The gap between knowledge and actual use: Combining ethnobotanical food inventory with dietary assessment in a rural tropical food system in West Sumatra, Indonesia

Lukas Pawera[1], Ali Khomsan[2], Ervizal AM Zuhud[2], Danny Hunter[1], Zbynek Polesny[3]

[1] Alliance of Bioversity International and CIAT, Rome, Italy
[2] Bogor Agricultural University (IPB), Bogor, Indonesia
[3] Department of Crop Sciences and Agroforestry, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague

Introduction and context

- There have been numerous studies documenting biodiversity and traditional knowledge on useful plants.
- However, studies capturing both overall knowledge and actual use are scarce. In the case of food, there is a known paradox of local communities surrounded by high levels of food biodiversity yet suffering from malnutrition.
- Documenting knowledge only may result in a limited or inaccurate understanding to the contribution of useful plants to humans.
- Our study aimed to assess the gap between available and actually consumed biodiversity of food plants.
- This study is a part of a larger PhD research project of the first author.

Methodology

Study area:

- West Sumatra province lies in the range of the Bukit Barisan Mountains, with the western part aligned with the Indian Ocean.
- Our study area was located in the Pasaman Regency, which is isolated, landlocked and has a high cover of forests (Fig. 1).
- The core of local land-use systems is based on the cultivation of wet rice and agroforestry systems dominated by trees (Michon et al. 1986).
- The selected regency Pasaman has the highest rate of stunted children in the province, reaching 41% (MOH 2018).
- From a cultural perspective, the region is dominated by the Minangkabau ethnic group and to a lesser extent by the Mandailing ethnic group. The present study involved both communities.

Ethical considerations:

- The research permission for this study was granted by the Indonesian Ministry of Research, Technology, and Higher Education (RISTEK).
- The methodology was reviewed by the ethical committee of the University of Indonesia (UI) in Jakarta, and ethical clearance was obtained (No. protocol 18-03-0291).
- The research followed the Code of Ethics of the International Society of Ethnobiology and all informants were familiarised with the research objectives, methods and expected results. The FPIC was obtained in a written form.
- The study was aligned with the goals and policy of the Indonesian National Medium Term Development Plan (RPJMN) 2015–2019, in particular with the key strategy (c) to improve the quality and nutritional value of the diet.

Data collection:

- In total, 200 women (15-49 years old) were interviewed individually from randomly selected households in 4 villages. The interviews followed a semi-structured questionnaire and covered basic socio-economic conditions, knowledge on food biodiversity, dietary habits and 24-hour food recalls.
- Diversity of edible plants in the local food system was documented by observation, measurement and through free listing (PAR 2018).
- The plants were collected with key informants and specimens were identified by botanists from the Andalas University in Padang.

Data analysis:

- Quantitative data were analysed initially by functions and pivot tables in Microsoft Excel, followed by the descriptive and inference statistics performed in the IBM SPSS program version 22 (IBM Corp., Armonk, NY, USA).
- We counted the total number of food plant species (both cultivated and wild) in the local food system, number of food plant species consumed in the last 24-hours, and utilization ratio as a proportion between these.
- All food plants were categorized into the food groups of Minimum Dietary Diversity for Women (FAO & FHI360 2016).
- In addition, a proportion of women reaching the recommended dietary allowances (RDA) for Indonesians (MOH 2013) was counted.

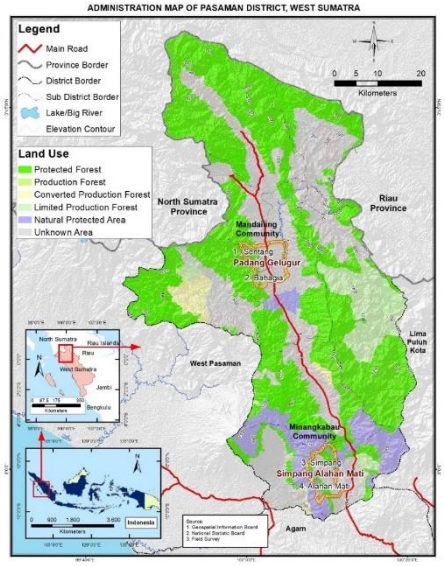

Figure 1 Map of the study area

Results

- A total of 131 food plant species were documented in the food systems of Minangkabau and Mandailing communities.
- The number of wild food plants (85 species) was slightly higher than the diversity of cultivated food plants (79 crop species), indicating that besides high crop diversity, the communities steward rich traditional knowledge on wild edibles.
- The highest number of species was found in the food groups: Other fruits (50), Other vegetables (42) and Leafy vegetables (28). The least diverse food group was Nuts and seeds (6).
- The dietary assessment showed that women consumed 66 food plant species in the last 24 hours. This indicates that only 50% of the total food plants were utilized during the previous day.
- It was found that food group Pulses had the highest utilization ratio, as 78% of available species were consumed. The largest gap was identified for Nuts and seeds, where only 17% of species were consumed.
- The dietary assessment found that most women did not reach the recommended dietary allowances (RDA) of micronutrients. The least met RDA were found for folate (4%), followed by calcium (9%), vitamin A (12%) and iron (16%).

Table 1 The gap between total food plant biodiversity and actual consumption

Food group	Proportion of consumers in the last 24 hours (%)[1]	Number of species consumed in the last 24 hours	Total number of species available in the food system	The species utilization ratio between consumed and available food plants
Starchy staples	100	6	8	2 (75% used)
Leafy vegetables	62	15	28	13 (54 % used)
Other vegetables	62	29	42	13 (69 % used)
Pulses	48	7	9	2 (78 % used)
Nuts and seeds	8	1	6	5 (17 % used)
Vit. A-rich plants	6	4	10	6 (40 % used)
Other fruits	40	16	50	34 (32% used)
Total	N/A	**66**	**131**	**66 (50% used)**

Conclusions and recommendations

- A total of 131 food plant species documented represent a rich biodiversity of food plants in the local food system.
- The study identified a large gap between the diversity of food plants and their actual consumption (50% species not consumed in the previous day).
- The dietary assessment showed that diets are far from adequate.
- Biodiversity of local food plants, especially vegetables, fruits and pulses could be used for diversifying diets and improving dietary adequacy.
- Our learning is that despite the importance of knowledge and its documentation, the actual use matters most.
- For future studies, we recommend documenting the knowledge but also capturing the actual use. The identification of the gap between useful resources and their actual use could provide more valuable and specific information for the communities, programs and policies.

Community workshops and materials

Acknowledgement

We thank the local communities who shared their knowledge and devoted their time to the study. Swisscontact Indonesia is greatly acknowledged for technical support. For the funding, we would like to acknowledge Neys-Van Hoogstraten Foundation (NHF) from the Netherlands. Co-funding of the principal investigator's mobility was obtained from the ALFABET mobility under the Erasmus Mundus Action 2 Programme. Additional stipends were received from the Internal Grant Agency (IGA FTZ, Project No. 20205009).

References

FAO, FHI360. 2016. Minimum dietary diversity for women Minimum. A guide for measurement. FAO, Rome.
Michon G, Mary F, Bompard J. 1986. Multistoried agroforestry garden system in West Sumatra, Indonesia. Agroforestry Systems 4 (4): 315-338.
MOH. 2018. Health profile of West Sumatra province in 2016. Ministry of Health of West Sumatra, Padang.
MOH. 2013. Recommended Dietary Allowances for Indonesian People. Ministry of Health Indonesia, Jakarta.
PAR. 2018. Assessing Agrobiodiversity: A Compendium of Methods; Platform for Agrobiodiversity Research, Rome.