Paper Title: ***Crafting an Information Ecosystem for Data Equity: Harmonizing Multidisciplinary Expertise***

Abstract:

In response to the pervasive issues surrounding data equity in healthcare and health information dissemination, an interdisciplinary team convened as the Health Humanities, Communications, and Informatics: (HHCI) Working Group to address these challenges. This paper elucidates the collaborative efforts of the HHCI working group, formed in the summer of 2023, comprising early and mid-career faculty from diverse disciplines including Information Science, Communication, Journalism and Media Studies, and Clinical Psychology. The team's collective endeavour culminated in the development of an Information Ecosystem (IE) model, meticulously crafted to confront the complexities of data equity within marginalized communities and racial minorities. Through extensive ideation sessions, the team delineated a comprehensive framework that outlines essential considerations for data equity projects and research endeavours. This paper serves to bolster data equity researchers by offering a foundational structure that elucidates the intricate interplay between sociocultural factors and the dissemination of high-quality health information. As a pioneering initiative, the Information Ecosystem and the discussion surrounding it lays the groundwork for future endeavours aimed at fostering equitable access to healthcare data and information dissemination channels. (Refer to Appendix A for insights into the formation of the HHCI working group and its overarching objectives).

1 - Introduction

1.1 – Background - Need to harness expertise in Health Humanities, Communications, and Informatics: the (HHCI) Working Group

There has been increasing attention to systemic and structural barriers to data equity that have persistently exacerbated inequities in the health and well-being of historically marginalized groups: A threat to public health (National Academies of Sciences et al., 2017). Data equity comprises the equal representation, access, and dissemination of credible health information and data; adhering to its four principles of equity-mindedness, collective impact, purposiveness, and systemic change helps to dismantle longstanding power imbalances and inequalities (Ramasubramanian & Dutta, 2023). Data equity in the public health communication environment refers to the equitable access, utilization, and distribution of health-related data and information, ensuring fairness and inclusivity across diverse population groups and demographics (CDC, 2022). Many researchers recommend the process of collecting, analyzing, interpreting, and

distributing data to be driven by marginalized communities to reduce subjectivity and biases that are interlaced with dominant voices(Ponce et al., 2023; Viswanath et al., 2022; Viswanath & Kreuter, 2007). Simply put, data does not exist within a vacuum, nor is it only represented by figures and numbers. Without data equity, stories of lived experiences from underserved groups that have the potential to alter political and economic systems remain hidden (Ramasubramanian & Dutta, 2023). The absence of an accurate account of these lived experiences can lead to communication inequalities amongst underserved communities, which can expand gaps within the conceptualization and use of the data. For example, data that depicts missed care (e.g., missed primary care appointments, lack of cancer screenings, prescriptions left unfilled) absent the known barriers to care, such as lack of primary care providers or insurance coverage due to under-employment, may lead to irrelevant communication approaches, such as campaigns to inform those at risk for poor outcomes resulting from missed care. (Chapman et al., 2022; Hager, 2021)

Inequalities in communication can contribute to knowledge gaps in the information environments of communities and social groups (Kontos et al., 2010). These gaps can affect responses to health-related challenges by influencing motivations to seek and engage with new information and inhibiting access to credible, inclusive, and relevant information (Goulbourne & Yanovitzky, 2021). Communication inequalities refer to the differences in the production and distribution of information and differences in information accessibility and availability among subgroups due to contextual and individual-level factors (Ackerson & Viswanath, 2009; Viswanath & Kreuter, 2007). Research suggests that communication inequalities can stunt the growth of a robust communication infrastructure within communities. Communication infrastructure encompasses formal and informal communication channels and networks that facilitate the flow of health information between communities, organisations, and external stakeholders(Goulbourne & Yanovitzky, 2021; Kim & Kim, 2021). Thus, the communication infrastructure is a critical bridge between the information environment and health outcomes (Goulbourne & Yanovitzky, 2021). With issues arising from data inequities, communication inequalities can lead to pernicious effects on information environments, limiting communities' ability to tackle health-related challenges.

In this paper, we outline how an interdisciplinary team collaborated to conceptualize an Information Ecosystem(IE) model. The working group, which was formed during the summer of 2023, is composed of early and mid-career faculty from Information Science, Communication, Journalism and Media Studies, and Clinical Psychology (See Appendix A for details on how the group was formed and its specific goals). The purpose of this information ecosystem model is to support data equity researchers by delineating the fundamental framework of data equity. The initial work product is a novel 'Information Ecosystem' (IE), tailored to address health equity concerns, which mapped the environment that results in the inequitable consumption of high-quality data/information.

