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Perspective paper

Questionnaire surveys: Methodological and epistemological problems for field-based ethnopharmacologists

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This paper is dedicated to S. Edwards' Kugu-Uwanh adopted father, J. Ngallametta, who passed away during its preparation. He was a respected Songman, and one of the last keepers of much traditional Wik and Kugu knowledge. He will be greatly missed.

Abstract

The classical scientific approach is empirical. One of the favoured means of gathering quantitative data in the health and social sciences, including ethnopharmacology and medical ethnobotany, is by use of questionnaires. However, while there are numerous published articles discussing the importance of questionnaire content, the fact that questionnaires themselves may be inappropriate in a number of cultural contexts, even where literacy is not a factor, is usually ignored. In this paper, the authors will address the main issues posed by the use of questionnaire surveys, using case studies based on their own personal experiences as ethnopharmacologists 'in the field'. The pros and cons of qualitative and quantitative research and the use of alternative means to elicit quantitative data will be discussed.

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1. Introduction

The interdisciplinary nature of ethnopharmacology, which is very important in the study of traditional medicine (Lipp, 1989; Heinrich et al., 2004), encompasses aspects from a number of diverse subject areas, including anthropology, botany, clinical research, pharmacognosy, pharmacology, natural product chemistry and toxicology. However, a concern raised by the International Society of Ethnopharmacology (see editor's note on the website, <http://www.ethnopharmacology.org/>) is that ethnopharmacological studies are predominantly focused towards the natural sciences with relatively few undertaken from a social science perspective. One reason for this is possibly because anthropology is often perceived pejoratively as a 'soft science', and although some anthropologists apply bioscientific methods, many more use qualitative methods apparently lacking in sci-

entific rigour. Given that the majority of academic ethnopharmacological studies are undertaken through natural science departments or institutions, it is therefore not unexpected that a social or cultural emphasis is frequently neglected.

Field-based ethnopharmacologists who work at the interface between the natural and social sciences often face challenges in how to marry these two approaches. Increasingly in recent years in the related disciplines of health research and ethnobotany, there has been a push to use quantitative methods in order to generate data that stands up to scientific scrutiny. This has been driven in particular by funding agencies. One of the most commonly used methods of eliciting quantitative data in the social sciences is through questionnaire surveys. However, while it has been recognised that there is a need for culturally appropriate ways to ask questions in these surveys, little has been written about the potential difficulties of using *questionnaires themselves* in some cultural contexts.

In this paper, three individual case studies will be presented, discussing the problems that the authors faced in contrasting cultural and environmental settings.

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2. The Wik experience (Australia)

2.1. Field site

Collaborative ethnopharmacological research took place at the invitation of the Wik peoples of Aurukun, an ex-emption, and currently the largest Aboriginal community in Cape York Peninsula, far north Queensland (Australia) between 2001 and 2003. Aurukun is classified as being ‘very remote’ according to the Australian Bureau of Statistics, and is situated on the western side of the Cape, on the Gulf of Carpentaria. Overland, access to Aurukun is restricted to four-wheel drive vehicles via a dirt road, which is cut off for a few months each year during the monsoonal ‘wet’ season when travel is restricted to air or sea. The habitats around Aurukun are diverse, consisting of mangroves and vast wetlands (both saltwater and freshwater), Melaleuca swamps, dense forest dominated by Eucalyptus species, open savanna and riverine gallery forest. Bauxite mining has been proposed for a large area in the interior, mainly eucalypt forest, but aside from some pastoralism for cattle established by the mission (which ended after an outbreak of TB in the 1970s), to date there has been very little non-traditional use of the land.

Traditionally hunter-gatherers, ancient land management practises, such as burning, are still undertaken by Wik traditional landowners, although the extent to which this corresponds to fire regimes prior to mission days is little known. The population of Aurukun according to the last census in 2001 was 1034, of which 907 persons were classed as indigenous (Australian Bureau of Statistics, 2001). The actual figure is somewhat higher, according to numbers registered with the local Health Clinic (personal communication), and is around 1300 of which 1200 are indigenous. (The census did not take into account people away on the date it was taken, such as those staying on outstations, in hospital, prison or visiting relatives elsewhere.) The indigenous population of Aurukun consists predominantly of the linguistically related Wik and Kugu groups from south of the Archer River, and the Wik-Way people from north of the Archer. The majority also belong to one of five spirit clans, each with distinctive ceremonial body paint markings, songs and dances. The number of Aboriginal language groups in Aurukun is about 15, but most of these languages are now extinct, or on the verge of extinction, with the notable exception of Wik-Ngathan and Wik-Mungkan, which remains the *lingua franca* of the community. (The term ‘Wik’ will be used generically to refer to all indigenous peoples of Aurukun in this paper.)

