Inclusive Services to Enhance Immigrants' Resilience to Crisis

1 Project Justification

1.1 Alignment of Project Objective with NLGL

The University of North Texas is seeking $415,366 for a 3-year **Applied Research** grant project that aims to enhance public library inclusive services for immigrants in times of crisis, strengthen the resilience of under-resourced immigrant groups, and contribute to the overall well-being of communities. This project will support the development and implementation of emergency and disaster management plans to strengthen the ability of libraries to provide services to affected communities, which aligns with the **National Leadership Grants for Libraries** program Goal 4 and Objectives 4.1 & 4.2. The project team has previously identified the most in-need US counties with high immigrant ratios, high crisis risks, and low resources, which will be the study areas to investigate three research questions: RQ1: What are the information needs of immigrants in crisis in under-resourced communities? RQ2: What is the status of public library practice in the inclusive services for immigrants in crisis? RQ3: What inclusive services can be recommended for public libraries to address the gaps in immigrants' needs when in crisis?

1.2 Statement of Need

Crisis events disrupt the normal functioning of individuals, groups, or systems, and can result in damaging impacts in various scenarios, including natural disasters, public health emergencies, and economic collapses. They present significant challenges or threats to the safety and well-being of individuals and can strain resources and exacerbate inequalities. Immigrants in under-resourced communities are especially vulnerable. Due to language barriers, legal status, social marginalization, and cultural differences, immigrants often face challenges in the access to related information, government assistance, and social support for crisis preparedness, response, and recovery (Hansson et al., 2020; Pongponrat & Ishii, 2018; Mendez et al., 2020). In the United States, approximately 14% of the population includes immigrants from various global locales; Of the 358 counties, 10% to 54% of the residents are either naturalized or non-US citizen immigrants, many of whom are non-English speakers or English learners (U.S. Census Bureau, 2022).

Public libraries play a vital role in assisting crisis preparation and recovery to support community resilience by providing public spaces, digital resources, information services, and other needed assistances (IMLS, 2020). Inclusivity for immigrants is an important aspect of such crisis-related services. Public libraries are highly committed to inclusivity and equity by offering accessible and available services to all individuals regardless of their immigration status. Neglecting immigrant populations can lead to secondary crises, such as spikes in poverty, homelessness, or crimes (Mendez et al., 2020). On the other hand, immigrants' positive experiences during crises can lead to their better integration to the host society in the long term (Ngin et al., 2020). Assisting immigrants in crisis will not only facilitates their resilience to crisis and reduce societal inequalities, but also enhances their understanding of government and public services from multiple perspectives, thereby aiding their integration to the host society. This study will investigate immigrants' needs in crisis for holistic and inclusive strategies to build community resilience, which will generate insights for enhancing the inclusive services to immigrants by public libraries, as well as informing other public service providers on how to better cater to the needs of immigrant populations.

1.3 Related Work and Research Gaps

1.3.1 Lack of a Holistic View of Immigrants' Information Needs in Crisis

Access to crisis-related information and being informed about the latest updates is a vital element in resilience-building. However, many studies found immigrants usually lack access to crisis-related information due to language barriers (Hansson et al., 2020; Pongponrat & Ishii, 2018; Mendez et al., 2020) and social capital limitations (Chu & Yang, 2020). New immigrants do not have extensive social or familial networks in the host country, which can be vital for support, resource-sharing, and information dissemination during crises. Immigrants have concerns about their immigration status (Mendez et al., 2020; Pongponrat & Ishii, 2018) and are often distrustful of the government (Hansson et al., 2020), which limits their access to the government assistance and support. Assisting immigrants in accessing to information in need is critical and will enhance their capacity to prepare for, respond to, and recover from crises. However, there is a lack of studies that provide a holistic view of immigrants' information needs, especially of the needs of immigrants from under-resourced communities.

1.3.2 Lack of Understanding How Public Libraries Serve the Most In-need Immigrants in Crisis

Numerous examples illustrate a variety of services provided by libraries in crisis. During the height of the COVID-19 crisis, public libraries were revealed as telemedicine hubs which allow users to overcome and "mitigate telemedicine disparities" (DeGuzman et al., 2022, p. 295). Mersand et al. (2019) explained that "due to their strong legitimacy in the eyes of citizens and the types of services and programs they are already providing, which in many cases go well beyond what could be considered traditional library services," public libraries can be centers of technologically connected smart communities (p. 3305). In particular, public libraries in rural communities are understood to be key resources for community members experiencing crisis situations (Bishop et al., 2013; DeGuzman et al., 2020; Jaeger et al., 2018).

Public libraries have served immigrants in their practices, but there is a lack of systematic research that goes beyond case studies on inclusive planning and development of services for immigrants in crisis settings. Projects have been established to serve immigrants, for example, the American Dream Literacy Initiative, Project Welcome supported by the American Library Association (ALA). Toolkits have been developed on serving immigrants and non-English speakers, such as How to serve the world @ your library, and Engaging Multilingual Communities and English Language Learners in US Libraries. These resources focus on including immigrants in general services, such as the collection development, language learning programs, and providing shared spaces. However, there is currently no guidance for libraries on how to serve immigrants in crisis, which could present a unique set of challenges due to immigrants' language barriers, legal and immigration status, and lack of knowledge to the roles of public agencies in the US. Due to factors that limit funding and staffing for public libraries' environmental scanning efforts, many public libraries are not always fully aware of the needs and challenges faced by immigrants in under-resourced communities—opening the way for gaps in the effectiveness and benefits of services and outreach programs aimed at immigrants in under-resourced communities.

