International Journal of Community Medicine and Public Health
Sherin SPN et al. Int J Community Med Public Health. 2018 Jan;5(1):81-85
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20175514

Original Research Article

The feasibility of using remote data collection tools in field surveys

Sherin Susan Paul N., Philip Mathew*, Felix Johns, Jacob Abraham

Department of Community Medicine, Pushpagiri Institute of Medical Sciences and Research Centre, Thiruvalla, Kerala, India

Received: 17 November 2017
Revised: 04 December 2017
Accepted: 05 December 2017

***Correspondence:**
Dr. Philip Mathew,
E-mail: pilimat@rediffmail.com

ABSTRACT

Background: The objectives of the study were to conduct a field survey to measure the prevalence of chronic diseases by taking history, to assess the feasibility of using remote data collection tools in field surveys and to create the map of the survey area using global positioning system (GPS).
Methods: A community survey was carried out in two urban municipal wards by trainees with medical sociology back ground among those aged 35 years and above. There were a total of 563 participants from whom history of chronic diseases were collected and from those aged 60 years and above the presence of frailty was assessed using Canadian Study of Health and Ageing (CSHA) Clinical Frailty Scale. The data was collected using a remote data collection application named KoBo Toolbox, downloaded in their smart phones, which was sent directly to the main computer in the Clinical Epidemiological Unit, using mobile data or Wi-Fi hotspots. The co-ordinates of the households were marked using GPS which was also sent through the KoBo Toolbox to the main computer. At the centre the data was converted into excel sheets and various percentages were calculated.
Results: In the survey the proportion affected with diabetes, hypertension, coronary artery disease and cerebrovascular accidents were 24%, 20.6%, 10.5% and 3.5% respectively. Among the older population 2.2% were found to be severely frail or worse requiring special care. The field map of the area surveyed was also generated using the co-ordinates marked using the GPS enabled phones.
Conclusions: The remote data collection tool enabled us to conduct a survey on chronic diseases, effectively, within a limited period of time, creating a map of the area surveyed.

Keywords: Data Collection, Internet, Medical records systems, Software, Mobile phones

INTRODUCTION

Survey research is a principle way of obtaining data from the social world. It uses interview as the standardised data collection method, with instrument being the survey questionnaire.[1] Community based health surveys in India are usually carried out through face to face interviews of household members by health workers. Traditionally, we use printed questionnaire which is either self-administered or interviewer administered to collect data from the field. This is later brought back to the main centre where all the information will either be compiled manually into the main ledger or book or will be made into a computer database. Either ways it is duplication of work and time consuming as the data is first gathered and then re-entered, which also increases the possibility for errors to occur. In this era of digitalisation and internet connectivity, technological advances are feasible in simplifying such activities. We conducted a small field survey to assess the prevalence of chronic diseases like diabetes, hypertension, coronary artery disease (CAD) and cerebrovascular accidents (CVA), by checking the

history of having these diseases, and clinical frailty, measured using the Canadian Study of Health and Ageing (CSHA) Clinical Frailty Scale. We also assessed whether using a data collection application, KoBo Toolbox, would simplify our survey process and the use of Global positioning system (GPS) in creating the map of the survey area there by increasing the accuracy.

METHODS

The survey was carried out in two municipality wards near the Urban Health Centre of our Medical College for a period of 5 days between March 2017 and May 2017. The days were selected according to the convenience of the trainees depending on their availability. A door to door survey was carried out in each of these days and information was gathered from those who were aged 35 years and above, who were available on that day. There were a total of 10 trainees who were from medical sociology background collected information regarding age, gender, marital status, type of family, type of living, possession of ration card and Rashtriya Swasthya Bhima Yojana (RSBY) insurance and known history of having chronic conditions like diabetes mellitus, hypertension, coronary artery disease and cerebrovascular accidents. From the older population (aged 60 years and above), history regarding insomnia and urinary incontinence was taken and frailty was measured using CSHA clinical frailty scale.[2] Frailty is a multi-dimensional syndrome among older population with lose of reserves like physical ability, cognition etc. making them vulnerable to debility and death. Clinical Frailty Scale by CSHA is a simple tool measuring 9 degrees of frailty that can be easily administered among the aged, thereby predicting functional decline and mortality.[2,3] Questions regarding the aforementioned details were entered in the KoBo Toolbox, which was downloaded in their android enabled smart phones.