Although there is a thriving arts centre for local talented artists, there are few other employment prospects in Aurukun, apart from a handful of jobs in the Shire Council and Health Clinic. There are also limited community development employment project (CDEP) places, which essentially provide ‘work for the dole’ and pay little more than basic welfare.

2.2. Health and healing

Many Wik people live in overcrowded, inadequate housing and a disproportionate number suffer from health and social problems, with alcoholism, domestic violence and suicide being commonplace in the community. Statistics show that there is a huge health disparity between Australia’s indigenous and non-indigenous populations (Australian Bureau of Statistics, 2002). Some of these can be attributable to economic deprivation, lack of access to suitable health care and poor diet (type II diabetes is prevalent in Aurukun, corresponding to the transition from a traditional diet rich in protein and plants to a ‘store food’ diet dominated by refined carbohydrates).

Compared with other communities, Aurukun is fortunate in having its own local Health Clinic, run by the governmental organisation Queensland Health, which provides primary health care to Aurukun’s residents. The Clinic, however, is not always the first port of call for ill people in the community. Some sicknesses, especially those of a serious nature, are considered by Wik people to have a spiritual or sorcery (*puriy–puriy*) causation, and traditional healers (or witchdoctors, known as *Noyan*) are in these cases called upon to both diagnose and treat the sick. The tools employed by a Wik *Noyan* are a piece of string (tied around the patient) and a cup of water into which objects, such as ‘bad blood’, small stones or pieces of wire ‘extracted’ from the patient are spat as verification of a *puriy–puriy* diagnosis. Healing is usually done by the laying on of hands and rubbing underarm sweat on the patient. Occasionally, a *Noyan* is requested at the Clinic, and clinic staff are generally amenable for them to attend to their clients, especially having noted that in cases of a psychological or mental nature a *Noyan* often has a greater success with their treatment than clinic staff do with more conventional ones.

Phytotherapeutic remedies (or ‘bush medicine’, called *opar*’ in Wik-Mungkan) are used in the Wik domestic setting to treat illnesses considered to be of a less serious nature, such as colds and skin infections. While the *Noyan* is also likely to be knowledgeable about plants, it is usually an older member of the patient’s family who treats a sick person, and within their home, rather than the clinic.

2.3. Research project

A major concern expressed by Wik people was loss of their traditional knowledge, including knowledge of local food plants and bush medicines. A senior Aboriginal Health Worker stated that young people in Aurukun today did not know much about *opar*’:

“...they forget culture - but old people still have culture”.
(Doris Poonkamelya Clinic Interview Notes, 2003.)

Similarly, an elderly Wik-Alkan Traditional Owner stated
“...my parents taught me the name of every tree, every plant,

everyfish. . . in 20 years this will all be forgotten. Young people today prefer to live in the busy world”.

The project was established to help address these concerns, by developing an ethnobiology database that could be used by local community members in the school, land and sea management centre and clinic. The function of the database is to act both as a repository of local traditional knowledge of plant foods and phytotherapies, and also to integrate current scientific data (where it exists) with this local knowledge, giving Wik people access to the data through their local names for plant species. Database development and data collection was undertaken by Sarah Edwards (SE).

While lifestyle changes and loss of languages no doubt contribute to loss of knowledge, it was also apparent that bush medicines (at least a few popular ones) were still being widely used in Aurukun, perhaps concurrently with prescribed pharmaceuticals from the clinic. As this could potentially pose health issues due to possible drug interactions, it was felt of interest to find out the extent of this practice. Most clinic staff interviewed did not enquire of their patients if they were using bush medicines. As one clinician explained, being given a Wik-Mungkan name for a plant would be meaningless to him, and he therefore would not be able to make a rational assessment of its potential benefits or risks. Occasionally, however, patients voluntarily told the clinic staff that they had used bush medicines.

2.4. Questionnaire

In conjunction with Aurukun’s Health Clinic, and with support from Queensland Health (whose Ethics Committee gave their approval), a questionnaire was developed to find out how many of the clinic’s clients also used bush medicines. The questionnaire was developed to be anonymous, confidential and non-compulsory, with the stipulation that questions did not have to be answered if the patient felt uncomfortable with them. Due to low levels of literacy in the community, it was decided that clinic staff would ask the questions and fill in the questionnaires for their clients.