2 - Information Ecosystem for Health Data Equity

2.1 Conceptualization of the Information Ecosystem (IE)

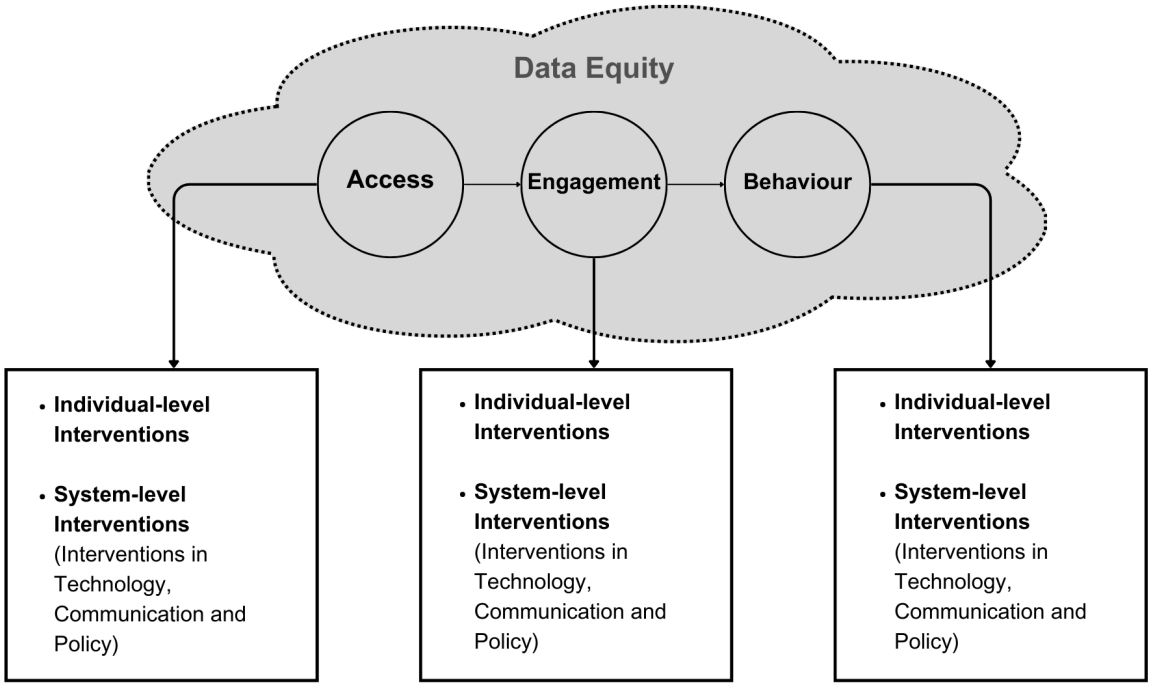

Figure 1: The Information Ecosystem (IE) for Health Data Equity

The primary purpose of initially conceptualising an information ecosystem was to facilitate the development, design, and communication of diverse projects aimed at advancing Data Equity. We established a common understanding of an information ecosystem, 'all structures, entities, and agents related to the flow of semantic information relevant to a research domain, as well as the information itself' (Kuehn, 2023). Our team opted for this definition for two primary reasons: a) It delineates semantic information, which is meaningful to individuals and b) To ensure the scalability of the ecosystem and its benefits across various research domains, we prioritize its applicability over a broader, all-encompassing ecosystem that includes all digital information.

We considered how the ecosystem depiction will account for structural barriers and historical oppression that people from target groups, such as racial minority populations experience, using the communication infrastructure as a social determinant of health (Goulbourne & Yanovitzky, 2021). The depiction situates the communication infrastructure as a pivotal link between health outcomes and the information environment. It also seeks to underscore how knowledge and information gaps resulting from the uneven distribution of information impede disadvantaged groups and communities from accessing, comprehending, organizing, and responding to health information (National Academies of Sciences et al., 2021). In articulating this into our IE, the primary focus lies on identifying aspects of the communication infrastructure that can be adjusted to mitigate communication disparities and enhance the ability of individuals and communities to address and manage health inequalities. We also found it imperative to identify policies and frameworks that may pinpoint and address the gaps within existing systems.

The information ecosystem aspires to aid investigations that will collect and track sources and communication channels of health information such as formal channels like the CDC and informal channels like one's social circles or relatives, such as a close family friend who got COVID, then concluded that vaccines must not be effective so they are not worth the risk. In a collaborative effort, our team of researchers converged to address such pressing public health issues, especially those prevalent in racial/ethnic minority communities. The collective mission revolved around building an information ecosystem (IE) which serves as a framework to support researchers in various areas of data equity, such as in the strategic design of systems that address health disparities via information channels that inform and empower marginalized communities.

2.2 The Information Ecosystem (IE) - Access, Engagement, and Behaviour

In this section, we describe the three key elements of the information ecosystem (IE): Access, Engagement, and Behaviour. These 3 components are derived from the HHCI and data equity initiatives' goals. (See Appendix A for details on how the group was formed and its specific goals)

(1) Improving access to relevant and credible health information (Access)
The first goal is to enhance access to relevant and credible health information. We define access as the knowledge of where an individual can find relevant, credible, and trustworthy information and the capabilities to do. For instance, an individual seeking information, and knowing and capacity to find, "Where can I receive a COVID-vaccine booster?" signifies 'Access'. Previous studies identified significant limitations on the available means of information access that could be met by improving electronic and digital access mechanisms (LaPelle et al., 2006). The IE emphasises the inclusion of a comprehensive repository of trustworthy health resources under 'Access'. By consolidating and curating accessible information, we can aspire to address long-standing disparities in healthcare information access.

