based on big data [27].

In infectious disease model individuals who did not indicate their immunization status, were not up to date with their vaccinations, or were not vaccinated against HPV, 23% (8/35) used the mHealth tool to be vaccinated. The tool's (1) instructional elements and (2) capacity to support tangible vaccination action plans were the main uses by the participants [28]. The collaboration with the healthcare professionals and Ministry of Health officials

The development of the App involved collaboration with healthcare professionals and Ministry of Health officials enabling its usage on both mobile phones and tablet computers. Its user-friendly interface, capacity to automate reports, and its open-source nature, ensuring long-term sustainability. The platform enables offline data capturing in the App, with the option to connect to the internet just for data uploading [29].

Recently, a mobile software application for providing pharmacy information called "Non-Prescription Medicine Mobile Health Application (NMMHA)" was designed and developed [30]. The first version of the software contains two main functions: searching for medicine information and setting time to take medicine. The user satisfaction result shows the proven evidence of the software acceptance; however, some functions were recommended by users during the software testing process. In this second version of the NMMHA, we focused on function adding and improving the mobile software application corresponding to user feedback [31].

Conclusion

Many people have become aware of their health. Mobile applications can also significantly improve environments with limited resources since they make data collecting more simple and thorough [33]. Based on the analysis that was carried out using VOS viewer, the results of clusters and trending topics from the study were obtained. This traveler's mobile app will collect current information from travelers regarding various travel-related illnesses, focusing on symptom monitoring. Ensuring data confidentiality, privacy, and public health are the high concern. The researchers chose two cluster themes related to the present study: application related to diagnosis for travelers and respondent risk assessment. These two themes are the most similar to this research topic. Most of the research related to these themes aims to identify travel risk applications that can raise people's knowledge of endemic areas, health risk avoidance, and early identification of infectious illness signs to recommend beginning management. Through bibliometric analysis and network visualization, the researchers summarized current developments in infectious disease for traveler's research to shed light on their research frontier, trends, and hot themes. These findings could be useful for future research and views in this quickly evolving subject. Based on the results of this research, the authors recommend, for future research, the development of an infectious disease travelers' mobile application that helps people self-monitor and report their traveler behavior.

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