The questions avoided asking about specific bush medicines, so as to maintain cultural protocols of not asking about traditional, sacred knowledge. Instead, it was structured in a way using tick boxes to elicit information including about the current extent of use of bush medicines to treat illnesses, and which illness categories people had treated using bush medicines. The illness categories were those given by Wik people in the course of recording information about the plants and their uses, and did not follow any standard biomedical categorisation, for example, “skin problems (sores, scabies, etc.)”, “stomach problems/diarrhoea” and “headache/fever”. A draft questionnaire had been given to clinic staff prior to implementation for comments, and a few minor alterations were made.

One of the changes was to the question “when was the last time you used bush medicine to treat an illness”, with the available tick boxes being reduced to two, “Recently, within

last year” or “longer-term (more than a year ago)”. The reason for this was because local Wik concepts of time differ considerably from the European, ‘linear’ concept, making it harder for Wik people to estimate when particular events had taken place. In fact, the Wik-Mungkan word corresponding to ‘time’ (*Aak*), is the same for ‘country’ or ‘place’, time being situational and relative in Wik terms.

However, even given the implementation of cultural constraints in questionnaire design it was a resounding disaster. Very few patients agreed to participate with the questionnaire survey with clinic staff often experiencing an element of hostility from patients they asked, including from those who moments before had been talking quite freely about bush medicines.

Clinic staff discussed the issue with the Aboriginal Health Workers and a few community Elders to try and establish why the questionnaire returns were so low. There were a number of reasons given, but primarily the majority of Wik people did not want to admit to using bush medicine. Most thought that it might offend the clinic if staff knew that their patients also used *opar*. Also, bush medicine is ‘secret business’, and people did not want to disclose this information to clinic staff. A proposal to translate the questionnaire into Wik-Mungkan and for the Aboriginal Health Workers to undertake the survey was also felt unlikely to work, since all of these issues would still apply. Although SE had built up a good relationship with Wik colleagues (and in fact had been ‘adopted’ into a family), when she also tried asking a few people in the community if they would like to participate in the questionnaire survey, they all gave a negative response, except for one who agreed to participate only on being paid a sum of money!

In addition to these reasons expressed, there are other fundamental reasons why questionnaires may not work in Australian Aboriginal contexts: culturally Aboriginal people are reluctant to expose themselves, and often feel ‘shame’ if they become the focus of attention. After years of colonialism and being marginalized, to be the subject of research, especially given the legacy of colonialism and its 19th and 20th century anthropologists, who often regarded Aboriginal peoples little better than museum or zoo specimens (Griffiths, 1996), it is quite understandable that a request to comply with a questionnaire by discussing what is viewed as a private matter, would result in a negative reaction.

3. The Mixe experience (Mexico)

3.1. Field site

The Mexican Mixe project questionnaires were developed for use in a large rural community of about 6000 inhabitants. The land of the Mixe extends mostly through the cool and humid mountains of the *Sierra de Juarez* in the Mexican state of Oaxaca. *San Juan Guichicovi* is the only Mixe-speaking community in the subtropical *Istmo de Tehuantepec*. It is the principal community (*cabecera*) in a subdistrict (*municipio*)

of the same name. In 1980, the *municipio* had 20,000 inhabitants, while the *cabecera* 5500–6500 (Heinrich et al., 1992). Seventy-five percent of the population in the *cabecera* are considered to be bilingual. A minute fraction of the population can only speak Spanish. The economy is based on subsistence agriculture (mainly maize) and on the production of coffee and citrus fruit. Another relevant commercial product is *huipiles* of the Tehuantepec style. They are produced by women and men of the community and are usually sold to Isthmus Zapotec merchant women, who resell them in numerous communities of the Oaxacan part of the Isthmus, and in many other regions of Mexico. No detailed monograph on the lowland Mixe is available. Two cultural aspects that have been dealt with in detail are the ritual calendar, which is still used in some parts of the *municipio* (Weitlaner-Johnson and Weitlaner, 1963) and, in some adjoining *municipios*, the relationship of religious ritual to medical concepts (Heinrich, 1994 and references therein).