(2) Improving engagement with relevant and credible health information (Engagement)
The second goal centres on improving engagement with health information. An extension of access, engagement reflects a desire for further understanding such as "I wish to learn more about how the booster will help me, and its risks for me." The team acknowledges the importance of not only providing information but also ensuring that it resonates with the diverse cultural and linguistic backgrounds of the target communities. innovative communication strategies in the information ecosystem such as multilingual resources and culturally sensitive approaches foster meaningful engagement with health information. There are real risks of subsequent emerging and reemergent infectious diseases (Balinska & Rizzo, 2009; Shafaati et al., 2023). Thus, there is an urgency to implement data systems to identify and monitor shortages of credible health information accessibility, especially for racial/ethnic minority groups who are frequently targeted for misinformation and experience gaps in accessing credible health information, it is imperative to provide support for media outlets and community resources serving these populations. This action is crucial for addressing persistent disparities in accessing reliable health information.

(3) Improving the capacity of target groups, and individuals belonging to them, to refine health behaviour based on health information (Behaviour)
The third goal focuses on elevating the capacity of target groups and individuals within them to refine health behaviour. The IE also points towards the need for empowering individuals to make informed decisions about their health. By implementing educational initiatives, skill-building programs, and community interventions, they aim to enhance the ability of community members to adopt healthier behaviours grounded in reliable health information. This interdisciplinary team envisions the information ecosystem as a dynamic and responsive framework that adapts to the evolving needs of minority racial/ethnic communities. With the IE we have aimed to create a transformative tool that addresses areas that connect current health disparities and establishes multiple pillars of consideration for sustained improvements in health outcomes within these communities. In doing so, we can exemplify the potential impact of research-driven initiatives in promoting health equity and fostering positive change in underserved populations.

Informed by these 3 goals and the multidisciplinarity of the group that convened around them, the team created an initial map and invited input from each member, ideas were then discussed considering the content expertise within segments of technology, communication, media studies, society, and policy. Additionally, by prioritizing access, engagement, and behaviour, the initiative aims to create a more inclusive and effective digital health communication landscape that empowers individuals to make informed decisions about their health and well-being.

First, a broad mind-mapped version with goals and the aims of an IE in mind was created. After this initial stage of diagramming, contributors further enriched the articulated thoughts. The collaborative efforts resulted in the creation of the IE (see Figure 1). The team examined the goals of the data equity initiative using the Integrated Behavioural Model (IBM) (Glanz et al., 2008) and implies this sequence *"Access -> Engagement -> Behaviour"* in its IE devised using the model. The IBM is a theoretical framework used to understand and predict health-related behaviours. The IBM describes the factors that lead to an individual's readiness or decision to initiate or modify health behaviour. IBM posits that behaviour is influenced by a combination of factors including attitudes, beliefs, social norms, perceived control, and environmental factors. It emphasises the importance of both cognitive and affective processes in shaping behaviour and suggests that behaviour change interventions should target multiple levels of influence to be effective. The IBM has been applied in various health promotion settings to study behaviours such as smoking cessation, physical activity, and adherence to medical treatments (Ching, 2019; Glanz et al., 2008; Hawe, 2015; Kim & Kim, 2021).

This sequence of *“Access -> Engagement -> Behaviour"* refers to the progression of actions leading to a specific behaviour. Initially, individuals must gain access to relevant information or resources related to the behaviour they are considering. Once access is achieved, engagement occurs, indicating active involvement or interest in the information or resources. Finally, this engagement may lead to actual behaviour change or action related to the initial information or resources accessed. This sequence underscores the importance of providing accessible information, fostering engagement, and ultimately promoting desired behaviours when it comes to health.

2.3 Intervention components of the IE

We further concretized the framework of “Access -> Engagement -> Behaviour” by adding recommended individual-level and System-level interventions to the ecosystem. The expertise of the researchers on this team (which are Technology, Communication, Psychology, Media & Health Policy) and a review of the literature informed the proposed interventions.
Intervention is “*the act of interfering with the outcome or course, especially of a condition or process (as to prevent harm or improve functioning)”* and in Health Equity intervention is defined as *“an intervention that helps to close the equity gap while aligning with the Triple Aim in healthcare: to improve patient experiences, improve health outcomes, and reduce costs”* (*What Are Health Equity Interventions?*, n.d.)

In the information ecosystem, intervention components are those that point toward work that can be done about addressing (in)equalities and (in)equities in digital health communication. In any ecosystem, it is important to focus on specific intervention avenues in order to directly inform public health. Interventions can occur at the points of access to health information (e.g., the information provided, what information is sought, and from what sources), engagement with health information (e.g., risk perception), and behaviour (e.g., health decision-making). As mentioned above, these interventions hold the most promise when matched to specific barriers to health.

