Assessing the Potential of Mobile Phone Verbal Autopsies in Crisis Settings: A Case Study on Venezuela, 2024

Abstract

Verbal autopsies (VAs) are a data collection tool used to identify causes of death in areas lacking reliable death registration systems. Structured interviews with family members of the deceased enable reconstructing the signs, symptoms, medical history, and circumstances leading to death. Traditionally, VA studies have been conducted in person; however, recent research suggests that phone interviews can yield similarly satisfactory results. Collecting VAs by phone offers significant cost reductions and simplify the logistics required for national-level studies. The objective of this study is to assess the potential of phone VAs data collection compared to in-person methods, using Venezuela as a case study. The sample for the study comes from household reporting deaths occurred between 2020 and 2023 collected by the 'National Survey of Living Conditions' 2023 (ENCOVI by its Spanish acronym). Between March 25 and June 15, 2024, we conducted 526 interviews—231 telephonically and 265 in person—using an adapted version of the standard VA instrument released by the World Health Organization (WHO) in 2022. Interview modalities were randomly assigned across selected territories. We accessed the feasibility, acceptance, and quality of data obtained through phone VAs compared to in-person interviews. Preliminary results show similar levels of accuracy and respondent acceptance between the two methods. However, the main difference lies in the effectiveness of reaching the designated informants. The primary reasons for failed telephone contact were "unanswered calls" (42.4%), "incorrect telephone numbers" (15.2%), or "deactivated/non-existent numbers" (42.4%). While mobile phone VAs offer logistical and financial advantages, particularly in crisis settings, the challenges of informant contact must be addressed to improve response rates. The potential for wide-scale implementation in similar contexts is significant, especially when weighed against the difficulties of conducting face-to-face surveys in crisis-affected regions.

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Long Abstract

1. Introduction

Verbal autopsies (VAs) are a data collection tool used to determine the underlying cause of death in populations in areas lacking reliable death registration systems. A structured interview with close relatives or caregivers of the deceased enables gathering information on signs, symptoms, medical history, and the circumstances preceding death. Standard questionnaires for conducting VAs have been developed by the World Health Organization (WHO) since the 1970s. Data collected through VAs facilitates identifying underlying causes of death at local, regional, or national scales, as well as assessing the quality of medical death certification. The use of VAs is widely recommended by the WHO in programs such as the Essential Interventions SCORE, an analytical tool that promotes evidence-based health data decision-making (WHO 2021), and the RAMOS method, which aids in identifying maternal deaths. Additionally, VAs have gained renewed attention due to their potential to identify misclassified deaths during the COVID-19 pandemic.

Traditionally, studies using verbal autopsies (VAs) have been conducted through face-to-face or in-person interviews. However, a recent alternative, which has shown promising results, involves conducting interviews via telephone (Nasaruddin et al. 2022). The advantage of the telephone modality for data collection lies in its significant reduction of costs and simplification of the logistics required to carry out such research on a national scale. In this context, the objective of this study is to assess the potential of collecting verbal autopsies via telephone compared to in-person interviews in crisis context. For this purpose, Venezuela is used as a case study, with data collection based on the National Survey of Living Conditions (ENCOVI by its Spanish acronym).

Since 2014, the Institute of Economic and Social Research at the Andrés Bello Catholic University (IIES-UCAB) has conducted the ENCOVI survey. ENCOVI is a nationally and regionally representative household survey aimed at providing a comprehensive picture of social vulnerability in Venezuela, highlighting socioeconomic disparities and identifying major issues. For the 2023 data collection, conducted between February and May 2023, a question was included regarding the number of household members who had passed away in the three years prior to the survey (2020-2023). The results of this question serve as the sampling frame for our study, which evaluates two data collection modalities for VAs: in-person and telephone.

We aim at answering the following specific questions: Do VAs collected via telephone exhibit the same viability, acceptability, and quality as in-person interviews? More specifically, we are interested in whether the two modalities maintain similar acceptance or rejection rates. Additionally, does the estimated time and number of prior contacts required to complete the interview vary depending on the applied modality? Given that the interview process involves revisiting painful events for the families of the deceased, do informants experience different levels of discomfort or distress depending on the mode of VA collection? We address these questions by considering in-person VAs as the reference or "gold standard" for the information collected, and we evaluate the feasibility of the telephone modality based on the similarity of its results to those of the in-person method. Statistically significant similarities would suggest that the telephone modality could serve as a useful tool for assessing mortality during crisis setting in Latin America.

