World J Surg (2014) 38:3041–3046
DOI 10.1007/s00268-014-2753-2

World Journal of Surgery

ORIGINAL SCIENTIFIC REPORT

Surgical Needs of Nepal: Pilot Study of Population Based Survey in Pokhara, Nepal

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Published online: 5 September 2014

Abstract

Background The Surgeons OverSeas assessment of surgical need (SOSAS) tool, a population-based survey on surgical conditions in low- and middle-income countries (LMICs), was performed in Sierra Leone and Rwanda. This pilot study in Nepal is the initial implementation of the SOSAS survey in South Asia.

Methods A pilot study of SOSAS, modified for Nepal's needs and reprogrammed using mobile data collection software, was undertaken in Pokhara in January 2014. Cluster randomized sampling was utilized to interview 100 individuals in 50 households within two wards of Pokhara, one rural and one urban. The first portion of the survey retrieved demographic data, including household members and time to nearest health facilities. The second portion interviewed two randomly selected individuals from each household, inquiring about surgical conditions covering six anatomical regions.

Results The pilot SOSAS in Nepal was easily completed over 3 days, including training of 18 Nepali interns over 2 days. The response rate was 100 %. A total of 13 respondents had a current surgical need (face 4, chest 1, back 1, abdomen 1, groin 3, extremity 3), although eight reported there was no need for surgical care. Five respondents (5 %) had a current unmet surgical need.

Conclusion The SOSAS pilot study in Nepal was successfully conducted, demonstrating the feasibility of performing SOSAS in South Asia. The estimated 5 % current unmet surgical need will be used for sample size calculation for the full country survey. Utilizing and improving on the SOSAS tool to measure the prevalence of surgical conditions in Nepal will help enumerate the global surgical burden of disease.

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Background

Although operative care is an essential component of health, surgery has traditionally been under-prioritized—if not absent—in global healthcare. This neglect may be attributed to the field's lack of familiarity with operative care, concerns about cost effectiveness, and the absence of the surgeon's involvement in healthcare planning [1]. In particular, there remains a striking dearth of research to quantify the burden of surgical disease in low- and middle-income countries (LMICs). An important goal for global health should be to ensure that all areas of the world have access to safe surgical care for those in need. However, to develop appropriate and effective solutions, reliable data are needed to determine the magnitude of unmet need [2].

The first population-based surveys on surgically treatable conditions in an LMIC were performed in Sierra Leone and Rwanda using the Surgeons OverSeas assessment of surgical need (SOSAS) tool [3, 4]. The Sierra Leone study revealed that 25 % of respondents required an assessment of a surgical condition at the time of interview [3]. For Rwanda, Petroze et al. [4] determined that 6.4 % of the population, an estimated 675,000 people, needed operative care, with nearly 15 %, an estimated 1.6 million Rwandans, reporting an operative condition within the previous year. Data from such studies show the baseline burden of surgical disease and support advocacy efforts to increase funding and resources for surgical services by Ministries of Health, international organizations, and donor agencies.

Nepal, one of the least developed South Asian countries, has a gross national income per capita of $US 700, is considered a low-income country by the World Bank classification, and ranked 145th of 187 countries in the United Nations Human Development Index [5, 6]. Nepal is a small land-locked country (147,181 square kilometers) with diverse geography, including eight of the world's ten largest mountains and numerous hills and lakes. The population (29.8 million) live predominantly in rural areas despite its increasingly rapid rate of urbanization [6]. Only 43 % of the population has access to all weather roads. Nepal is politically fragile after a decade-long conflict ending in 2006 [5, 7]. The medical structure in Nepal consists of ten regional/teaching hospitals, 67 district hospitals, and 13,700 primary healthcare outreach clinics. Despite all these facilities, much of the population live in rural areas and do not have access to healthcare due to cost and geographic barriers [7, 8].

A review of surgical admissions to a children's disability hospital in Nepal revealed that patients who presented late for treatment did so because of difficult geographic access to health facilities and deficiencies in the capacity to deliver health services at the primary level [9]. The Nepal Community Emergency Preparedness Group has proposed an emergency medical services (EMS) plan that advocates for navigable roads to increase access to the mountainous regions, without which, rescue and retrievable services are unable to reach injured individuals within a reasonable amount of time [10].