2.3.1 Interventions for ‘Access’:

a. Individual-level Interventions:

Individual-level interventions in improving access to healthcare information and in turn to healthcare services will involve addressing various factors that may impede an individual's ability to obtain timely and appropriate care. It involves integrating primary care information with information concerning other services, such as housing, nutrition, or mental health support services. Outreach activities and capacity outside of clinic/healthcare facilities, to provide information concerning healthcare services and payment support. Interventions may be more complex for populations who experience access barriers (e.g., those experiencing unstable housing, and mental health challenges) such as availability, affordability, and acceptability (Hawe, 2015; “Interventions to Improve Access to Primary Care for People Who Are Homeless,” 2016) pressing barriers related to availability, affordability, and acceptability of healthcare services may involve developing tailored solutions that consider the unique circumstances and preferences of these populations. For example, providing flexible scheduling options, offering transportation assistance, or integrating mental health services into primary care settings can help overcome access barriers for vulnerable populations.

b. System-level Interventions:

System-level interventions focus on barriers and facilitators to access to healthcare and health information, such as social determinants of health, developing and disseminating innovative

technology-enabled solutions to extend care (e.g., telehealth), and integration of inpatient and outpatient care (e.g., care coordination) (Bhatt & Bathija, 2018). Creation of health information and related factors such as reading level, presentation of information, and dissemination impacts access; ensuring proper evidence-based and patient-informed information and widespread dissemination matters. Additionally, healthcare information spreads through various channels such as One-to-one interactions, like doctor-patient consultations and peer support groups, which offer personalized exchanges. Provider-level interventions in healthcare systems such as provider communication skills training increase the likelihood of access to evidence-based healthcare information in a way that patients can understand, take in, and use. Conversely, one-to-many channels, such as mass media campaigns and community workshops, disseminate information widely. Employing diverse formats will ensure healthcare information effectively reaches diverse audiences. Effective communication strategies and media campaigns are essential for promoting health behaviours and disseminating accurate information. Engaging narratives, culturally sensitive messaging, and collaboration with media outlets can enhance the efficacy of healthcare communication efforts. While information communication technologies present some promise, their incorporation into minority population IEs is still limited due to design limitations (Valdez & Rogers, 2022).

2.3.2 Interventions for 'Engagement':

a. Individual-level Interventions:

Individual-level interventions aimed at enhancing engagement with health information involve empowering individuals and promoting proactive health, as well as those improving risk perception, decreasing fear and negative effects if it is a barrier to healthcare information engagement, and teaching media literacy skills.
Empowering self-advocacy is crucial to empower individuals to advocate for their healthcare needs and rights. This involves teaching them how to assertively communicate their concerns, request accommodations when necessary, and seek second opinions in healthcare settings. Alongside this, encouraging regular health screenings and preventive care by stressing the significance of it encourages individuals to take proactive measures for their health and well-being. Offering information about recommended screenings, vaccinations, and lifestyle adjustments promotes preventive healthcare practices. Combatting stigma and misconceptions surrounding certain health conditions fosters open dialogue and diminishes barriers to seeking healthcare information and services. Providing accurate information, challenging stereotypes, and cultivating supportive environments help individuals feel more comfortable discussing their health concerns. These interventions aim to empower individuals, encourage proactive health behaviours, and create environments conducive to open communication about healthcare needs and challenges.

b. System-level Interventions:
System-level interventions must focus on engaging relevant populations/communities and defining for relevant populations what effective healthcare engagement is. Tailoring interventions to meet the unique needs, preferences, and cultural contexts of diverse communities fosters trust, promotes participation, and improves health outcomes. For example, healthcare provider communication interventions focused on empathic communication increase patient engagement

with provided healthcare information, decreasing stigma. Systems-level intervention efforts within the healthcare system can decrease provider and system-level stigma and improve patient engagement with provided healthcare information.
Additionally, different groups rely on specific information gatekeepers for healthcare guidance. While some may trust medical professionals and healthcare institutions, others may seek advice from community leaders, religious figures, or online platforms. Understanding these dynamics helps tailor information dissemination strategies to meet the needs and preferences of diverse populations.

2.3.3 Interventions for 'Behaviour':

a. Individual-level Interventions:

Individual behavioural interventions focused on data equity tend to be informed by psychosocial theories (e.g., Theory of Planned Behaviour, Theories of Behaviour by Rachel Davis, Integrated Model of Behaviour Change) and those targeting the specific health behaviour of interest (e.g., diet, physical exercise). These interventions recognize the complex interplay between individual behaviour and broader social determinants of health. By integrating psychosocial theories, they aim to understand the underlying factors influencing health behaviours and address barriers to equity. Interventions in the context of data equity focus on individuals using information to inform their health behaviours.
Traditional health behaviour interventions may apply theories such as social cognitive theory (Davis et al., 2015) to understand how individuals' beliefs, attitudes, and social environments influence health behaviours. Data equity behaviour interventions may include interventions for increasing the utility of health information for actual behaviour change, such as behavioural activation after receiving and engaging with health information from a reliable source, or health decision making interventions, or interventions that prompt patients to create SMART (i.e., Specific, Measurable, Actionable, Reasonable, Time-Based) goals. Sometimes these interventions benefit from health behaviour specificity: By identifying specific behaviours like diet or physical exercise, interventions can tailor strategies to promote healthier choices and mitigate disparities in access and outcomes. By addressing individual behaviours within the context of data equity, these interventions strive to reduce disparities and promote health equity across diverse populations. They acknowledge the importance of considering social, economic, and environmental factors that shape health behaviours and outcomes, aiming to create inclusive and empowering approaches to improve overall health and well-being.