2. Methods

Study setting: Since the second decade of the 2000s, Venezuela has been experiencing a profound social and economic crisis with far-reaching consequences for its demographic trends. The collapse of the public health system, years of food insecurity and medication shortages, coupled with the rise in infectious diseases and the state's inability to provide care for chronic illness patients, have undoubtedly driven significant changes in the country's mortality patterns (Correa 2018, Garcia et al. 2019). The COVID-19 pandemic, with its multiple waves, has exacerbated the structural social and institutional problems, significantly impacting all dimensions of the population's living conditions. Concurrently, a massive emigration of nationals, estimated at 7.2 million (R4V 2024), has altered the population composition (Garcia 2024). Epidemiological alerts indicate an increase in infectious diseases such as malaria, measles, diphtheria, and tuberculosis, among others (PAHO 2024a, PAHO 2021b). Additionally, non-communicable diseases, such as cancer and cardiovascular diseases, have seen a rise in incidence. The health crisis has been compounded by the aftermath of the COVID-19 pandemic, with PAHO estimating excess deaths of 3,642 for 2020 (12.8 per 100,000 inhabitants) and 18,684 for 2021 (66 per 100,000 inhabitants). However, it is currently difficult to accurately quantify how the crisis has impacted Venezuelan survival rates, as official vital statistics have not been updated or made available to the public since 2016.

Sample size: For the 2023 ENCOVI survey, a stratified random sample of 12,683 households was interviewed, with representation at the national level and across main cities, secondary cities, and medium and small towns. Of this sample, 1,162 households responded affirmatively to the following question: *"In the past three years, since 2020, has anyone who lived with you in this household passed away?"*. Out of the total households reporting a deceased member, 1,137 were traceable through a valid phone number and exact address. Considering the geographical concentration of these households across the country and the existing socioeconomic disparities, we chose 4 federal entities with the highest population density for conducting the verbal autopsies (VAs) via both in-person and phone modalities. These areas include: 1) the Metropolitan Area of Caracas, which encompasses the Capital District, the most populated municipalities of the state of Miranda, and La Guaira due to its proximity; 2) Maracay and its surrounding areas in the state of Aragua; 3) Valencia and its surrounding areas in the state of Carabobo; and 4) the city of Maracaibo and its surrounding municipalities, including Maracaibo, San Francisco, and Cabimas in the state of Zulia. The assignment of modalities was done randomly, with an equal number of VAs conducted in each of the selected municipalities.

Table 1. Sample geographical distribution

Area	Household with valid phone number and address		Replacement	Total
	In-Person	By-Phone		
Caracas	86	86	19	191
Maracay	14	14	7	35
Valencia	23	23	6	52
Maracaibo	117	117	14	248
Total	**240**	**240**	**46**	**526**

Participants: In addition to identifying households with reported deaths, the 2023 ENCOVI survey enabled contact with the informant or reference person through the phone number and/or physical address provided during the initial data collection phase. The first contact is made with the ENCOVI informant, who is questioned about the deaths that occurred in the household, including precise dates of occurrence, and asked to identify the most suitable informant for the verbal autopsies (VAs).

The ideal VA informant had to be at least 18 years old and either present with the deceased during the events leading to their death or possess detailed knowledge of the deceased's health condition prior to their passing. This informant could be a member of the household or an external person with relevant information. Once the

most appropriate VA informant was identified, they were contacted by phone to arrange either an in-person or phone interview. For accuracy, a pre-questionnaire adapted from the main questionnaire was used.

In cases where more than one death was reported in the household during the reference period, the most appropriate informant for each VA was determined separately, with priority given to the informant of the most recent death for reporting purposes. Only 14% of the households reporting death occurred in the reference period reported two or more deaths.

Study instruments and procedures: For the collection of information on verbal autopsies (VAs), a Spanish adaptation and translation of the standard instrument developed by the World Health Organization (WHO) in 2022 was utilized. This questionnaire is designed for use on an electronic platform (Kobo) and has been adapted to include COVID-19 as a cause of death. The study also employed translated versions of all supplementary documents developed and made available by WHO, including filling manuals and training guides for interviewers (WHO 2022). The same questionnaire was used for both in-person and telephone interviews.