SOSAS was designed by Surgeons OverSeas to spearhead data collection on the population level for countries where, due to limited access and availability of surgical care, hospital data would not reveal a true burden of surgical need. The survey tool is freely available online and includes logistical guidelines and data management plans [11]. The original SOSAS was executed using a commercial survey design tool (FileMakerPro), which is expensive and cumbersome to program. For this study, the survey questions were transcribed into two forms via a free online mobile data collection system convenient for smartphones and tablets. Furthermore, some of the questions (for example, ethnicity) were revised or added based on the circumstances in Nepal.

The primary objective of this pilot study was to investigate whether SOSAS is a feasible tool to be deployed in Nepal. Furthermore, this pilot study provides the basis for sample size calculation and logistical planning for a future countrywide assessment that will help provide data on the unmet surgical need in Nepal.

Methods

A proof-of-concept pilot study of the SOSAS survey tool was undertaken in Pokhara, Nepal in January 2014.

Institutional Review Board (IRB) approval for the pilot study was obtained from the Johns Hopkins Bloomberg School of Public Health IRB and from the Nepal Health Research Council in Kathmandu, Nepal.

A group of 18 local medical interns from Manipal College of Medical Sciences was given basic training in surgical capacity, interviewing, enumeration and household allocation, and SOSAS tool specifics over the course of 2 days. The group of medical interns included five women and 13 men, all fluent in both Nepali and English. The medical interns were placed in five groups: three groups of four people and two groups of three people. All groups had both male and female enumerators.

Pokhara is the third largest city in Nepal, approximately 200 km west of Kathmandu (Fig. 1). Pokhara is divided into 18 wards. Two wards were chosen for this pilot study, Ranipauwa (ward 11) and Lamachaur (ward 16), to represent the most urban and rural parts of Pokhara, respectively. Using official maps from the local government, the two wards were divided into five clusters. Five households were randomly selected from each cluster, thus 25

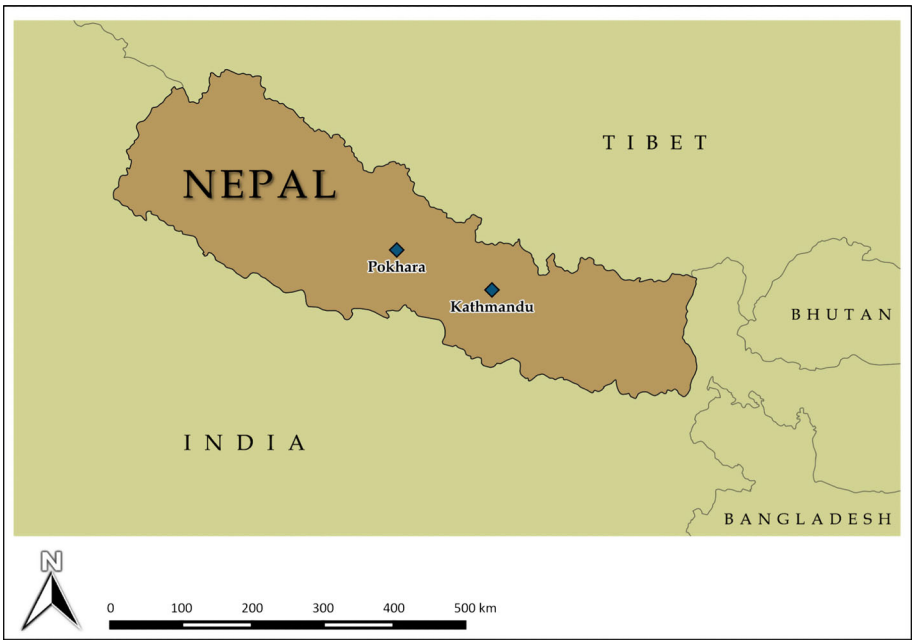

Fig. 1 Map of Nepal

households from each ward. We chose the geographic center point in each cluster for the start of our systematic sampling survey. Thereafter, while standing with the back to the front door, every fifth structure to the right of the interviewed household was approached for the survey. In case of more households per structure, an on-site listing was made and random assignment of the household was facilitated by the use of a random calculator. If the structure randomly selected appeared to be empty or the household did not give informed consent, the next structure was approached to be interviewed.

Once a household was identified, a standardized recruitment script was read briefly, describing the purpose of the survey and what it would require of the participants. If a child answered the door, we asked to speak with the head of the household or the first available adult. If the household member was interested in the study, we proceeded to consent the head of the household for the first portion of the SOSAS survey. If the head of the household was not present, a voluntary surrogate would give consent.