1.3.3 Dimensions of Vulnerability and Resilience Building for Immigrants

Immigrants face unique challenges in crisis due to their socio-cultural background, and economic and legal status, which can be categorized into four aspects: (i) Economic vulnerability. The financial instability of immigrants has been identified in several studies (Behbahani et al., 2020; Subroto & Datta, 2023). Due to the legal status of immigrants, their employment is usually at risk pre-crisis. Disasters and epidemics can further exacerbate the situation (Mendez et al., 2020). (ii) Social vulnerability. Immigrants face a lack of social support (Pongponrat & Ishii, 2018), and targeted discrimination or conflicts based on their demographics; for example, immigrants' evacuations were affected by rumors of "immigration status is checked at shelters" during Hurricane Harvey and Hurricane Irma (Hunt et al., 2020). (iii) Physical vulnerability. Their physical health is at a high risk due to various reasons, such as their unfamiliarity or distrust with health systems (Khullar & Chokshi, 2019) and a deficiency in health care resources (Behbahani et al., 2020). (iv) Psychological vulnerability. Mental health issues in the immigrant community after disasters have been identified by several studies (Vu & VanLandinham, 2011; Subroto & Datta, 2023). Our proposed work will first analyze immigrants' needs from these aspects and investigate into ways to enhance their resilience building through an informational perspective; for example, education on crisis preparedness, response and recovery, effective communication, connection with other community members, and knowledge of the local legal and health systems, with which public libraries are well-equipped to help.

1.4 Preliminary Work

The project team utilized publicly available data, including the demographics of populations from the American Community Survey (ACS), natural hazard risks from the Federal Emergency Management Agency (FEMA), and broadband use data from the National Telecommunications and Information Administration (NTIA), and identified 15 counties that are in critical need of crisis services for immigrants. These counties have a relatively higher proportion of immigrants in the population, a higher risk of crisis, and a lower rate of broadband use. A higher proportion of immigrants signifies a higher need for immigrant-related services as public libraries serve local residents. Areas that lack broadband services will have more limitations on accessing digital crisis-related information; public services to help access information becomes critical. There are 48 public libraries in the identified areas, varying in size and type (Institute of Museum and Library Services (IMLS), 2021). Figure 1 shows these 15 counties. Please see the supporting attachment "Mapping Areas in Need of Immigrant-Focused Crisis Support" for more information about these counties. We further identified under-resourced communities in these counties based on the poverty rate of census blocks (U.S. Census Bureau, 2022).

The proposed mixed-methods research will be conducted in the identified areas, with the recruitment of public library staff and immigrant community members as research participants. Through a systematic investigation of immigrant communities' information needs and public library services in the targeted areas, this project will gather the necessary knowledge and create a toolkit to enhance the ability of libraries to support their under-resourced immigrants in emergency and disaster management situations.
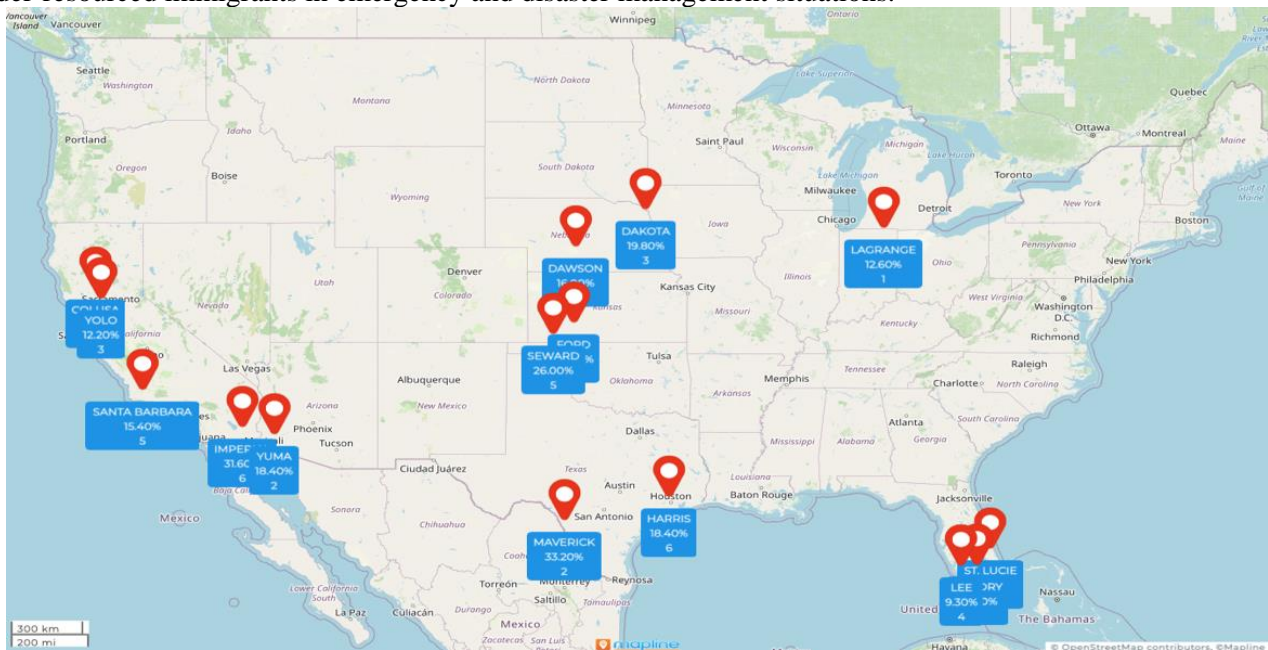

Figure 1. Geographic distribution of the 15 counties and 48 public libraries in these counties as targets. The label shows the name of the county, approximate proportion of immigrants, and the total number of public libraries.

2 Project Work Plan

This project will use mixed methods to investigate the information needs of immigrants in under-resourced communities and the inclusive services of public libraries for immigrants in crisis preparedness and recovery in the targeted counties. Additional locations and their public libraries will be identified for study if needed. Appropriate IRB approvals will be secured for all surveys and interview studies.

Throughout all stages of the project, an advisory board will provide advice and guidance for the project team. Project personnel will meet with the advisory board on Zoom annually to receive feedback on the project's progress and development. The team will also send quarterly updates to the advisory board. Individual meetings and correspondence with advisory board members will also occur as needed during the project. The advisory board members will be compensated for their time. We aim to have about 10 people serving on the advisory board. So far, the project has obtained commitment from the following leaders of experts on emergency and disaster management research in LIS and in Emergency Management and Disaster Science:

- Dr. Vanessa Frias-Martinez, Associate Professor in College of Information Studies and UMIACS, Director of Computational Linguistics and Information Processing Lab and Co-Lead of the Values-Centered AI Institute at the University of Maryland College Park. Her research interest includes emergency response, fairness of AI, and smart cities. She has been PI and Co-PI of grants totaling $12,117,000 from NSF, Maryland Transportation Institute, and others. She will collaborate on Task 1.1-*data-driven insights from user-generated data* and provide guidance on working with public agencies.
- Dr. Marcia A. Mardis, Professor and Associate Dean for Research in College of Communication & Information, Director of the Information Institute at Florida State University. Her research intersects community disaster resiliency, learning resources, and workforce development. She has been PI, Co-PI, and/or senior personnel on many NSF and IMLS grants totaling over $25 million. Dr. Mardis will oversee the studies with librarians from targeted areas and help with project dissemination.
- Dr. Edward Benoit III, Associate Director and Associate Professor in the School of Library & Information Science at Louisiana State University. The founder of the IMLS-funded PROTECCT-

3

University of North Texas

GLAM, a project to develop a climate disaster risk assessment scale for galleries, libraries, archives, and museums. We will seek his suggestions throughout the project.