The VA questionnaire is divided into three population-specific sections: 1) VA-NEONATE Questionnaire, which gathers information on neonatal, perinatal, and fetal deaths (deaths of children under four weeks old); 2) VA-CHILD Questionnaire, which collects data on post-neonatal deaths and deaths of children up to 11 years old; 3) VA-ADULT Questionnaire, which addresses deaths of adolescents and adults (individuals aged 12 years and older).

In addition to the seven traditional sections of the VAs designed by WHO, additional sections were included to address the number of deaths reported in the household and the suitability of the informant for each death report. These sections also cover reasons for civil registration of deaths, the emotional well-being of respondents regarding the VAs, and reasons associated with refusal or potential incompleteness of the survey. Furthermore, questions regarding the emotional well-being of respondents were added to the original survey. These questions are crucial for assessing the level of acceptance of such surveys within a crisis context. The results provide evidence of the potential utility of surveys.

Data Collection Given the complexity of the questionnaire and the sensitive nature of the topic, a team of sixteen (16) interviewers was assembled. The training course for the interviewers lasted 28 academic hours, spread over four days. It included a 4-hour session with specialized psychologists to provide tools for self-care and trauma-informed interviewing techniques. Additionally, two group support, listening, and counseling sessions were organized for the interviewers—one at the end of the pilot phase and another at the conclusion of the data collection process. The interviewer geographical assignments were based on proximity.

Data collection for the verbal autopsy (VA) took place from April 25 to June 15, 2024. Prior to the full survey rollout, a pilot test was conducted from March 21 to April 3, 2024. Interviews were carried out between 8 a.m. and 6 p.m., with interviews conducted outside these hours requiring prior consent from the respondent. For telephone interviews, the number of attempts was limited to 10 calls, while for in-person interviews, the limit was set at 2 visits. In-person and telephone VAs were conducted simultaneously.

Statistical methods: To address our questions regarding the feasibility, acceptability, and quality of telephone versus in-person verbal autopsies (VAs), we will conduct a non-inferiority trial. This trial aims to determine whether telephone VAs result in less favorable completion and rejection patterns compared to in-person VAs. The purpose of a non-inferiority trial is to rigorously evaluate a new methodological approach against an accepted and effective one, with the goal of demonstrating that the proposed alternative is nearly as effective (Kaji & Lewis, 2015).

In evaluating the modalities through a non-inferiority trial methodology, we will consider the following indicators:

Cooperation Rate: Measured as the number of completed interviews divided by the total number of surveys scheduled for each modality.

Rejection Rate: Measured as the number of rejected interviews divided by the total number of surveys scheduled for each modality. Additional metrics will also be considered at this stage.

Completion Rate: Calculated as the number of completed interviews divided by the sum of completed and incomplete interviews.

Contact Efficiency: Measured by the average number of contact attempts required to complete each survey.

Accuracy Rate: Evaluates the number of surveys with sufficiently precise information to classify the reported death within the International Classification of Diseases (ICD) codes, relative to the total number of completed surveys.

Consistency Rate: Calculated by the number of surveys with consistent information out of the total number of completed surveys. Consistent surveys are those in which both the free narrative and categorical responses correspond to the description of the same morbid or circumstantial event that triggered the death.

Ethical clearance: The study was approved by the institutional review boards of the Universidad Católica Andrés Bello in Venezuela and New York University—Abu Dhabi. All participants provided verbal consent before engaging in the study and agreed to the recording of narratives regarding the circumstances, events, causes, and symptoms presented by the deceased prior to their death. Both participants and interviewers had access to professional psychological support via telephone throughout the study.

3. Preliminary Results

In this section, we include preliminary results of our outcomes y descriptive statistics and proportional distributions. New analyses, as outlined in the methods section, will be included in the final version of the study, along with a discussion section and recommendations.

3.1 *Final status of the surveys*

Table 3 reveals that face-to-face surveys have a higher proportion of completed surveys (65.8%) compared to those conducted via phone (49.2%). This discrepancy in proportions appears to stem from a higher incidence of surveys classified as "Lost-Unavailable" meaning those where the person or household could not be located. In the case of telephone surveys, these lost cases include unanswered calls (42.4%), incorrect phone numbers (15.2%), or deactivated or non-existent numbers (42.4%). For face-to-face surveys, the issues include households that could not be located with the provided information (35.3%), initial phone contact was not possible (17.6%), households that moved (20.6%), and various other reasons (26.5%).