3.2. Health and healing

There are at least 15 different types of healers (*pa'am iixyp'*) known in the community. The largest groups are “specialists in home remedies”. Other important groups are midwives, *chupadores* (healers that suck out an illness), prayer makers (*rezadores*), spiritists (*espiritistas*) and spiritualists (*espiritualistas*). Considerable differences distinguish the various groups of healers (Heinrich, 1994; Heinrich et al., 1998). Recently, the number of those offering help in case of illness has grown to include travelling salespersons (mostly Mixe-speakers with minimal experience in Western medicine), assistants to the local Roman Catholic priest, various protestant groups and trained nurses. The differences between these health care providers are enormous. The travelling salespersons and other individuals with minimal experience in Western medicine is best considered as charlatans, while others have a solid background in medical therapy. Over the past 10 years, there have always been one to four practising medical doctors present. Some are medical doctors sent by Mexican government agencies, such as Instituto Mexicano del Seguro Social (IMSS) and Instituto Nacional Indigenista (INI). Some of the “specialists in home remedies” and travelling salespersons sell pharmaceuticals and give advice on how to administer them. No quantitative data are available on the importance of these forms of medication as opposed to indigenous phytotherapy. Data in this area were collected in 1985 and 1986, and later in several short trips (1–2 months).

3.3. Research project

Looking back at research which was mostly conducted about 20 years ago, and the experience of using a questionnaire in a Lowland Mixe community in Oaxaca is tricky, not only because the scientific framework has changed considerably, but also because one's memory is certainly selective and subjective. Fieldwork was undertaken for about 13

months as part of a study on the medicinal plant use of the Lowland Mixe, by Michael Heinrich in collaboration with Nereyda Antonio B., a biologist, and with various healers whose medico-botanical knowledge was recorded (Heinrich, 1989; Heinrich et al., 1992). This study was developed prior to the comparative tools produced for subsequent research in lowland Mexico (Heinrich et al., 1998).

3.4. Questionnaire

The initial goal for the questionnaire element was to see how the knowledge about medicinal plants is distributed between the genders, in age groups, along the cultural continuum from conservative Mixe speakers to mestisized members of the community and according to socio-economic status. Overall 182 inhabitants were interviewed. Only part of this information was published (Heinrich, 1994), in part because of lack of time, but also because of the complexity of the analysis required. One crucial outcome was the identification of preferred forms of treatment of eight popularly recognised illnesses.

From a methodological perspective, an approach like the one used in San Juan Guichicovi raises a whole series of questions. A vivid recollection is of the response of one of the key informants, on being told about the new element of the project: “Why, haven't I told you everything?”

A similar reaction was experienced on contacting other healers in the community and in surrounding areas. Since all interviews were conducted by Nereyda Antonio and Michael Heinrich (together with a translator), who were both known to work with healers, the interviewees were puzzled about the interviewers' interest in their concepts. They were also puzzled about the house-to-house survey. Frequently, the interviewees were asked: “Why do you do this?”

A few people seemed uncomfortable in being contacted at home, but the vast majority simply seemed to enjoy the interest in their knowledge. This novel element to what the ‘outsiders’ were doing renewed the already intense interest in the researchers' activities. However, explaining the goals of such a sociological tool to someone who has never been exposed to such interviews is problematic, and the impression gained over the whole of the period was that the informants found it difficult to understand what this was intended for. This was in marked contrast to the other work undertaken in the study, where people clearly understood that the researchers were recording the healers' usage of medicinal plants. The questionnaire also resulted in a lot of informal information about the research project being discussed and helped in disseminating information about it.

More problematic remained the issue of random sampling. Short-term migration to outlying *ranchos*, for example, is frequent, and clearly the sample was not as random as one would have expected. The researchers decided to interview the first person in every third house in a street, but the sample was clearly biased to the elderly, to women with young children, and to people who were sick or chronically ill. Another cru-

cial issue is the number of interviews conducted. Although fortunate that during several weeks of intensive work it was possible to interview a relatively large number of informants, in other cases the sample size was far too small for meaningful comparisons. Martínez et al., 1998, for example, looked at forms of home treatment by mothers in different communities of rural Mexico with the goal of understanding what form of treatment is administered by the primary carers of young children, their mothers. The communities selected were from different regions of Mexico and included American Indian as well as Mestizo (Spanish speaking Mexicans of mixed descent) populations. Mothers of young children were interviewed about the type of home treatment their children received during their last episode of diarrhoea. The sample size in the communities was in the range of 25–41, making a statistical analysis problematic.

4. The Graecanic experience (Italy)

4.1. Field site

In the Graecanic project, questionnaires were developed to be used in Gallicianò in southern Italy. The Graecanic area is part of the cultural and linguistic heritage of the Magna Graecia (Greater Greece, 8th century B.C.) and the history of the later Byzantine Empire in southern Italy.