- **Dr. DeeDee M. Bennett Gayle**, Associate Professor of Emergency Management, Director of the Extreme Events, Social Equity, and Technology Laboratory at University at Albany, SUNY. Her research expertise is in social equity during disasters, social vulnerability in disasters, and marginalized populations. She has been the PI, Co-PI, and senior personnel of multiple NSF and NIH funded grants, totaling over $10M. She will provide guidance on crisis management practices throughout the project.
- **Dr. Hao-Che Wu**, Associate Professor at the Emergency Management and Disaster Science at UNT. He has been the PI and Co-PI of multiple NSF and Natural Hazard Center grants totaling over $1M. He has participated in the development of a handbook for urban disaster resilience. He will collaborate on developing the toolkit for public libraries in serving immigrants for crisis preparedness and recovery.

The advisory board will also include 5 community consultants to connect with and broaden the impact of the project on immigrant communities. We are going to work with public librarians, leaders, and coordinators of immigrant community organizations, church groups, and coordinators and volunteers of NGOs for immigrants. We have obtained the support from the following community consultants, and will connect to additional individuals who we will identify during the process of the project:

- **Dr. Ana Cleveland**, Regents Professor, Sarah Law Kennerly Endowed Professor, and Director of the Health Informatics Program at UNT. Dr. Cleveland is a renowned expert on the intersections of health, information, and services for underserved populations. She is a Cuba immigrant and has many connections with Hispanic communities in Texas.
- **Adam S. Davis**, Director of System Services at the Palm Beach County Library System. He has been actively involved in library services to help communities in the response and recovery from disasters. He will help connect with crisis management practitioners in libraries and immigrant communities in Florida.
- **Dr. Michele A. L. Villagran**, Assistant Professor in the College of information at San Jose State University. She is the current REFORMA Research Committee Chair and REFORMA Education Committee Chair. REFORMA is the national association to promote library and information services to Latinos and the Spanish-speaking. She will help connect with immigrant communities in California.
- Nora Rizvi, Employment Specialist at the International Rescue Committee (IRC). IRC is a national organization that helps people affected by conflicts or disasters to survive and recover. She will help us connect with immigrant communities, and people who serve immigrants and refugees.

2.1 Research Objective 1: Identify the Information Needs of Immigrants in Crisis

A mix of quantitative and qualitative methods will be used to obtain input from immigrants in the targeted locations with varying circumstances, including ones who regularly use the Internet and those without broadband use. This work will adopt a triangulation method composed of multiple data sources, methods, and analysis to cross-check and validate findings, which includes (i) A data-driven study of user communication on social media during crisis to identify issues faced by immigrants (Task 1.1); (ii) A survey with immigrants (Task 1.2); and (iii) Interviews with immigrants (Task 1.3).

The data-driven study will use retrospective social media data on natural disasters and the COVID-19 crisis. We will not limit the data to be aligned with the survey and interview studies in locations and time. The main purpose of the data-driven study is to generate a comprehensive list of all potential issues, which will further be used to inform questions for the survey and interview studies. The retrospective crisis data together with current studies with users will reflect problems that are persistent and require efforts to address.

The survey and interviews will complement the data-driven study by offering a more detailed and nuanced understanding of the needs of immigrants in crisis. People often contend that findings extracted from social media data are biased, as social media users tend to be younger generations with relatively higher socioeconomic backgrounds and are more tech-savvy. On the other hand, the participants of surveys can be purposely selected to be inclusive of a more diverse range of participants, including the population groups who do not frequently engage in social network activities. In addition, the insights generated by the data-driven study may not be entirely correct as algorithms are not perfect in comprehending user communications. Therefore, conducting user studies is essential for validating and interpreting the findings.

The study proposed here will be among the pioneering investigations of the comparative findings between the data-driven method and user study method. This will not only present a holistic understanding of immigrants'

needs in times of crisis, providing insights for more inclusive decision making for emergency management and response; the differences in the findings with the data-driven method and user studies will also garner a better understanding regarding the biases in social media data. This could serve as a foundation for future interpretations of findings based on user-generated social media data.
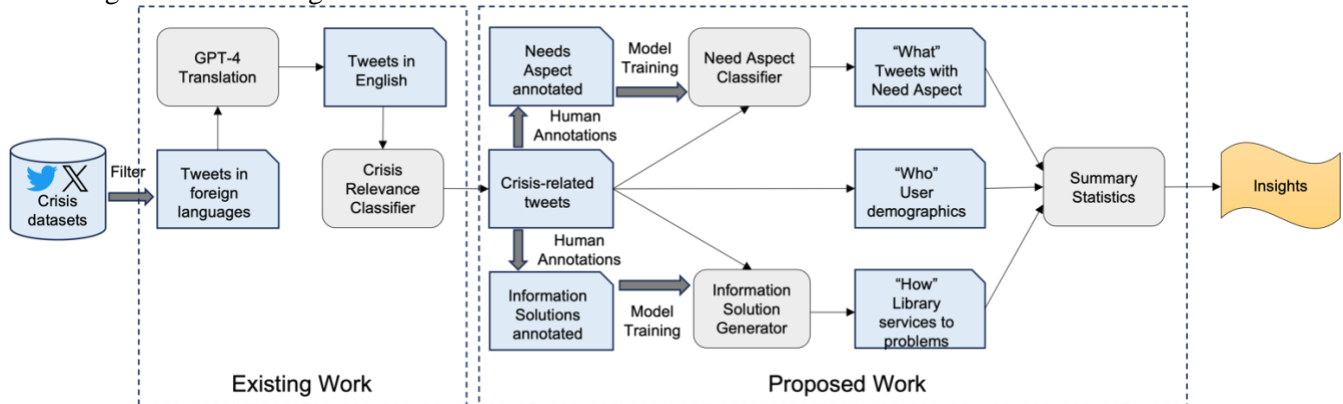

Figure 2: Processing flow of user-generated data. Data modules are colored blue. Model modules are grey.