The first portion of the survey gathered household demographics, including a listing of all members of the household (age and sex) and information regarding timing and distance to health facilities. Household members were defined as those sleeping in the same structure the night before the interview. Children aged 8–17 year were included; children younger than 8 years were excluded as respondents for the individual interviews. Members of the household who were mentally disabled or cognitively impaired as described by the head of the household or surrogate were excluded as respondents for the individual interviews. The household representative was also asked to report the total number of deaths that occurred in the household within the previous 12 months as well as the proximal cause of each death.

After the first portion of the survey was performed, the second portion of the survey, consisting of structured interviews of two randomly selected household members, was administered. If a person was selected but not available for the interview, an appointment was made for later that day or the following day. If two additional attempts were made for the interview and the person was still not available, the person was excluded from the analysis. After appropriate consent was obtained, the second portion of the interview questioned the two randomly selected individuals to elicit symptoms covering six anatomical regions: (1) face, head, and neck; (2) chest and breast; (3) abdomen; (4) groin and genitalia; (5) back; and (6) extremities. Respondents were asked whether they felt they needed surgical care for any condition detected from the survey. Further questions investigated the timing of the conditions, perceived barriers to care, and general health questions. For the female participants, questions regarding menstrual cycle, birth control methods, and cervical cancer screening were assessed. After the two participants were interviewed, the enumerators continued to the next household by the method described above.

The questions were asked in Nepali by the enumerators and entered in English using tablets and smartphone devices. Two separate forms were created in a mobile data collection software (Magpi, The DataDyne Group, 2014) for each portion of the survey: one form for the first section

answered by the head of the household/surrogate and another form for the second section, with one for each individual interviewed. The mobile data collection software allowed data entry in the respective forms without the need of an Internet connection. This mobile data collection software allowed data to be uploaded and retrieved once an Internet connection was established. All data were reviewed the evening the surveys were conducted to assess for adequacy of data collection. The data were uploaded to the data collection software website and extracted to a digital spreadsheet.

Debriefings were held with the enumerators after the surveys were conducted to assess any difficulties during data collection or with conducting of the surveys. Immediate feedback on adequacy of data and questions about recording data were given to the enumerators.

Results

The pilot testing of SOSAS in Nepal was easily completed over 3 days, including training. With our five groups of volunteer medical interns, the surveying took approximately 2 days, divided in two afternoons. Of the 100 attempted interviews, 100 individuals agreed to complete the survey, giving a response rate of 100 %. No household required revisiting during the pilot study.

Demographic data of the participants can be found in Table 1. On average, the total interview time was 18.5 min per household (range 9–60), including the interview with the head of the household and the interviews with the two randomly selected individuals. The number of household members within the households interviewed ranged from 2 to 19 members, with an average of 6.2 members per household. Only one household reported a member of the household dying within the past 12 months.

Of the 100 respondents, 13 stated they had a current surgical need (face 4, chest 1, back 1, abdomen 1, groin 3, extremity 3). Eight of the 13 respondents stated they did not perceive a need for surgical care, leaving five respondents out of 100 (5 %) with a current unmet surgical need (Table 2). Of the five respondents with an unmet surgical need, three stated that personnel, facilities, or equipment were unavailable, one had no money for healthcare, and one had no money for transportation to a healthcare facility. Of the 100 respondents, 59 were female. Strikingly, of the women aged over 21 years (47 of 59), only seven had undergone a pap smear (14.8 %).

The enumerators stated that the amount of training and feedback was sufficient. The use of smartphones was very helpful. The team had access to three tablets, and with the addition of the smartphone device compatibility with the mobile data collection software, they were able to perform more surveys in a shorter amount of time. Given that the medical interns owned the devices, they were very comfortable using them and preferred using their own devices. There appeared to be no preference for any individual type of smartphone or tablet, as the interface was identical.

The only change suggested by the enumerators regarding the survey was to include more free text space describing the particular surgery the participant had undergone, as some participants were operated on a few times for the same surgical problem. For example, one woman had a recurrent abdominal wall hernia that was operated on twice.