KoBo Toolbox is a free and open source online data entry tool developed by Harvard Humanitarian initiative with support from various organisations like Brigham and Women's Hospital, USAID etc.[4] It can run on any device, whether tablet or phone, as long as they have Android or iOS. The users can freely download the KoBo Toolbox application into their android device and enter questionnaire into it; the data collected through this questionnaire will be kept as cloud storage by the application. After downloading the application, the device (phone/tablet) can be handed over to the field worker, who moves from house to house collecting data. If there is an internet connectivity or mobile data package available in the device, the cloud stored data can be sent to the main database immediately or else this could be done as soon as one reaches the internet hotspot. Currently KoBo Toolbox is widely used during humanitarian crisis like natural calamities, manmade disasters etc. as it is quick and less time consuming. It is also been used in other fields like wildlife and fisheries, to understand their hunting, consumption, migratory patterns etc.[5,6]

In our survey the global positioning system (GPS) co-ordinates of each household from which the data was collected was also marked using the mobile phones. All the data thus collected, along with the GPS co-ordinates were kept as cloud storage in KoBo application and was later sent to the main computer at the clinical epidemiological unit (CEU) of the hospital, where the data was ultimately stored, using the mobile data pack. Those phones that did not have the mobile data availability, the data were transferred as soon as it reached a Wi-Fi hotspot. Finally at the CEU all the data from KoBo Toolbox cloud storage were converted into excel sheets and percentages of baseline socio demographic characteristics and those affected with chronic diseases were calculated. Using the GPS co-ordinates the map of the surveyed area was also created.

RESULTS

The trainees surveyed a total of 563 participants of which 55% were aged 60 years and above. The baseline socio demographic characteristics are given in Table 1 and the map created using the GPS co-ordinates of the surveyed area is given in Figure 1.

Table 1: Socio demographic characteristics.

Variables		Number (%)
Place	Area 1	295 (52.4)
	Area 2	268 (47.6)
Age	Middle age (35-59)	249 (44.2)
	Younger old (60-79)	252 (44.8)
	Older old (≥80)	62 (11)
Gender	Male	244 (43.3)
	Female	319 (56.7)
Marital status	Currently married	426 (75.7)
	Unmarried/separated	16 (2.9)
	Widow/widower	121(21.5)
Type of family	Extended nuclear	152 (27)
	Nuclear	38 (6.7)
	Joint	373 (66.7)
Type of living	Living alone	32 (5.7)
	Living with children	106 (18.8)
	Living with parents	10 (1.8)
	Living with relatives	12 (2.1)
	Living with spouse	123 (21.8)
	Living with spouse and children	280 (49.7)
Have ration card	Yes	544 (96.6)
	No	19 (3.4)
Have RSBY	Yes	113 (20.1)
	No	450 (79.9)

Figure 1: Map of the area surveyed created using GPS co-ordinates.

One fourth of the total population was affected with diabetes mellitus (24%) and one of the survey participants had hypertension (20.6%). The proportion of the population affected with CAD and CVA were 10.5% and 3.4% respectively (Table 2). The map of households with members having Diabetes Mellitus is given as Figure 2.

Table 2: Presence of chronic diseases among the survey population.