Task 1.1: Data-driven Insights with User-generated Data (Sep 2024 to Apr 2025)

Previous studies found that the ownership of smartphones among immigrants is greater than 90% and that low-income populations heavily rely on smartphones for social activities (Tsetsi & Rains, 2017). This opens opportunities to use user-generated data online to surface the needs and challenges of people in crisis. We will focus on the analysis of crisis-related tweets originating from the US in non-English languages. It is highly probable that these tweets were posted by immigrants who are non-English speakers. The data-driven insights about immigrants may not be entirely accurate or complete, but can reflect relatively comprehensive user needs across locations during different types of crises. This will also be the first study investigating multilingual social media data in crisis, offering an understanding of the value of user-generated data in minority languages. Figure 2 shows an overview of the process to extract insights from user-generated data.

The first part of the work is to translate non-English languages into English and identify user-generated content that are crisis-related. We will first utilize large language models (LLMs), such as GPT-4, for the translation, which has the state-of-the-art performance in machine translation. We will then use the crisis relevance classifier we developed in prior works to identify crisis-related content. Our prior studies (Hong et al, 2018; Xie et al., 2021) found the majority of social media discussions originating from crisis-affected areas or with crisis-related hashtags, are irrelevant to the crisis. We have developed a multi-faceted categorization method to identify crisis-related content based on the informativeness, information sources, and locality (Xie et al., 2021; Yu et al., 2022).

In this study, we propose a novel framework to extract insight related to information practices from these crisis-related tweets. In information services, "who, what, and how" are three fundamental aspects that guide the understanding, organization, and practice of information services in public libraries. As Matthews (2017) explained, these three aspects are clearly seen in every reference service interaction which "involves a customer, a librarian, the interaction between the two, and access to a set of resources that can be used to answer the question" (p. 229). Furthermore, providing services for vulnerable patrons during crisis scenarios means that "librarians must understand the situated information needs of their in-crisis patrons" (Westbrook, 2015, p. 6). Therefore, the proposed framework will aim to extract information regarding the "who, what, and how" aspects.

The literature review on immigrants' vulnerability (Section 3.3) summarized the crisis-related issues into four dimensions: economic, social, physical, and psychological, which are also mentioned by the National Disaster Recovery Framework promoted by FEMA. Therefore, we will categorize crisis-related issues into these four need aspects to extract information of "what." For an efficient and scalable way to identify the need aspects, we will develop language models, such as transformer-based models, multi-task learning models, and LLM-based models that have been explored in our prior studies. We will hire annotators for manual annotations of need aspects, validate the reliability of annotated data, and use valid data for model training and evaluation.

We will utilize the abilities of LLMs to extract insights regarding "how to serve" based on the issues reflected in the social media data. LLMs are not only capable of comprehending human language, but also assisting in problem-solving. Pre-trained with vast amounts of textual data, LLMs can extract meaningful insights from contextually relevant text and have shown promising performance in question answering. Specifically, we will randomly sample crisis-related tweets, and hire graduate students from Library and Information Science majors to help with the manual annotations. This approach is necessary as LIS students will know to look for library services that may not be obvious to others as libraries provide a vast array of services beyond information services to their communities, including social work services, mental health support, work training courses, and opportunities for community involvement, among others (Abidin et al., 2023; Akbar & Asmiyanto, 2021; Scott, 2011). For each tweet, they are asked to respond with what kind of library service may help; whether social services, facilities, consultation, education, or humanitarian care should be provided to meet patron needs. The annotated data will be used to finetune LLMs so that LLMs will generate solutions constrained in library services.

Additionally, we will utilize user profiling algorithms to estimate the demographics of users and get information of "who". This information will be combined with the need aspects and generated library services for summary statistics. This will provide a macro review regarding what services are needed by immigrants in crisis, and inform items for the following survey and interview studies.

Available Datasets: (i) Dataset of Hurricane Irma: This dataset includes large-scale geotagged tweets collected by the Firehose API of Twitter during Hurricane Irma in 2017. The Firehose API was used to retrieve all tweets in hurricane-affected states before, during, and after the hurricane, with a temporal range from August 15th to October 12th. There are 9,263,399 tweets in English and other languages. (ii) CrisisMMD: This dataset consists of tweets collected during major natural disasters based on crisis keywords, including 6,664,349 tweets for Hurricane Harvey; 2,953,322 tweets for Hurricane Maria; and 455,311 tweets for the California wildfires. The dataset is publicly available (Alam et al, 2018). (iii) COVID-19 data: Chen et al. (2020) curated the IDs of COVID-19 tweets from January 2020 to Febrauary 2023, with a total of 2,775,946,436 tweets. The PI hydrated tweets in 2022 before the deprecation of Twitter's API. This data includes ~64% tweets in English and the rest in other languages.

Task 1.2: Survey of Immigrants (May 2025 to Aug 2025)
We will conduct an assessment survey to uncover immigrants' information needs, challenges to meet these needs, and their perceptions of library support. Variations in these needs and perceptions will be examined based on the participants' demographic and social economic factors, as well as other immigrant-related characteristics, such as English language proficiency, immigrant status, length of residency, integration to the host society, etc. The survey instrument will not only be useful for understanding needs and perceptions relevant to public libraries' crisis services in this study, but also can be adjusted and adopted by other agencies that face a lack of knowledge of immigrants to provide services. Furthermore, this study will explore the methodology of using data-driven insights to formulate survey items for further investigations, which can be applied in research beyond this topic.