b. System-level Interventions:

System-level interventions are more frequently integrating technologies. Thus, behavioural intervention technologies (BIT) focused on data equity are being evaluated and refined for efficacy in various health contexts, including mental health. BITs are defined as behavioural interventions that use information and communication technology to address both behavioural and mental health outcomes with a focus on utilizing health data to improve health behaviors. For example, videoconferencing and telehealth-enabled interventions to provide mental health

services (i.e., teletherapy) have been studied for increasing the likelihood of behaviour change (Mohr et al., 2013). Further system-level interventions aim to integrate behaviour tracking into the electronic medical record system, creating automatic prompts for healthcare providers and to the patient through a patient portal to check in about ongoing behaviour change, increasing the likelihood of sustained behaviour change after a health information and/or health behaviour intervention.

In the pursuit of achieving data equity for ethnic/marginalized/vulnerable populations, it is imperative to emphasise not only the improvement of the flow of and engagement with health information but also the structural development underlying these efforts. While enhancing accessibility and engagement with health information is crucial, it is equally essential to address systemic barriers that hinder marginalized communities from accessing and utilizing such resources effectively. Moreover, focusing on health literacy and acknowledging the capacity of people of colour to navigate complex health information is paramount. This entails designing interventions and resources that are culturally sensitive, linguistically appropriate, and considerate of diverse learning styles and knowledge frameworks. Additionally, engaging with target communities at the very inception of public health issues is critical. By involving communities upfront before developing research questions, researchers can ensure that their investigations are grounded in the lived experiences, priorities, and concerns of the populations they seek to serve. This participatory approach fosters trust, enhances relevance, and increases the likelihood of interventions being embraced and sustained by the community.

Through this ecosystem, our team of researchers hopes to empower those who are not only informed by community engagement but also actively involve community members in the co-creation and validation of any research surrounding data equity. The collaborative process put into the information ecosystem ensures measuring the extent to which research projects incorporate community engagement can serve as a valuable metric for assessing the effectiveness and inclusivity of public health initiatives.

In the future, the IE can be made more advanced by integrating community-driven indicators and feedback mechanisms into project evaluation frameworks. This will help researchers gauge the impact of their efforts on promoting health equity and fostering meaningful community participation in decision-making processes. Ultimately, centering community voices and experiences in public health research and practice is essential for advancing equity, dismantling structural barriers, and promoting health outcomes that are truly inclusive and reflective of the diverse needs and realities of marginalized populations.

2.4 Collective Impact of the Information Ecosystem:

The concept of the Information Ecosystem (IE) developed by the interdisciplinary team at HHCI is designed for utilization by a variety of stakeholders involved in public health, community development, and health equity initiatives. Our model depicts the information infrastructure that exists in a health information environment and the behavioural outcomes experienced by members of a particular community or social group.

Potential users and beneficiaries of this concept include:

1. Healthcare Professionals: Healthcare providers and practitioners can leverage the IE to identify specific areas where there is a need for health information generation or distribution, better communication strategies, improved patient education, and tailored health interventions to better serve minority racial/ethnic communities. For example: A healthcare provider in an urban clinic who notices a trend of low vaccine uptake among Hispanic communities can use the IE to map & identify gaps and employ necessary interventions (perhaps interventions of improved communication strategies or patient education materials), leading to the development of culturally tailored educational resources and targeted outreach efforts to improve vaccination rates among Hispanic residents.

2. Researchers and Academia: Researchers in fields such as public health, sociology, and information sciences can benefit from the IE by using it as a framework for studying and addressing health disparities within minority communities. For example: A team of researchers, much like the HHCI working group, focusing on health disparities among African American communities can use the IE framework to analyse patterns of health information access and utilization. By studying the information ecosystem, they identify systemic barriers to healthcare access and develop interventions aimed at improving health outcomes and reducing disparities within these communities.

3. Community Organizations: Non-profit organizations and community-based groups focused on health promotion can utilize the IE to design programs and initiatives that are culturally sensitive and responsive to the unique needs of minority populations. For example, A non-profit organization dedicated to improving health outcomes in underserved neighbourhoods can utilize the IE diagram to design a community-based health education program. By understanding the information landscape within the community, they tailor their outreach efforts to address specific health concerns and cultural preferences, leading to increased engagement and awareness among residents.