During the period of the Magna Graecia, the whole eastern Mediterranean was dominated by Greek culture. Today, the Graecanic area has receded into the Aspromonte Mountains to the southern tip of the Peninsula (Region of Calabria) and to Salento, in the Region of Puglia. The inhabitants of the Graecanic area, in respect to the surrounding Italian population, are characterised by their own language (*Graecanico*), culture and history as an ethnic and linguistic minority. The elderly inhabitants of Galliciano are bilingual (*Graecanico* and *Calabrian*), whereas the younger generation mainly speaks *Calabrian*, an Italian dialect. Italian (the official language of Italy) is only spoken at school or by officials. Officially Gallicianò has around 100 inhabitants (16 households), of which around 30% are employed in agriculture, 35% in the construction industry and service sector abroad and a substantial percentage, although no precise figures are available, in forestry and related occupations. Gallicianò was partially destroyed by two serious floods in 1951 and 1971, which forced many inhabitants to abandon the village. Floods and earthquake together with fire and epidemics have led to the gradual decrease of farming and pastoral activities in the community (Condemi, 1999).

4.2. Health and nutrition

Many wild plants are traditionally used not only for food, but also for medicinal purposes, as nutrition and health of people are strongly interconnected. The significance of wild food plants has been underestimated for a great number of

cuisines, partly because such food plants are commonly collected by women and children, but also because they fall outside the limits of food science and nutritional anthropology. Wild food plants are a supplementary nutrition source contributing to a healthier diet, but they also represent a potential source of income for rural communities. Wild greens are called *ta chòrta* in *Graecanico* and are consumed on a weekly to daily basis when they are in season. Elderly women, mainly housewives, are the main keepers of traditional food knowledge, while men play an important role in gathering the plants and fungi that grow far away from the village.

4.3. Research project

This project was established to evaluate traditional wild food plants and attributed health significance in the Mediterranean. Changes in lifestyle result in the risk of losing this valuable traditional food knowledge and with it a healthy and balanced diet. Only a few of the younger generation, who are no longer fluent speakers of the ancient language *Graecanico*, know the culturally most important wild edible plant species. Evidence from the field suggests that the loss of traditional *Graecanic* plant names risks leading to a decrease in the number and variety of used *chòrta* (Nebel, 2005).

4.4. Questionnaire

As part of this study, a socio-nutritional questionnaire on the consumption of traditional food plants and its relation to social, economic and anthropological factors was developed. Individuals were interviewed about the perception of health maintenance, health beliefs, other health behaviours related with the consumption of generic foodstuffs and specific plant dietary components. Overall 22 members of eight households were interviewed. Household members are defined as those residing at the time of the study and normally cook and/or eat together one meal an average of one meal daily. This enabled investigation of the characteristics, consumption and perspectives of different household members, such as inter-generational factors. Data was collected in spring 2003 by Sabine Nebel (SN).

After random sampling of eight households (= 50% of the households), the main person responsible for preparing food in the household was interviewed first, and any other member of the household afterwards. As the community is very small, most of the housewives of the randomly sampled households had already shared their ethnobotanical knowledge about wild food plants in unstructured interviews the year before. So, the question: “Why, haven’t I told you this before?” was very common, and made people at first a bit reluctant to continue the interview. However, after encouraging and explaining the purpose of the interview, most of the people were happy to continue. In general, the sample size in this project is very small and statistical analysis might be problematic.

Furthermore, as the interview was on several sheets of paper, it looked very official to the people and increased their doubts. “*Can our knowledge be just in figures?*” asked one of the interviewees. As at first the interview was conducted in Italian by SN and not the local dialect, the sound of the official language of Italy reinforced the impression of being something official to the people. Later the interview was conducted with the help of a local person from the village, to bring it closer to the people and reassure them, that the information gathered is entirely for this project and has nothing to do with the authorities. This, however, raised the question of the influence of a local translator present at the interview.

Another methodological problem can be the length of the interview. In this research, the interview had several parts, including as well a Food Frequency Questionnaire (FFQ). In the FFQ people were asked to give the frequency and average amount of different foods that they have consumed over the last 12 months. As mentioned by [Shahar et al. \(2003\)](#), a major dilemma of an FFQ is the length of the questionnaire. Shorter FFQ's would save time and energy for the interviewee, but an abbreviated FFQ may be less sensitive to traditional foods, and thus be less accurate.