The survey will be developed to answer the following research questions:
- What are the information needs of immigrants in crisis response in physical, economic, social, psychological, and other aspects?
- What information channels do immigrants primarily use to access information related to crisis preparedness and recovery?
- Do immigrants meet their information needs in crisis with the existing information channels? What aspects of information needs have not been satisfied?
- How do immigrants perceive the role of public libraries in crisis preparedness and recovery?
- Do immigrants utilize public libraries to obtain information needed for crisis preparedness and recovery? In what ways?
- What expectations do immigrants have regarding the role of public libraries in crisis preparedness and recovery?

The items will be formulated based on a comprehensive scoping review of existing studies on immigrants' needs in crisis and the insights discovered from the data-driven study and on a 5-point Likert scale. Open-ended questions are designed to seek other opinions about the topic that have not been covered by the listed items. The survey questions will undergo rigorous reviews by all the project team members and the advisory board members to ensure their clarity, consistency, and comprehensibility.

We estimate to conduct surveys with ~400 immigrants in total from the targeted locations. To ensure representations across sites, we will conduct a first-round survey to collect ~200 samples, analyze the locations, and then purposely choose sites to collect more samples for broader representations across sites. We will use the Qualtrics platform to administer the survey and collect responses. Surveys will be translated into different languages, such as Spanish, Chinese, Arabic, and Vietnamese. Participants will have the option to choose a language they prefer to answer the questions. Survey participants will be solicited via social network groups, non-profits, and advocacy groups, such as the International Rescue Committee (IRC), church groups, and advisory board members' connections. The Co-PI, Dr. Ana Roeschley, has built connections with refugee communities through her IMLS funded project, which will help us reach immigrant communities. Incentives will be offered for survey participants. After data collection, we will conduct statistical analysis to report participants' perceptions regarding the questions, and to identify the differences in perceptions by demographic, socioeconomic, and immigrant-related characteristics. Multivariate regression analysis and structure equation modeling will be explored to reveal the relations.

Task 1.3: Interviews with Immigrants (Sep 2025 to Feb 2026)
In the survey, we will provide options for immigrants to leave their contact email or phone number for a follow-up interview study, which will include a reward for participation. Survey results will inform the structure of the semi-structured interview questions, which will be framed around the following four factors.

- The information that is the most important for immigrants to prepare for and recover from crises.
- Motivations for the use of certain information channels to access information related to crisis preparedness and recovery.
- Challenges immigrants face to access needed information for crisis preparedness and recovery.
- The factors that motivate or stop immigrants from seeking support in public libraries for crisis preparedness and recovery.

We plan to conduct semi-structured interviews with about 20 immigrants or until the information observed reaches saturation. To ensure that non-English speakers can participate, student translators will be hired to assist the communication in languages other than English. While conducting the semi-structured interviews, research team members will take analytic notes as the interviews progress and ask follow-up questions based on this analysis. LeCompte and Schensul (2013) explained that this "recursive process allows researchers to respond to variation and contradiction in the field, altering their models and explanatory theories so that they remain congruent with reality as it occurs" (pp. 83-84). This recursive method will enable the research team to utilize the constant comparison method during the development of new inductive categories and codes—ensuring an in-depth and nuanced analysis of the complex issues at the heart of this study.

2.2 Research Objective 2: Investigate Current Practices in Libraries
Survey and interview studies with librarians will be conducted to understand how the needs of immigrants have been considered in the design and implementation of crisis-related services. We will use a combination of survey and interviews as we aim to gain a holistic understanding of current practices with both breadth and depth. Surveys allow reaching a larger audience and provide for quantitative assessment, however, may lack insights regarding details relevant to the practices. Interviews, on the other hand, enable us to delve deeper into the specifics, uncovering the motivations, challenges, and other considerations relevant to the practices.

Task 2.1 Survey of Librarians (Mar 2026 to Jul 2026)
A survey will be utilized to provide a baseline of knowledge regarding librarian perceptions of library services for immigrants in crisis preparedness and recovery. The survey will be pilot tested with 2 public librarians to ensure the comprehensiveness, clarity, and consistency of questions. The project team will then use a combination of targeted sampling and snowball sampling to recruit participants in a survey of public librarians in the selected counties. Using publicly open data about public employees, the research team will send recruitment emails to every public services/ reference/ outreach librarian in the selected library systems. Using survey recruitment methods recommended by Hank et al. (2017), the research team will work to "build participant interest in the research enterprise" through the personalization of outreach efforts, the utilization of the five-contact framework, and through paid participation incentives (p. 277). We will also reach out to librarians through the networks of our advisory board members and connect with others referred to us by participants.

Anticipating a 60% return rate, the survey will be used to assess librarians' perceptions of services for immigrants in crisis preparedness and recovery. The survey will also examine how these conceptions and perceptions vary based on individual and institutional factors, such as each librarian's experience and institutional type. The survey will include questions about respondents' demographic information, Likert scale questions about the self-perceived effectiveness of library services for immigrants and the self-perceived ability of libraries to serve immigrants facing crisis, and open-ended questions about the nuances involved with public library services for immigrant communities. A mixed analysis integrating descriptive statistics for closed ended questions and constant comparison methods for open ended questions will be utilized. In addition to revealing librarian perceptions, survey results will inform the creation of the study protocol for Task 2.2, the semi-structured interviews with librarians.

Task 2.2 Follow-up Interviews with Librarians (Mar 2026 to Aug 2026)
Librarian survey participants will click a link to sign up for the follow-up studies if they choose. From this set of participants, about 20 librarians with a mix of administrators and front-line librarians from various sites will be chosen for virtual semi-structured interviews. Using a recursive approach to the research, the survey results will be used to construct the semi-structured interview protocols. LeCompte and Schensul (2013) described recursive analysis as a process in which "researchers explore their data both from the 'top down' (deductively, using predefined coding categories for analysis) and from 'bottom up' (inductively, developing newly identified codes/analytic categories)" (p. 83). This iterative approach will allow the research team to investigate the motivations, forms, and focuses of existing crisis-related services and programs, as well as the outcomes and challenges in current practices with more depth than can be conveyed in a survey study.

2.3 Research Objective 3: Identify Gaps and Develop Immigrant-inclusive Practices
Information from librarians and immigrants will be analyzed to identify the needs of immigrants in under-resourced communities and library practices, as well as possible library service gaps. The focus group method will be used to identify service gaps and brainstorm ideas about recommended services to support immigrants.