Table 1 Demographic data of survey participants and households

Sex	
Male	41
Female	59
Average age of participant (years)	35.7
Education of participants [*n* (%)]	
None	20 (20)
Primary	31 (31)
Secondary (junior/senior)	25 (25)
Tertiary (diploma, college, bachelors)	19 (19)
Graduate (masters degree, PhD)	5 (5)
Occupation of participants [*n* (%)]	
Unemployed (includes student, retired)	39 (39)
Homemaker	20 (20)
Domestic helpers (cleaners, housekeepers)	1 (1)
Farmer (herders, agriculture, pastoralist)	8 (8)
Self-employed/small business owner	21 (21)
Government employee (teacher, police officer, healthcare worker)	4 (4)
Non-government employee (cooperation managers, NGO staff)	7 (7)
Average number of household members per household surveyed	6.2
Average interview time per household (min)	18.5

Participants $n = 100$; households $n = 50$

NGO non-governmental organization

Discussion

The pilot testing of SOSAS in Pokhara, Nepal proved to be feasible, noting that the SOSAS tool could be used in another region of the world, South Asia, without difficulty. The survey methodology, ease of electronic data collection, and use of medical interns as enumerators proved to be successful. The enormous amount of support received from Nepal Medical College and Manipal College of Medical Sciences for this project, including all the volunteer enumerators and in country coordination efforts, made the pilot possible. With 18 enumerators, the survey was undertaken

Table 2 Surgical needs by anatomical area

Anatomical area	Face/neck	Chest	Back	Abdomen	Groin	Extremity	Total
Current surgical problem	4	1	1	1	3	3	13
No desire for surgical care	2	0	1	0	3	2	8
Unmet surgical need	2	1	0	1	0	1	5

rapidly. All enumerators had significant medical and technical knowledge, as well as prior research education, which sped up training and made the scope of the survey more easily understood. In a countrywide survey, using a smaller number of enumerators with less medical knowledge would likely require more time in the training process. Furthermore, the interviews took an average of 18.5 min per household. However, given the hospitality inherent in the Nepali culture, all the enumeration teams were invited in for tea by the household that was being interviewed. This added to the total time spent on data collection and would need to be taken into account for the full country survey.

We added two questions to the original SOSAS survey: two questions regarding pap smears and loop electrosurgical excision procedure (LEEP) for abnormal tissue in the cervix to further expand the data on women's health provided by the original SOSAS. These questions appeared to be easy to answer and all women aged over 21 answered the questions without difficulty. If there was any confusion with regards to the question, a description of a pap smear and LEEP procedure was given for clarification.

The previous SOSAS surveys in Rwanda and Sierra Leone were performed solely with tablet devices. An exciting point with regards to the pilot study in Nepal was the ability to use smartphone devices for data collection. The majority of the enumerators involved in the pilot study owned smartphone devices, thus limiting the funds spent on tablets. With this success, future SOSAS surveys can decrease costs of countrywide surveys by using these other types of devices for data collection. Basic mobile data collection software programming took 2 days to complete, and the mobile data collection software interface was enumerator friendly and quickly understood by the enumerators. The benefit of this software was the ease of use in areas without wireless Internet and that the data could be easily uploaded once a wireless connection was available. Using this mobile data collection software safeguarded that all questions would be answered, helping to make data collection more complete.

The two wards sampled in this pilot study, though one ward was the most rural of Pokhara, were still very close to two large tertiary hospitals. Thus, the 5 % of respondents with unmet surgical need are likely an underestimation of the overall unmet surgical need in Pokhara, Nepal. Most respondents were able to walk to a tertiary care facility within 10 min.

Many limitations exist in this study. One significant limitation is inherent in the survey's definition of operative conditions. All operative conditions in this survey relied upon self-reported conditions via a verbal interview. The participant of the survey, not the enumerator, determined the benefit of surgical care. Thus, the conditions identified via the survey serve as proxies in estimating operative disease prevalence. This may overestimate some conditions, such as a fibroadenoma in the breast, which may not require surgical intervention, but usual follow-up screening. However, this survey also does not determine other conditions such as abdominal cancers or early breast cancers that would obligate surgical care, thus underestimating the true surgical burden of disease. Despite these limitations, surgical conditions recognized by SOSAS provide an initial estimate of need for surgical consultations.

Conclusions

The SOSAS pilot study in Pokhara, Nepal was successfully conducted and proved that the SOSAS population-based survey assessing surgical need can be performed in South Asia. The use of smartphones in addition to tablets proved to be an effective way to lower the costs of such a survey. Such devices were easily used by the enumerators to collect data.

After the success of the pilot study in Nepal, the next step is to perform a countrywide survey in Nepal with incorporation of a physical exam performed by a physician for further validation. The incorporation of a physical exam would help confirm verbal interview findings and strengthen the SOSAS tool. Ethical approval for the countrywide survey with physical exam is underway. Using and improving on the SOSAS tool to measure the prevalence of surgical conditions in Nepal will help enumerate the global surgical burden of disease.

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