Variables		Number (%)
Presence of diabetes mellitus	Yes	135 (24)
	No	428 (76)
Presence of hypertension	Yes	116 (20.6)
	No	447 (79.4)
History of CAD	Yes	59 (10.5)
	No	504 (89.5)
History of CVA	Yes	19 (3.4)
	No	544 (96.6)

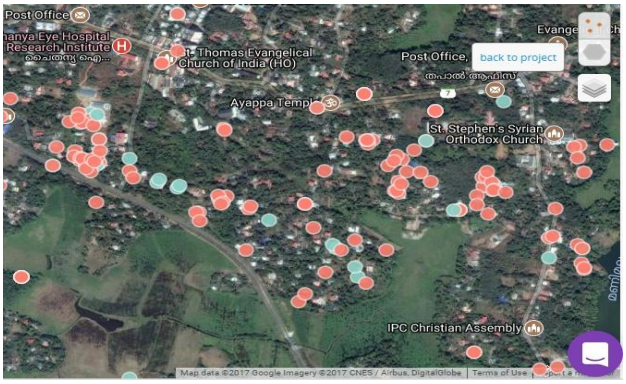

Figure 2: Map of households with patients having diabetes mellitus.*

There was a total of 314 old age population in the survey of which 51 (16.2%) were having insomnia and 22 (7%) had urinary incontinence. When assessed using Clinical frailty scale 122 of the older population were well; 4 were severely frail, 1 was very severely frail and 2 were terminally ill, completely dependent for personal care. Mildly frail individuals were 13, requiring support with finances, transportation, medications, heavy household work etc. 11 were moderately frail requiring mild assistance with personal care (Table 3).

Table 3: Clinical frailty scale for older population.

Variables		Number (%)
Frailty scale	Very fit	47 (15)
	Well	122 (38.9)
	Managing well	88 (28)
	Vulnerable	26 (8.3)
	Mildly frail	13 (4.1)
	Moderately frail	11 (3.5)
	Severely frail	4 (1.3)
	Very severely frail	1 (0.3)
	Terminally ill	2 (0.6)

DISCUSSION

Community survey is one of the commonest tools used to collect information regarding the views of the whole community or the groups we are interested in. Traditionally, in India this has been carried out using printed survey questionnaire, the data which would be later re-entered back into the main computer database or ledger. This is quite a tedious process involving double entry increasing the chances of mistakes while entering. In this article we are assessing the feasibility of using a remote data collection tool, KoBo Toolbox, in replacing the printed questionnaire for collecting and entering the data and the advantages and disadvantages of the same. We used the KoBo Toolbox to measure the percentages of people affected by chronic diseases like diabetes, hypertension, CAD and CVA, in the age group 35 years and above and those who were frail among older people, residing in two urban municipality ward areas, along with creating a map of the area surveyed using GPS co-ordinates.

The baseline results of our study showed that more than 50% of our participants were aged 60 years and above.[7,8] This could be because the trainees took those who were available at each household during the survey, rather than following the list of those aged 35 years and above. Since the survey was carried out in the morning working hours, it was highly likely that the middle aged population would be busy with their job obligations and hence poor representation. The number of women were more than that of men, an inclination attributed to increased life expectancy of the women.[9,10] Nearly 6% of the total participants were living alone in our survey population. This is a common trend in Kerala due to its unique characteristics like low fertility and mortality rates and increase in life expectancy leading to rise in older generation and increase in adult economic migration, causing the older parents to be independent for their day to day living.[11,12] Almost all of the survey participants (96.6%) had ration cards which was in line with the high

coverage of ration cards in the states. Till recently ration card was commonly used as identity proofs to avail most of the government services.[13,14] Further data need to be collected exploring the reasons for not having a ration card by remaining 19 participants. Only one fifth of the survey participants had RSBY health insurance (20.1%). This is slightly lower than expected since according to the government data, RSBY coverage in the study area was nearly 23%.[15,16]