Task 3.1 Focus Group with Librarians (Sep 2026 to Feb 2027)
Once the challenges regarding serving immigrants for crisis preparedness and recovery have been identified, Dr. Ana Roeschley, who has extensive experience with administering focus groups, will lead a series of virtual focus groups to identify solutions and possible best practices for public libraries. This research approach was chosen as focus groups provide an interactive environment that encourages dynamic interactions among participants, thus fostering collaborative problem-solving and creativity. Participants can provide immediate feedback on proposed solutions, allowing for the refinement and iteration of solutions at the same time. Wildemuth and Jordan (2016) explained that focus groups are an ideal tool for a study of complex issues, saying, "Because the group members challenge each other's views, the discussion in a focus group has often been found to reveal a more nuanced perspective on a topic than could have been discovered through individual interviews" (p. 258). Such nuance is necessary for this stage of the study because proposed solutions cannot be implemented if they only include one type of perspective into the design. The focus group will engage participants with diverse experiences and perspectives, which may spark innovative ideas regarding which strategies can realistically be employed to streamline the process of providing essential services to immigrants.

Sampling for the focus groups will be targeted. During Task 2.1, librarian survey participants will click a link to sign up for the follow-up studies if they choose. From this set of participants, the focus group participants will be chosen to ensure a mix of librarians from various large and small, urban, and rural libraries. Additionally, the research team will work to ensure that participants from diverse ethnicities, genders, ages, and experiences are included as much as possible. We plan to conduct 10 focus groups with 3 to 5 librarians in each group. The study data from earlier phases—including the perceptions and opinions of immigrants and community experts—will be integrated into the development of focus group protocols.

Task 3.2 Develop the Toolkit (Mar 2027 to Aug 2027)
The focus group data will be used for the creation of an online toolkit on immigrant-inclusive services with profiles of the immigrant population and the facility profile of the public libraries. The toolkit will be translated into multiple languages to ensure they will be accessible to different immigrant populations. The project team will

utilize user-centric design in the creation of the toolkit with continuous feedback from immigrants, community consultants, advisory board members, and experts in crisis management. Workshops and presentations in conferences, such as ASIS&T, PLA, and ALA, will be organized to promote the usage of the toolkit. We plan to collaborate with library associations and emergency management experts from the project advisory board to create online webinars in platforms such as ASIS&T, aiming to expand the toolkit's reach to a national audience and make it accessible not only to librarians but also to the wider public.

2.4 Summary of Project Goals and Outcomes
The table below shows a summary of the research objectives, tasks, methods to be used, and the expected outcomes.

Research Objective	Tasks	Methods	Outcomes
RO1: A holistic view of immigrants' information needs in crisis	Task 1.1 Obtain insights from user-generated social media data	Develop and evaluate neural language models for need aspect classification and information solutions. Statistical analysis to identify the scope of issues and the differences of issues by user demographics.	A comprehensive report outlining crisis-related issues immigrants have Datasets with manual annotations of different types of needs and solutions from information aspects Neural language models that can be used to extract insights from user communication data in crisis Publications in venues focusing on crisis informatics and computational linguistics
	Task 1.2 Survey of immigrants	Design surveys based on data-driven insights and literature reviews. Survey immigrants to have a comprehensive understanding of immigrants' needs.	A survey questionnaire to assess immigrants' information needs for crisis preparedness and recovery A report summarizing details about immigrants' information needs and their perceptions of public libraries in crisis-related services
	Task 1.3 Interviews with immigrants	Semi-structured interviews with immigrants to have an in-depth understanding of the causes and methods to build connections between immigrants and libraries.	A report summarizing challenges immigrants face, causes of challenges, and motivations to seek for help from libraries Publications that compare the differences of data-driven and user-study findings. Publications on the method to utilize data-drive insights to inform questions in user studies
RO2: A systematic review of the current practices of public libraries in crisis-related services and serving immigrants	Task 2.1 Survey of librarians	Design surveys based on immigrants' characteristics and needs identified from RO1. Survey librarians on existing practices in immigrant-related, disaster-related services, and how they support immigrants.	A survey questionnaire that enables public libraries to assess the inclusivity of services for immigrants for crisis preparedness and recovery A report summarizing the current status in serving immigrants for crisis preparedness and recovery
	Task 2.2 Interviews with librarians	Semi-structured interviews with librarians to have an in-depth understanding of the motivations, capabilities, and resources of libraries to support immigrants' resilience to crisis.	A report summarizing the current practices implemented by libraries with varying facility profiles.
RO3: Develop immigrant-inclusive services to enhance their resilience in crisis	Task 3.1 Focus group with librarians	Conduct focus groups with librarians to identify gaps and develop solutions.	A report summarizing the focus group discussions with librarians on immigrant-inclusive services for crisis preparedness and recovery
	Task 3.2 Toolkit development	Design the toolkit with user-centric design based on the findings from Task 3.1. Test the toolkit with a small group of audience to gather feedback on its usability and effectiveness.	An online toolkit on immigrant-inclusive practices based on the profile of the immigrant population and resources of public libraries Workshops and online webinars to promote the usage of the toolkit

2.5 Project Team and Resources
The project team includes the following key personnel:

- PI Dr. Lingzi Hong, an Assistant Professor of Data Science at UNT. Her research area is in computational social science, crisis informatics, and data literacy education. She has computational research published in top-tier artificial intelligence conferences, such as *AAAI, NAACL,* and *EMNLP*, and user needs and information behavior studies published in *ASIS&T* and *IJHCI*. Dr. Hong will lead the efforts in data-driven methods and survey studies, including the design, dissemination, and analysis of surveys.
- Co-PI Dr. Ana Roeschley, an Assistant Professor and Director of Archival Studies in the Department of Information Science at UNT. She is the Principal Investigator of the IMLS-supported, *Records of Refuge: Supporting Refugee Communities' Archival Needs* (RoR)—a three-year research project that aims to close research gaps on the documentary and archival needs of refugees in the US. Dr. Roeschley will lead efforts in the interviews with immigrants and the focus group with librarians.
- Co-PI Dr. Yunfei Du is Professor and Associate Dean of Academics in the College of Information at UNT. He has more than 20 years of experience working with library education and has conducted funded projects in rural public libraries and museum studies. He specializes in library workforce training and community outreach. His publications include research methods, information behavior, library education, and rural libraries. Dr. Du will lead efforts in the toolkit design and dissemination of project deliverables.