4. Policy Makers: Policymakers and governmental agencies involved in public health policy can find value in the IE concept as a guide for developing policies aimed at reducing health disparities and promoting equitable health outcomes. For example, A state health department uses the IE framework to inform the development of public health policies aimed at addressing disparities in access to healthcare information and services. By identifying key components of the information ecosystem, policymakers can prioritize interventions that promote health equity and improve outcomes for marginalized populations.

5. Educational Institutions: Educational institutions, particularly those involved in health education and community outreach, can incorporate the IE into their curriculum and outreach efforts to train future healthcare professionals and community leaders. For example: A university integrates the IE concept into its public health curriculum to train future healthcare professionals. Students learn to analyse the information ecosystem

within different communities and develop strategies for promoting health literacy and equity in their future practice.

6. Technology Developers: Developers of health-related technologies and platforms can use the IE concept to create digital tools that are accessible, culturally relevant, and effective in disseminating health information to minority communities. For example: A team of app developers creates a mobile health application targeting Spanish-speaking users. By considering the information ecosystem, they design the app to provide culturally relevant health information, connect users with local resources, and facilitate communication with healthcare providers, ultimately improving health outcomes within Hispanic communities.

7. Community Leaders and Advocates: Local community leaders, advocates, and grassroots organizations can draw on the IE concept to guide their efforts in addressing health disparities, fostering community engagement, and advocating for improved healthcare resources. For example: A community organizer in a rural area uses the IE framework to assess the availability and accessibility of health information for residents. Armed with this knowledge, they mobilize community members to advocate for improved healthcare resources and services, leading to the establishment of a community health centre and expanded access to care.

8. Public Health Initiatives: Larger public health initiatives at regional, national, or international levels can adopt the IE framework to ensure that their programs are inclusive, responsive, and effective in reaching diverse populations digitally. For example: A national public health initiative focused on reducing obesity rates among Native American populations adopts the IE framework to guide its digital outreach efforts. By understanding the unique information needs and preferences of Native communities, the initiative develops culturally appropriate messaging and resources that resonate with target audiences, ultimately contributing to positive behaviour change and improved health outcomes.

Overall, the IE will be beneficial to anyone involved in promoting health equity, addressing health disparities, especially in digital spaces, and fostering positive change in underserved populations, particularly those belonging to minority racial/ethnic communities.

3 - Discussion

Here are 5 key insights we present in our paper:

1. Targeted Approach for Inequality Reduction:
The Data Equity Initiative aims to address inequalities in access to life-saving health information for specific groups, such as racial/ethnic minority populations, older adults, and persons with disabilities, and enhance engagement which is the ability and motivation to consider the

implications of health information towards one-self and the community (Goulbourne & Yanovitzky, 2021)

2. Conceptualization of Information Ecosystem:
The information ecosystem is a central concept in the initiative, encompassing structures, entities, and agents related to the flow of semantic information relevant to the research domain. It focuses on improving access to relevant and credible health information, enhancing engagement with that information, and empowering target groups to refine health behaviour based on the information.

3. Recognition of Technological Impact:
The initiative recognizes the importance of technology in the information ecosystem, both as a potential facilitator and sometimes maybe a hindrance. It seeks to identify gaps in access intersectionally and understand how trusted sources create barriers to information diffusion.

Technology can both counter and exacerbate health inequalities and should be considered an important mediator. It can impact each of the three major components of the IE as discussed below.

a) Access:
    - Facilitators (Enhanced Access):
        Online Healthcare Services: Digital platforms like Google and ChatGPT can provide health information to larger sections of society, including those who lack access to traditional health resources like hospitals due to monetary, insurance, distance, or stigma-based considerations.
    - Barriers (Digital Divide):
        Unequal Access: Limited access to devices, internet connectivity, and digital literacy exacerbates health inequities, leaving some populations behind.
b) Engagement:
    - Facilitators (Representation and Visibility):
        Healthy Markets Initiative: In Vietnam, this initiative uses safe peer-led online forums and chatbots to reach marginalized groups, such as LGBTQI+ individuals, ensuring their voices are heard and their unique needs addressed.
    - Barriers (Health Algorithms):
        Algorithmic Bias: Bias in algorithms used for diagnosis, treatment recommendations, or resource allocation can disproportionately affect certain groups.
c) Patient Behaviour:
    - Facilitators to Recommendations (Patient Portals):
        Patient Engagement: Patient portals allow individuals to engage with their health records, communicate with providers, and actively participate in their care.
    - Barriers to Recommendations (Misinformation):

Algorithmic Bias: Misinformation and lack of access to appropriate health information can result in reduced adoption of vaccination and other beneficial actions.

In summary, technology's impact on health equity is multifaceted. It requires intentional design, ethical considerations, and collaboration across sectors to ensure that digital tools empower all individuals and contribute to dismantling inequity.

4. Policy and Data Collection Imperatives:
There is a need to establish policies and frameworks that address gaps in existing systems and collect data to track access disparities among different populations. Additionally, involving patient populations in research, improving health system navigation, and integrating behavioural medicine in healthcare are important aspects of the initiative.