5. Conclusions

In these three cases presented questionnaires were used to gather quantitative data from different groups of people: in the first case clinic patients, secondly from a randomised sample and thirdly from housewives. While the cultural contexts and the specific users of plants in the surveys were diverse, all three contexts presented similar difficulties in applying a questionnaire approach. In the Wik case, the act of asking even general questions about bush medicines was enough to cause affront, due to the delicate nature of what is deemed ‘secret business’. In the latter two cases, some respondents were surprised that they were being asked to complete a survey when they felt that they had already told the researchers everything they wanted to know.

Field-based ethnopharmacological and ethnobotanical research is very dependent on, and sensitive to, micro-politics, i.e. researcher-collaborator relations. The act of formal surveying through use of questionnaires can alter the *status quo* by creating a perceived imbalance in power between researcher and interviewee. From the perspective of a questionnaire respondent, the formal survey makes them an ‘object of study’, rather than a colleague on an equal footing. In the case of the Greacenic and Mixe communities, the initial use of Italian and Spanish, respectively, which are the ‘language of officials’, compounded this effect, and it is likely that use of English in the Wik community also contributed to the respondents’ reluctance to participate. In all three examples given, respondents did not comprehend readily what the questionnaires were ultimately for, and certainly in the Wik and Greacenic communities the forms provoked

an antagonistic reaction due to their perceived association with officialdom.

These experiences are in contrast to those of Gomez-Beloz, who advocates the use of questionnaires in ethnobotany based on his experience working with the Winikina Warao ([Gomez-Beloz, 2002](#)), which for him was successful. One crucial piece of information that he mentions is that he compensated all his respondents, including those who ended the interview before it was completed. [Voeks and Leony \(2004\)](#) used a questionnaire in Bahia, Brazil to examine the link between medicinal plant knowledge and age, gender and socio-economic standing and state that they were “*forced to solicit specific individuals to participate*”, actively coaxing and contributing a ‘tip’ to their informants. In the first case study presented, the fact that a Wik man agreed to participate on condition of ‘being paid’, along with Wik culture having a strong tenet of reciprocity, indicates that questionnaires could also be perceived as work or transactions.

Therefore, the question that should be asked before developing a questionnaire survey is: what does a questionnaire actually *mean* to a community? Does it represent officialdom to be resisted? Or is participating in a survey perceived as work that should be compensated, or an exchange with something expected in return? Generally, ethnobotanical and ethnopharmacological field data are more about *knowledge*, and less about practice. In non-literate societies, it is common for a select few to be ‘keepers of knowledge’, thus making random surveys largely irrelevant. Restricting questionnaires to these specialist traditional knowledge-holders results in small sample sizes, making statistical analyses and comparisons virtually redundant. It is, therefore, necessary to redefine in which circumstances questionnaires are actually useful.

In the Aboriginal context only traditional owners have authority to speak about the plants that grow on their clan estate, due to the sacredness of knowledge: this is the Aboriginal Law. In cases like these, collecting quantitative data for the sake of adhering to accepted perceptions of scientific credibility is unlikely to generate data as valuable as qualitative data accumulated through working closely with a small number of specialists using anthropological methods, such as participant-observation. Quantitative surveys may still be possible in some circumstances, but other indirect and unobtrusive survey approaches should be considered. For example, in [Lee et al.’s paper \(1994\)](#) on apparent dietary intake in remote Aboriginal communities, a ‘store-turnover’ method was used. Quantitative data can also often be generated from qualitative data, for example, it may be possible to calculate the number of separate medicinal uses of particular plant species, and the number of times they have been mentioned by collaborators, thus generating a guide to the relative importance of particular species (cf. [Heinrich et al., 1998](#)).

There are advantages and disadvantages to both qualitative and quantitative approaches. One advantage of qualitative research includes ‘flexibility’, thus allowing researchers to be innovative, although critics say that this may result in anecdotal

dotal or unstructured data, a failure to test hypotheses, and a tendency to bias. However, quantitative survey methods are not necessarily value free, and often manipulate data according to preconceptions. Extrapolation from sample surveys may ignore possible disparities that exist in the 'real world', and how respondents answer questions in formal contexts may differ from responses given in a more relaxed interview. Dependence solely on quantitative methods omits to consider the social and cultural construction of 'variables', which need to be comprehended to obtain a complete and valid picture (Silverman, 2001). Scientific data that is based on repeatable experiments or random sampling is not necessarily superior to data generated qualitatively and is based on social realities. Science, after all, is a process of inquiry, whichever method is used. In the area of ethnopharmacology we need to focus on developing novel methods of inquiry, and on implementing the knowledge ethnopharmacologists gain to benefit the traditional custodians of this knowledge.

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