Computing Resources: The PI Dr. Hong has a secured server located in her office with an Intel Core i7, 32GB memory, 512 GB hard drive, and 2 Nvidia graphic cards, and a server under the management of Computing for Arts and Sciences of UNT, which has an Intel Xeon Gold 6226R processor, 128 GB memory, and 3 Nvidia RTX 8000 graphic cards. Dr. Hong has applied for the Open AI's Research Access Program and awarded API for Open AI models, such as GPT-4 to support her research.

3. Project Results
The project will yield both intellectual merit in methodological advancement and real-world applications. On the research front, this project proposes a novel triangulation method that combines the use of data-driven methods with user studies to investigate immigrants' information needs in crisis in under-resourced communities. We will develop new algorithms on the extraction of insights about user needs and how to serve the needs in crisis with large-scale user-generated data, investigate the value of social media data in minority languages, and explore the methodology of using data-driven insights to inform survey designs. Data from different sources using different methods will be collected and analyzed. This will enable the cross-checking of findings, leading to an advanced understanding of the potential biases from data-driven or user study methods, which will be instrumental in interpreting data-driven results with user generated data, and developing research methods that can mitigate bias.

Through the investigation with immigrant communities and public librarians, this project will generate a comprehensive understanding of immigrants' information needs in crisis, including people from under-resourced communities, and the current practices by public libraries. This will not only help public libraries identify gaps and develop strategies and practices, but also inform other agencies about how to be immigrant-inclusive in their practices. The research findings will be disseminated via publications, presentations, and organized workshops at conferences, such as ALA, PLA, ASIS&T, and ISCRAM (a top conference on crisis response and management). Datasets, algorithms, and research protocols will be shared under ethical rules.

The project will also generate practical applications. Survey instruments will be developed, which could be reused by libraries or other public agencies to collect information from immigrants regarding their information needs, and for public service providers to assess the current state in immigrant-inclusive services. Reports will be provided to public libraries on the holistic view of immigrants' information needs and current practices as references. An online toolkit for public libraries will be developed providing guidance on immigrant-inclusive services based on the profile of the immigrants and the available resources of public libraries.

To promote the findings, the project team will create a project website to release up-to-date research outcomes and instructions on how to provide immigrant-inclusive services for crisis preparedness and recovery. This information will also be shared through round tables, library organizations, and listservs, such as PUBLIB, ALA Connect, and the ALA Ethnic & Multicultural Information Exchange Round Table (EMIERT). Although much work will be done in this project, the abundant data collected from immigrants and librarians may generate findings that inspire new questions. As a part of this project, we aim to set up new projects that is going to be based on this study for continuous research on inclusive services for immigrants.

Schedule of Completion

The proposed project will begin August 1, 2024, and conclude July 31, 2027.

Activity Year 1	Aug 2024	Sep 2024	Oct 2024	Nov 2024	Dec 2024	Jan 2025	Feb 2025	Mar 2025	Apr 2025	May 2025	Jun 2025	Jul 2025
Project kickoff	▓											
Project advisory board meeting 1	▓											
Task 1.1-1 Dataset preparation		▓										
Task 1.1-2 Data translation and cleaning			▓									
Task 1.1-3 Data annotation				▓	▓							
Task 1.1-4 Model training						▓	▓	▓				
Task 1.1-5 Summary and statistical analysis								▓				
Task 1.2-1 Design and pilot survey questions									▓	▓		
Task 1.2-2 Collect survey data of immigrants										▓	▓	
Task 1.2-3 Analyze survey data of immigrants												▓

Activity Year 2	Aug 2025	Sep 2025	Oct 2025	Nov 2025	Dec 2025	Jan 2026	Feb 2026	Mar 2026	Apr 2026	May 2026	Jun 2026	Jul 2026
Project advisory board meeting 2	▓											
Task 1.3-1 Design interview questions and protocols	▓											
Task 1.3-2 Conduct interviews with immigrants		▓	▓	▓								
Task 1.3-3 Analyze the data of immigrant interviews					▓	▓						
Task 2.1-1 Design survey questions for librarians							▓					
Task 2.1-2 Collect survey data of librarians								▓	▓	▓		

Activity Year 3	Aug 2026	Sep 2026	Oct 2026	Nov 2026	Dec 2026	Jan 2027	Feb 2027	Mar 2027	Apr 2027	May 2027	Jun 2027	Jul 2027
Task 2.1-3 Analyze survey data of librarians										▓	▓	
Task 2.2-1 Design interview questions and protocols							▓					
Task 2.2-2 Conduct interviews with librarians									▓	▓	▓	
Task 2.2-3 Analyze the data of librarian interviews											▓	▓
Project advisory board meeting 3	▓											
Task 3.1-1 Design focus group protocol		▓										
Task 3.1-2 Conduct focus groups			▓	▓								
Task 3.1-3 Analyze focus group data					▓	▓						
Task 3.2-1 Design the toolkit							▓	▓	▓			
Task 3.2-2 Seek for feedback about the toolkit design										▓		
Task 3.2-3 Dissemination of the toolkit											▓	
Project advisory board meeting 4												▓
Project wrap up and promotion												▓

Digital Products Plan

Types of Digital Products
In the data-driven study, the project will generate crisis data with annotations of need aspect, user demographics, and library service information. The data usage will adhere strictly to the data policies set forth by the platforms and comply with federal and state privacy laws and regulations. The data sharing will also adhere to the data policies by the platforms and dataset creators. Before sharing, the data gathered will undergo a thorough deidentification process, which include removing or modifying any identifiable information, such as usernames, and emails. This project will develop machine learning and LLM-based models for crisis-related social media data analysis, which will be shared to research communities to promote studies on crisis informatics and immigrants' needs in crisis.

In the survey and interview studies, both quantitative and qualitative data will be generated. Part of the data will be the output of data engineering, analysis, and visualizations. Part of the data will be digital content created for general audience, which will include reports, work-in-progress posters, and video presentations. These digital products will be archived in UNT digital libraries and shared on the project website. The content shared will strictly comply with ethical guidelines in privacy and security.