Our results show that the prevalence of diabetes mellitus among the survey population was 24%. This rate is slightly higher than other diabetes studies conducted in Kerala which showed a prevalence ranging between 5% and 16%.[17-20] The high prevalence could also be because the survey was conducted in the age group 35 years and above. It has been shown that in developing countries majority of people with diabetes are in the age group 45 to 64 years as compared to western figures where the diabetes is common among those aged 65 years and above.[21,22] According to the report published by the Indian Council for Medical Research in 2017 hypertension is the commonest risk factor (13.4%) driving people to death and disability.[23] In the present survey it was found that one fifth of the participants had hypertension, which reiterates the need for continuing community awareness regarding hypertension. But this prevalence is much lower than many community prevalence of hypertension published from Kerala.[24-26] This could be because in this survey we did not actually measure hypertension, but only added those who gave a history of hypertension. Cardiovascular diseases top the list of diseases that causes premature death and number of years living with disability in the age group 40 years and above.[23] In our survey one tenth of the participants gave a history of having coronary artery disease; but the actual prevalence of the disease would be much higher. Only 3.4% of the participants gave a history of stroke which is the second highest cause for premature mortality.[23] When assessed using the clinical frailty scale, an important predictor of functional decline and death, nearly 10% of the participants were frail. Among them 1 participant was very severely frail and 2 were terminally ill. These three requires special attention as their frailty scale suggests complete dependency, approaching end of life. Community volunteers and families with older population can be sensitized more about frailty and could be taught about when to be alert, providing special attention.

Advantages and disadvantages of KoBo Toolbox

The questionnaire was administered easily through KoBo Toolbox by the trainees. Since it required only a smart phone to collect data, the process was much less tedious as they did not have to carry large baggage of printed questionnaires. All the collected data got stored as cloud data and was directly send to the data base because of which it was less time consuming. In case of any error, it was easier to go back as the exact co-ordinates of each household were available through GPS. Also GPS mapping prevented bogus information from being collected as it could be easily traced; also it was easy to compare with the available map or information in each ward or panchayat. Since the GPS co-ordinates collected was sent through the KoBo Toolbox application, separate maps for households with each chronic disease could be created, which would help immensely in future follow up.

This process would require availability of smart phones or tablets which could be expensive than printed questionnaire. It also requires a slightly higher training to use these gadgets to correctly enter the data into the application. Technical assistance is required to download the application and to make the questionnaire in it.

Limitations

To assess the reliability of the data at least 10% of the households should have been revisited by health workers and recollected the whole information, which was not done in this study. But this could be done on a later stage as the co-ordinates of each household is available, with which houses can easily be reached.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Suchman L, Jordan B. Interactional Troubles in Face-to-Face Survey Interviews. J Am Stat Assoc. 1990;85(409):232–41.
2. Rockwood K, Song X, MacKnight C, Bergman H, Hogan DB, McDowell I, et al. A global clinical measure of fitness and frailty in elderly people. CMAJ Can Med Assoc J. 2005;173(5):489–95.
3. Gregorevic KJ, Hubbard RE, Katz B, Lim WK. The clinical frailty scale predicts functional decline and mortality when used by junior medical staff: a prospective cohort study. BMC Geriatr. 2016;16:117.
4. Harvard Humanitarian Initiative. KoBoToolbox: Data Collection Tools for Challenging Environments. KoBo Toolbox. Available at: http://www.kobotoolbox.org/. Accessed on 4 August 2017.
5. Deniau C, Gaillard T, Mbagogo A, Réounodji F, Le Bel S. Using the KoBoCollect tool to analyze the socio-economic and socio-cultural aspects of commercial hunting and consumption of migratory waterbirds in the Lakes Chad and Fitri (Chad). In: Conference proceedings of 2017 EFITA WCCA congress: European conference dedicated to the future use of ICT in the agri-food sector, bioresource and biomass sector. Available at: http://www.efita2017.org/proceedings/. Accessed on 4 August 2017.