Table 2. Percentage Distribution of Surveys Conducted by Final Outcome

Final Status	In-Person	By Phone	Total
Complete	65,8	49,2	58,2
Incomplete	0,4	0,5	0,5
Rejected	9,0	16,8	12,5
Lost- Unavailable	24,8	33,5	28,8
Total	**100**	**100**	**100**

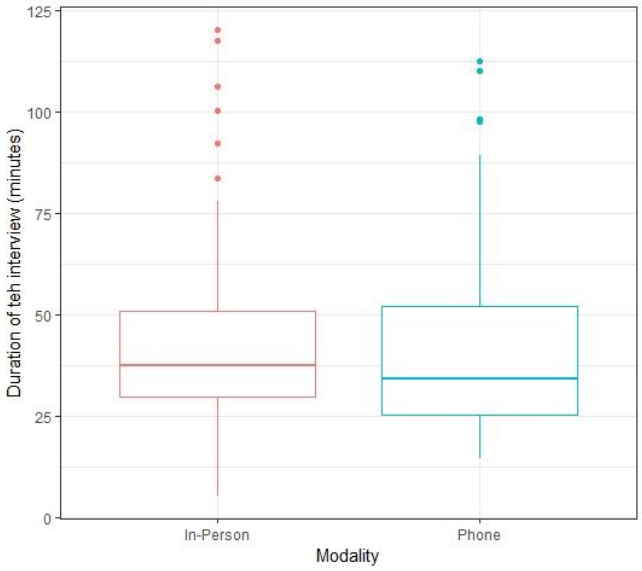
Similarly, the proportion of rejected surveys is higher for the telephone modality, with the predominant reasons cited by respondents being "fear due to political or personal insecurity" (39%), followed by "lack of time"

(27.3%). In contrast, rejection of face-to-face surveys is primarily due to "perceived lack of personal benefit" (42.9%) in providing the information or "unwillingness to revisit a painful situation" (23.8%).

3.2 Efficiency of the Modalities

To complete the surveys, it was necessary to contact, on average, a greater number of respondents for face-to-face surveys. Specifically, 37% of face-to-face verbal autopsies required contacting two or more individuals to obtain the information demanded by the questionnaire. In contrast, only 26% of telephone surveys necessitated reaching out to more than one respondent. Regarding the duration of the survey, both modalities have an average duration of 42 minutes per survey; however, the telephone modality exhibits greater variability in the time spent (see Figure 1).

Figure 1. Duration of the interview



3.3 Quality of Information Collected by Modality

Among the surveys reviewed, 78% of those conducted via telephone provided information sufficiently accurate to determine a specific cause of death (see Table 3), which can be classified according to the International Classification of Diseases, Tenth Revision (ICD-10). In contrast, this percentage rises to 93.2% for face-to-face verbal autopsies.

Table 3 Quality of the information for determining the underlying Cause of Death

Classification of cause of death	In-Person	Phone	Total
Enough information to define the cause of death	93,2	78,0	87,0
Ill-defined	6,8	19,5	12,0
Insufficient information to define the cause	0,0	2,4	1,0
Total	**100**	**100**	**100**

3.4 Acceptance of the Modalities

The vast majority of respondents, approximately two-thirds, reported not feeling affected by the questions used in the verbal autopsies (VAs) to describe the events and causes leading to the death of the household member. From both the self-assessment of the respondents and the interviewers' perceptions, those interviewed through face-to-face VAs exhibit a slightly higher proportion of emotional impact compared to those interviewed via telephone. According to Table 4, 31.6% of respondents in the face-to-face modality reported feeling affected by the interview, while 29.2% were recognized as perceptibly affected by the interviewers. In the telephone

modality, 28.4% of respondents reported feeling affected by the questions, and this was also observed by the interviewers.

Table 4. Respondents reporting affected feelings and being perceptibly affected by questions during verbal autopsies

	In-Person	Phone	Total
Respondents Reporting Being Affected by the Questions			
YES	31,6	28,4	30,6
NOT	68,4	71,6	69,4
Total	**100**	**100**	**100**
Respondents Perceived as Being Affected by the Questions According to the Interviewers"			
YES	29,2	28,4	29,0
NOT	70,8	71,6	71,0
Total	**100**	**100**	**100**

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