5. Communication and Community Engagement:
Emphasising effective communication strategies, the initiative underscores the importance of utilizing diverse communication channels, including community engagement activities, town halls, and one-on-one interactions, to disseminate health information, frame messages appropriately, and identify credible sources for information dissemination.

4 - Future Work in the Health equity domain

Future work will involve prioritizing research and innovation to identify novel approaches, interventions, and technologies aimed at improving health information access, and engagement, and promoting health equity on both personal and systemic levels using the IE. This entails conducting rigorous evaluations, piloting new interventions, and exploring innovative solutions to address complex health information dissemination and utilization challenges. These strategies collectively aim to advance equity, dismantle barriers, and foster inclusive health outcomes for marginalized populations.

In the forthcoming endeavours, the diverse team of researchers will engage in continuous monitoring and evaluation of health data and behaviours. This involves implementing mechanisms for ongoing assessment to gauge the effectiveness of interventions aimed at reducing disparities in health information access. The process encompasses tracking changes in access patterns, evaluating the impact of policies and interventions, and identifying areas for improvement. Moreover, expansion and scaling efforts seek to extend successful interventions to new populations and regions experiencing disparities in health information access. This will involve collaborating with additional stakeholders beyond academia, leveraging technology for broader dissemination, and adapting strategies to meet diverse community needs.

Additionally, the HHCI group emphasises the importance of incorporating feedback and iterative improvement to ensure the responsiveness of initiatives to evolving needs and challenges. Establishing feedback mechanisms enables the gathering of input from target populations, stakeholders, and community partners to inform programmatic research decisions. Furthermore, addressing emerging technologies and platforms involves anticipating and mitigating potential

barriers to health information access posed by platforms such as social media, mobile applications, and artificial intelligence in future research studies. We acknowledge the need to stay abreast of technological advancements and proactively address these challenges. Advocacy and policy development efforts will concentrate on influencing policy changes to tackle the underlying determinants of health information disparities. This includes advocating for policies supporting equitable access to healthcare resources, addressing social determinants of health, and promoting health literacy. Building Sustainable Partnerships entails strengthening and expanding collaborations with community organizations, healthcare providers, policymakers, and other stakeholders to establish a sustainable infrastructure for addressing health information disparities. This encompasses fostering collaborative relationships and aligning efforts toward common goals.

5 - Conclusion:

In conclusion, the concept of the Information Ecosystem (IE) emerges as a powerful framework for understanding and addressing health disparities, particularly within minority racial/ethnic communities. Through the interdisciplinary approach of our team and the data equity initiative, the IE emphasizes the importance of recognizing and addressing systemic barriers to healthcare access, promoting health equity, and fostering positive change in underserved populations. It underscores the need for collaboration, innovation, and a holistic approach to improving health outcomes. This serves as a start of valuable insights into the information infrastructure that shapes health behaviours and outcomes. The potential applications of the IE are vast, spanning healthcare practice, research, community outreach, policy development, education, technology development, advocacy, and public health initiatives. As we move forward in today's digital world, it is essential to continue exploring and refining the IE framework, adapting it to evolving health challenges and digital landscapes. By embracing the principles of the IE and engaging stakeholders across sectors, we can work towards building a more equitable and inclusive healthcare system where everyone has access to proper healthcare information and resources, regardless of their background or circumstances. The IE serves as the first step, towards designing projects and research that will shape a future where health disparities are reduced, and health equity is achieved for all.

References:

Ackerson, L., & Viswanath, K. (2009). The Social Context of Interpersonal Communication and Health. *Journal of Health Communication*, *14 Suppl 1*, 5–17. https://doi.org/10.1080/10810730902806836

Balinska, M., & Rizzo, C. (2009). Behavioural responses to influenza pandemics. *PLoS Currents*, *1*, RRN1037. https://doi.org/10.1371/currents.RRN1037

Bhatt, J., & Bathija, P. (2018). Ensuring Access to Quality Health Care in Vulnerable Communities. *Academic Medicine*, *93*(9), 1271–1275. https://doi.org/10.1097/ACM.0000000000002254

Chapman, K. A., Machado, S. S., van der Merwe, K., Bryson, A., & Smith, D. (2022). Exploring Primary Care Non-Attendance: A Study of Low-Income Patients. *Journal of Primary Care & Community Health*, *13*, 21501319221082352. https://doi.org/10.1177/21501319221082352

Ching, D. K. (2019). *Factors that Explain and Predict Community Pharmacists' Provision of Smoking Cessation Services: An Application of the Integrated Behavioral Model* [M.S., The University of Toledo]. https://www.proquest.com/docview/2327411241/abstract/D07C2C50C42B4A8APQ/1

Davis, R., Campbell, R., Hildon, Z., Hobbs, L., & Michie, S. (2015). Theories of behaviour and behaviour change across the social and behavioural sciences: A scoping review. *Health Psychology Review*, *9*(3), 323–344. https://doi.org/10.1080/17437199.2014.941722

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health Behavior and Health Education: Theory, Research, and Practice*. John Wiley & Sons.