6. Hamer MJM, Reed PL, Greulich JD, Charles W. Beadling MD. Liberia national disaster preparedness coordination exercise: Implementing lessons learned from the West African disaster preparedness initiative. Am J Disaster Med. 2017;12(1):35–41.
7. Rajan SI. Aging in Kerala: one more population problem? POPLINE.org. Asia-Pac Popul J. 1989;4(2):19–48.
8. Gulati L, Rajan SI. The Added Years: Elderly in India and Kerala. Econ Polit Wkly. 1999;34(44): 46-51.
9. Thomas MB, James KS. Changes in mortality and human longevity in Kerala: are they leading to the advanced stage? Glob Health Action. 2014.
10. Global, regional, and national under-5 mortality, adult mortality, age-specific mortality, and life expectancy, 1970–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Lond Engl. 2017;390(10100):1084–150.
11. Pushpangadan K. Remittances, consumption and economic growth in Kerala : 1800-2000. 2003; Available at: https://opendocs.ids.ac.uk/opendocs/handle/123456789/3038. Accessed on 4 August 2017.
12. Rajan SI. From Kerala to the Gulf: Impacts of Labor Migration. Asian Pac Migr J. 2004;13(4):497–509.
13. Ministry of Consumer Affairs, Food and Public Distribution. Press Information Bureau, Government of India. 2017. Available at: http://pib.nic.in/newsite/mbErel.aspx?relid=158329
14. Cyriac S, Sam V, Jacob N. The PDS system in Kerala: A review. CCS Working Paper; 2008.
15. Ministry of Health & Family Welfare. Rashtriya Swasthya Bima Yojana. 2017. Available at: http://www.rsby.gov.in/Statewise.aspx?state=27. Accessed on 4 August 2017.
16. National Informatics Centre, Pathanamthitta. Pathanamthitta - Statistics. Pathanamthitta District Official Website. Available at: http://pathanamthitta.nic.in/statistics/statistics.html
17. Sathish T, Oldenburg B, Tapp RJ, Shaw JE, Wolfe R, Sajitha B, et al. Baseline characteristics of participants in the Kerala Diabetes Prevention Program: a cluster randomized controlled trial of lifestyle intervention in Asian Indians. Diabet Med. 2017;34(5):647–53.
18. Kutty VR, Joseph A, Soman CR. High Prevalence of Type 2 Diabetes in an Urban Settlement in Kerala, India. Ethn Health. 1999;4(4):231–9.
19. Menon VU, Kumar KV, Gilchrist A, Sugathan TN, Sundaram KR, Nair V, et al. Prevalence of known and undetected diabetes and associated risk factors in central Kerala—ADEPS. Diabetes Res Clin Pract. 2006;74(3):289–94.
20. Kutty VR, Soman RC, Joseph A, Pisharody R, Vijayakumar K. Type 2 diabetes in southern Kerala: Variation in prevalence among geographic divisions within a region. Natl Med J India. 2000;13(6):287-92.
21. McBean AM, Li S, Gilbertson DT, Collins AJ. Differences in Diabetes Prevalence, Incidence, and Mortality Among the Elderly of Four Racial/Ethnic Groups: Whites, Blacks, Hispanics, and Asians. Diabetes Care. 2004;27(10):2317–24.
22. King H, Aubert RE, Herman WH. Global Burden of Diabetes, 1995–2025: Prevalence, numerical estimates, and projections. Diabetes Care. 1998;21(9):1414–31.
23. Indian Council of Medical Research, Public Health Foundation of India, Institute for Health Metrics and Evaluation. India: Health of the Nation's States The India State-Level Disease Burden Initiative. New Delhi, India: ICMR, PHFI, IHME; 2017. Available at: http://icmr.nic.in/publications/India_Health_of_the_Nation%27s_States_Report_2017.pdf. Accessed on 4 August 2017.
24. Thankappan KR, Sivasankaran S, Sarma PS, Mini G, Khader SA, Padmanabhan P, et al. Prevalence-correlates-awareness-treatment and control of hypertension in kumarakom, kerala: baseline results of a community-based intervention program. Indian Heart J. 2006;58(1):28–33.
25. G Zachariah M, Thankappan KR, C Alex S, Sarma P, S Vasan R. Prevalence, correlates, awareness, treatment, and control of hypertension in a middle-aged urban population in Kerala. Indian Heart J. 2003;55:245–51.
26. Vimala A, Ranji SA, Jyosna MT, Chandran V, Mathews SR, Pappachan JM. The prevalence, risk factors and awareness of hypertension in an urban population of Kerala (South India). Saudi J Kidney Dis Transplant. 2009;20(4):685.

Cite this article as: Sherin SPN, Mathew P, Johns F, Abraham J. The feasibility of using remote data collection tools in field surveys. Int J Community Med Public Health 2018;5:81-5.