Data and Metadata Standards
The project team in collaboration with the University of North Texas Digital Libraries (UNT DL) team will choose file formats for the digital data and information that will enable the most effective and most secure management over time. Best practices for data curation and digital preservation will govern the choices of file formats for text and images. Where proprietary software is used, every effort will be made to provide the output of the software in a format as open as possible. Metadata records will be created to describe each of the project's digital resources. The UNT DL utilizes a system of metadata based on qualified Dublin Core metadata elements that ensure long-term preservation and viability of the digital objects housed in their system. Metadata records will be retained and available for open access through the UNT DL.

Policies for Access, Sharing, and Privacy
Sharable data will be saved in UNT DL, which is open access and free. Access restrictions can be placed on all items in a deposit. We adhere to the ethical guidelines on access restrictions, confidentiality, and community and individual wishes on data sharing. To store and secure the data, we will store the data in at least three secure locations that are locked, pass-coded, or encrypted, which include a secured server, an external hard-drive in a locked location, and a secure cloud-based server. Requests can be made to the Principal Investigator for limited access to the data generated by the project team. Data and files not to be shared will be saved on two secure servers, which the PI has full control, and an external hard drive in a locked location.

Policies for Re-use, Re-distribution, and Derivatives
To the extent possible, data and derived datasets collected and/or created by the project will be available to other researchers for reuse. The re-use and re-distribution will strictly adhere to the data policies set forth by the platforms where data are collected. Metadata describing all data and derived datasets will include information about requesting access to and use of the data and

datasets. Others using the project's collected, created, and/or derived data products will be requested to provide a standard citation (proper attribution provided by the project) to credit both the NSF and this project for access and use of the data.

Plans for Archiving and Preservation
The UNT DL is committed to long-term access and stewardship of publicly available research outputs. Recently, the UNT Libraries completed a self-audit using the criteria of the Trusted Repositories Audit & Certification: Criteria and Checklist (TRAC). Utilizing the facilities provided by the UNT Data Repository, all data generated by this project will be backed up frequently to protect from loss of data from hardware failures, fire, theft, etc. All research products and project-related materials, such as technical reports, presentations, and publications, will be made long-term accessible through the UNT Scholarly Works open access repository, hosted in the UNT DL.

Data Management Plan

Types of Data
Research data that will be used and generated in this project will include social media data in json, csv, plain text, and images etc.; survey questions in QSF (Qualtrics Survey Format) and word; survey data in csv and excel; interview questions and protocols in plain text, word, and pdf; and interview data in audio, video files, and transcripts in plain text. The data gathered from individual users will undergo a thorough deidentification process, which include removing or modifying any identifiable information, such as usernames, IP addressed, and emails, for access and use. In the process of the project, both quantitative and qualitative data will be generated. Part of the data will be the output of data engineering, analysis, and visualizations. All the code created for the statistical analysis, visualizations, machine learning and deep learning models will be kept and shared. To the extent possible, data will be shared in structures such as json, csv format. Code including R files, python files, textual documents, as well as images of visualizations will be shared. In terms of project outcomes, digital content on research findings will be shared in reports, posters, video presentations, and publications. The content shared will strictly comply with ethical guidelines in privacy and security.

Data and Metadata Standards
The project team in collaboration with the University of North Texas Digital Libraries (UNT DL) team will choose file formats for the digital data and information that will enable the most effective and most secure management over time. Best practices for data curation and digital preservation will govern the choices of file formats for text and images. Where proprietary software is used, every effort will be made to provide the output of the software in a format as open as possible. Metadata records will be created to describe each of the project's digital resources. The UNT DL utilizes a system of metadata based on qualified Dublin Core metadata elements that ensure long-term preservation and viability of the digital objects housed in their system. Metadata records will be retained and available for open access through the UNT DL.

Policies for Access, Sharing, and Privacy
Sharable data will be saved in UNT DL, which is open access and free. Access restrictions can be placed on all items in a deposit. We adhere to the ethical guidelines on access restrictions, confidentiality, and community and individual wishes on data sharing. To store and secure the data, we will store the data in at least three secure locations that are locked, pass-coded, or encrypted, which include a secured server, an external hard-drive in a locked location, and a secure cloud-based server. Requests can be made to the Principal Investigator for limited access to the data generated by the project team. Data and files not to be shared will be saved on two secure servers, which the PI has full control, and an external hard drive in a locked location.

Policies for Re-use, Re-distribution, and Derivatives
To the extent possible, data and derived datasets collected and/or created by the project will be available to other researchers for reuse. The re-use and re-distribution will strictly adhere to the data policies set forth by the platforms where data are collected. Metadata describing all data and derived datasets will include information about requesting access to and use of the data and datasets. Others using the project's collected, created, and/or derived data products will be

requested to provide a standard citation (proper attribution provided by the project) to credit both the IMLS and this project for access and use of the data.

Plans for Archiving and Preservation
The UNT DL is committed to long-term access and stewardship of publicly available research outputs. Recently, the UNT Libraries completed a self-audit using the criteria of the Trusted Repositories Audit & Certification: Criteria and Checklist (TRAC). Utilizing the facilities provided by the UNT Data Repository, all data generated by this project will be backed up frequently to protect from loss of data from hardware failures, fire, theft, etc. All research products and project-related materials, such as technical reports, presentations, and publications, will be made long-term accessible through the UNT Scholarly Works open access repository, hosted in the UNT DL.

Roles and Responsibilities
        The PI will have overall responsibility for the research data management. The PI will regularly check data for accuracy and completeness and review data analysis results for consistency. Disseminating the results generated by this project will be carried out by the PI and graduate research assistants in a multitude of ways. We are asking to support travel by the PI and the graduate research assistant. Major conferences in this area include *the International AAAI Conference on Web and Social Media (ICWSM)*, *ACM Web Science*, *IEEE Big Data*, *the Annual Meeting of the Association for Information Science and Technology (ASIS&T), American Library Association Conference (ALA), Public Library Association Conference (PLA), and Information Systems for Crisis Response And Management (ISCRAM)*. Research findings will also be published in peer-reviewed journals. A small selection of these journals includes *JASIS&T, Information Processing and Management (IP&M), Library & Information Science Research (LISR),* and *Public Library Quarterly (PLQ).*