Goulbourne, T., & Yanovitzky, I. (2021). The Communication Infrastructure as a Social Determinant of Health: Implications for Health Policymaking and Practice. *The Milbank Quarterly*, *99*(1). https://doi.org/10.1111/1468-0009.12496

Hager, Q. C. (2021). *The Impact of Community Churches and Barbershops on Preventive Care Utilization Among African American Men* [D.P.A., Walden University]. https://www.proquest.com/docview/2600750152/abstract/129AADB4D2244E04PQ/1

Hawe, P. (2015). Lessons from complex interventions to improve health. *Annual Review of Public Health*, *36*, 307–323. https://doi.org/10.1146/annurev-publhealth-031912-114421

Interventions to Improve Access to Primary Care for People Who Are Homeless: A Systematic Review. (2016). *Ontario Health Technology Assessment Series*, *16*(9), 1–50.

Kim, E., & Kim, Y.-C. (2021). Communication Infrastructure, Migrant Community Engagement, and Integrative Adaptation of Korean Chinese Migrants in Seoul. *Communication Research*, *48*(5), 717–739. https://doi.org/10.1177/0093650218782819

Kontos, E. Z., Emmons, K. M., Puleo, E., & Viswanath, K. (2010). Communication Inequalities and Public Health Implications of Adult Social Networking Site Use in the United States. *Journal of Health Communication*, *15*(Suppl 3), 216–235. https://doi.org/10.1080/10810730.2010.522689

Kuehn, E. F. (2023). The information ecosystem concept in information literacy: A theoretical approach and definition. *Journal of the Association for Information Science and Technology*, *74*(4), 434–443. https://doi.org/10.1002/asi.24733

LaPelle, N. R., Luckmann, R., Simpson, E. H., & Martin, E. R. (2006). Identifying strategies to improve access to credible and relevant information for public health professionals: A qualitative study. *BMC Public Health*, *6*(1), 89. https://doi.org/10.1186/1471-2458-6-89

Mohr, D. C., Burns, M. N., Schueller, S. M., Clarke, G., & Klinkman, M. (2013). Behavioral Intervention Technologies: Evidence review and recommendations for future research in mental health. *General Hospital Psychiatry*, *35*(4), 332–338. https://doi.org/10.1016/j.genhosppsych.2013.03.008

National Academies of Sciences, E., Division, H. and M., Practice, B. on P. H. and P. H., States, C. on C.-B. S. to P. H. E. in the U., Baciu, A., Negussie, Y., Geller, A., & Weinstein, J. N.

(2017). The Root Causes of Health Inequity. In *Communities in Action: Pathways to Health Equity*. National Academies Press (US). https://www.ncbi.nlm.nih.gov/books/NBK425845/

National Academies of Sciences, E., Medicine, N. A. of, Nursing 2020–2030, C. on the F. of, Flaubert, J. L., Menestrel, S. L., Williams, D. R., & Wakefield, M. K. (2021). The Role of Nurses in Improving Health Equity. In *The Future of Nursing 2020-2030: Charting a Path to Achieve Health Equity*. National Academies Press (US). https://www.ncbi.nlm.nih.gov/books/NBK573898/

Ponce, N. A., Shimkhada, R., & Adkins-Jackson, P. B. (2023). Making Communities More Visible: Equity-Centered Data to Achieve Health Equity. *The Milbank Quarterly*, *101*(S1), 302–332. https://doi.org/10.1111/1468-0009.12605

Ramasubramanian, S., & Dutta, M. J. (2023). The CODE^SHIFT model: A data justice framework for collective impact and social transformation. *Human Communication Research*, hqad050. https://doi.org/10.1093/hcr/hqad050

Shafaati, M., Chopra, H., Priyanka, Khandia, R., Choudhary, O. P., & Rodriguez-Morales, A. J. (2023). The next pandemic catastrophe: Can we avert the inevitable? *New Microbes and New Infections*, *52*, 101110. https://doi.org/10.1016/j.nmni.2023.101110

Valdez, R. S., & Rogers, C. C. (2022). Consumer Health Informatics for Racial and Ethnic Minoritized Communities: Minor Progress, Major Opportunities. *Yearbook of Medical Informatics*, *31*(1), 167–172. https://doi.org/10.1055/s-0042-1742520

Viswanath, K., & Kreuter, M. (2007). Health Disparities, Communication Inequalities, and eHealth. *American Journal of Preventive Medicine*, *32*, S131-3. https://doi.org/10.1016/j.amepre.2007.02.012

Viswanath, K., McCloud, R. F., Lee, E. W. J., & Bekalu, M. A. (2022). Measuring What Matters: Data Absenteeism, Science Communication, and the Perpetuation of Inequities. *The*

ANNALS of the American Academy of Political and Social Science, *700*(1), 208–219. https://doi.org/10.1177/00027162221093268

What Are Health Equity Interventions? (n.d.). EQUIP Health Care | Research to Improve Health Equity. Retrieved February 15, 2024, from https://equiphealthcare.ca/resources/about-health-equity-and-health-equity-interventions/what-are-health-equity-interventions/