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Re: Assessment of the M.Sc. thesis on 'Food, agrobiodiversity and diet: the nutritional ethnobiology of the Minangkabau and Mandailing Indigenous food systems in West Sumatra' by Ing. Lukáš Pawera, Identification number: 109832, submitted in November 2020

The PhD thesis by Mr. Lukáš Pawera was supervised by Dr. Ing. Zbyněk Polesný with co-supervision by Dr. Danny Hunter and Prof. Dr. Ali Khomsan. Data collection was carried out in the framework of a research-for-development project including extensive field work in West Sumatra, Indonesia.

In general, Mr. Pawera made great efforts to come up with a very comprehensive and very well elaborated thesis, apparently also well aligned to the national Development Plan of Indonesia with a focus on improving the quality and nutritional value of the diet. It is a truly interdisciplinary work which makes a great contribution to linking agriculture and nutrition with a strong focus on agrobiodiversity and the local food environment.

For his thesis, Mr. Pawera collected data during March and April 2018 in the West Sumatra province, Indonesia, among two different ethnic groups, a matrilineal and a patrilineal community. The **overall goal** of this research for development study was to contribute to food and nutritional security of the two communities in West Sumatra by strengthening and diversifying local food systems. Mr Pawera formulated **two major objectives** each including several specific aims, which mainly structured the thesis, namely 1) To assess diet and food security in relation to socio-economic characteristics; and 2) To document the diversity of food plants and characterise their importance and potential nutritionally and ethnobotanically.

In addition, **four research questions** were formulated, which however, are not completely aligned with the objectives. There was, for example, no specific aim for research question No.4 and the latter was, thus, not sufficiently answered. The research questions are 1) What social or ecological factors predict a nutritionally adequate diet? 2) What proportion of consumed foods and nutrients comes from different food acquisition pathways and land-use systems? 3) What is the richness of food plant diversity and what motivations and barriers affect its persistence and use? 4) How do

two different cultures nested in a similar environment affect the use of agrobiodiversity and dietary outcomes?

The **introduction** is comprehensive with a good structure that leads from general global challenges in agriculture, food and nutrition to the concrete situation in the project area, stating the overall aim, objectives and research questions. Thereby latest studies and literature is cited. Similarly, the literature review includes an immense number of studies from the different areas of agriculture, nutrition, and ethnobotany, reviewing different concepts such as nutrition-sensitive agriculture and finally coming up with a conceptual model of the food environment, focusing on food acquisition pathways. This creates a comprehensive basis for this inter-disciplinary study so that the reader is well equipped.

In the **methodology section** it shows that Mr. Pawera has familiarised himself in depth with many different approaches and methods for data collection which he explains in detail and well structured. One shortfall is that the sample size was estimated and not calculated, which is possible, however, it remains unclear on which basis the estimation took place, e.g. whether a specific indicator such as dietary diversity score of the local population was applied. The method section would also improve through adding a time line showing when which activity in the course of this study took place. The individual questionnaires and focus group discussion guidelines are still missing and are suggested to be added to the Appendix. In the section on Focus Group Discussions the term “wild food plants” is used whereas otherwise overall “food plant diversity” or “agrobiodiversity” is surveyed. The different wording should be aligned better so that it is very clear when which group of plants or biodiversity is studied and analysed. While in the discussion “key outcome indicators” are mentioned these are not stated in the method section which still should be done. In addition, it is suggested to add a figure of the 4-cell-analysis as this could help to describe this tool in a better and clearer way.

Mr. Pawera designed three **new indices** to quantify species’ contribution, underutilization and potential for dietary diversity. In general, this is very helpful and could potentially provide guiding for decision makers on which plant species to focus e.g. in development or intervention activities. Highlighting multipurpose crops or “multi-food-group” species through the “underutilisation” index is a very good and important proposal. However, the wording of the first index CDD for the “species’ contribution to dietary diversity” is considered difficult as it does not necessarily depict the contribution to “diversity”. For example, rice, rated to have the highest contribution to dietary diversity, does not increase the overall dietary diversity when eaten by all participants every day, it rather shows the “importance” of this particular species to the diet. Maybe some re-wording or further explanation is necessary as well as some critical discussion and reflection.

The **results section** is well structured according to the two objectives and presents the results in a comprehensive way with sufficient, yet, not too many figures and tables. Some parts of the results section include already interpretation and partly cite literature and need to be either shifted to the discussion section or deleted in case the issues are already covered in the discussion.

Next to the different areas of interest such as socio-economic profile, health, food security and dietary intake of the target communities also correlations were carried out in order to find the predictors of dietary adequacy as well as of crop species richness. Here it became clear that the mean adequacy ratio was associated with food crop species richness – which is an important and very interesting outcome. Yet, it was not clearly stated whether this was total food crops or only cultivated or wild food crops, respectively. Acquisition pathways of food are not only related to food, yet, also to nutrients namely dietary energy and iron and compared between purchased and cultivated/ collected and also between the two different communities. To show not only the pathways for foods itself but also find out where critical nutrients are obtained from is an important analysis and well visualised. In this chapter, 6.1.4., where data is compared a lot between the two different communities, it is strongly suggested to provide these comparison in a table as otherwise the reader is slightly at a loss which community has higher scores in which area. The land uses as sources of wild food plants are depicted very nicely and the perceptions and attitudes towards local and especially wild food plants is elaborated very well.

In general, when presenting the data the exact data source, e.g. focus group discussion, needs to be mentioned more regularly to understand exactly where which data stems from, e.g. chapter 6.2.1. When presenting plant species either in the text or in tables and figures there is no standardised procedure whether to use English or Scientific names and, thus, there is some confusion. This would be no problem if the table in the annex listing all plant species would contain all names, so it is suggested to add here the English names as well (Appendix 2, table A1).

The **discussion part** is divided into three main parts, which makes sense as it covers the nutrition part, the agrobiodiversity part and the linkages between both. Yet, the order could be switched (have the linkages as the last chapter) and also the relation to the research questions could be more clear as again question No.4 seem to be not fully answered. The two communities are compared, yet, how the different cultures affect the use of agrobiodiversity and diets does not get clear, rather their geographical situation and infrastructure (close to the main road) seem to be of importance.

A large number of studies were consulted for the discussion and are cited which is very impressive. In some paragraphs, however, the discussion ends with citing a different study and an own interpretation and short conclusion of the comparison between own and other data is missing. This is especially true in chapters 7.2 and 7.3 where a great amount of literature is cited which, however, leaves the reader slightly puzzled at the end as there is no conclusion drawn and either a table or a short conclusion on what is the take away from all this should be added. At some point the food lists with the 30 foods each for the key nutrients (shown in results chapter 6.2.6) need to be critically discussed and that some of these “local” foods are fortified (e.g. with iron) and could possibly contribute to an increased sugar intake (e.g. Milo, chocolate milk, diverse cookies/ cakes).

The chapter which is called “**Summary and recommendations ...**” should be “Conclusions and recommendations” while an overall short and succinct summary is still needed. The

recommendations are again structured according to the two main objectives and next to recommendations also suggestions for subsequent research is made which is very helpful. Only in some cases it seems that these suggestions are not directly drawn from the study data and are in one case also very general. The **conclusion** completes the study in a successful way as it lists all important and outstanding findings and draws conclusions from them. Only the very last sentence is too general and it is suggested to end with the one but last sentence which is more meaningful for this particular study.

The **reference list** is very rich and seems to be all-encompassing regarding the topic and study site, only some citations of studies have mistakes and very few are missing which would not have happened when a reference manager is used which is strongly recommended for the next publication. The **appendix** is very impressive with various information about the events conducted for knowledge sharing and awareness raising including training material. As a first appendix, still, the research tools, namely the questionnaires should be added; and as a second appendix, the list of all researched plant species should be shown.

Overall, given the inter-disciplinary approach of this study, the apparently extremely high commitment of Mr Pawera for the topic, digging deep into the different scientific areas and obviously great dedication during the field study, the submitted thesis fulfils without doubt all requirements of a Ph.D. thesis and is recommended for the final defence.



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