Community Perceptions of the Determinants of Diabetes in Peri-Urban Vanuatu

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Abstract
Health promotion is a core component of the Pacific region’s response to noncommunicable diseases (NCDs) prevention and control. However, while health promotion should build on and be informed by contextually specific norms and social discourse, there remains a paucity in research that seeks to understand how people in the Pacific region comprehend chronic conditions and their determinants. Based in peri-urban Vanuatu, this codesigned study utilized an open-ended survey to investigate community perceptions of factors contributing to the development of type 2 diabetes. Results demonstrate a complex picture of diabetes-specific health literacy, with 22 distinct causes identified by 308 respondents. Dietary factors were commonly acknowledged; however, dietary complexity was not well understood. Limited recognition of the role of tobacco and alcohol consumption in disease development was also noted. Overall, findings demonstrate mixed successes in NCD-related health promotion. Moving away from more universalized approaches commonly advocated by donors, this research identifies the need for locally designed and driven health promotion that focuses on more nuanced, culturally sensitive, and contextually grounded messaging.

Keywords
diabetes mellitus, determinants, health literacy, noncommunicable diseases, NCDs, Pacific, Vanuatu

What We Already Know
- The escalating burden of NCDs was recognized as a “human, social and economic crisis” by Pacific leaders in 2011.
- Given the constrained resourcing of the Vanuatu health system, primary and secondary prevention of NCDs has been prioritized by government.
- Enhanced population health literacy is a fundamental component of improved population health.

What This Article Adds
- Despite widespread public health messaging regarding NCDs, there has been limited community uptake of the 4 × 4 definition of NCDs in peri-urban Vanuatu.
- Dietary complexity is generally not well understood at the community level, and there remains limited recognition of tobacco consumption and the harmful consumption of alcohol as determinants of diabetes.
- Evidence suggests that while existing public health messaging is both relatively widespread and effective, universalized approaches negate important social and cultural specificity that is necessary for effective health promotion and desired behavior change.

Introduction
Noncommunicable diseases (NCDs) now represent the leading cause of premature mortality in Vanuatu.1 This NCD burden mirrors similar regional trends, with the Pacific now ranked as having some of the world’s highest rates of NCD-related incidence, morbidity, and mortality.2-6 The significant and widespread impact of this burden has been recognized by Pacific leaders who, in 2011, declared NCDs a regional “human, social, and economic crisis.”7
The emergence of diabetes is of particular concern to Vanuatu’s 272,000 citizens. The increasing disease prevalence, from 2.8% in 1998 to 13.1% in 2016, and significant complication rates have fueled concerns among health sector and other interested parties. However, evidence also indicates that the reporting of erroneous diabetes prevalence data across the region, and the highly visible presence of blindness and amputations as comorbid disease complications, may have contributed to an amplification of public concern.

In response to the individual, community, health system, and economic ramifications of increasing incidence and poor disease management, the Vanuatu Ministry of Health and its partners have sought to prioritize the effective prevention and control of NCDs. National action has focused on primary prevention, aligning with global and regional recommendations and acknowledging the physical and economic infeasibility of treatment-focused responses. Scaffolded against the $4 \times 4$ definition of NCDs—referring to 4 major diseases, namely, cardiovascular disease, cancer, diabetes, and chronic obstructive pulmonary disease, and the 4 modifiable determinants of poor diet, insufficient physical activity, smoking, and the harmful consumption of alcohol—the national NCD policy includes explicit strategies focused on health promotion and disease prevention. Through multi-sectoral engagement, strategies aim to improve community health awareness and promote behavior change while also seeking to foster environmentally enabling conditions that reduce population exposure to NCD risk factors.

Evidence demonstrating links between improved individual and population health literacy and enhanced health outcomes is vast. Alongside larger structural changes, the prioritization of health promotion activities, as a means for improving how communities access, understand, appraise, and apply health information, is an integral facet of Vanuatu’s NCD response. However, with the exception of work by Bollars et al and a small but growing body of knowledge shared by Pasifika scholars and communities in New Zealand, there remains little context-specific literature to inform health promotion activities or approaches. Furthermore, while detailed anecdotal knowledge about how diseases are understood within communities is shared among health workers, financial and human resource constraints have limited systematic documentation and evaluation of health promotion activities and their impact. This paucity in research outlining how individuals and communities understand NCDs and their modifiable determinants has constrained local health actors’ abilities to push back against externally driven donor-funded and -supported, one-size-fits-all, universalized approaches to health promotion. Context-specific evidence demonstrating how NCDs are understood at the community level is hence integral to ensuring that health promotion activities are designed and delivered to maximize impact.

Focusing on diabetes as an NCD of particular public concern in Vanuatu, this study seeks to understand community-level knowledge of disease determinants. By mapping community perceptions of disease etiology against the $4 \times 4$ model for NCD health promotion and analyzing points of divergence, this study aims to build an evidence base to inform future health promotion activities and population health literacy efforts.

**Methods**

As part of a larger project analyzing the intersection of cultural knowledge and belief systems and health, this study was codesigned by ni-Vanuatu health workers, bureaucrats, community representatives, the study’s enumerators, and the article’s authors. The study was prompted by requests from community and institution-based health workers as well as an acknowledged need for more detailed and context-specific research into NCDs, as outlined in the Vanuatu NCD Policy and Strategic Plan. Diabetes was selected as the disease of focus given its more obvious symptomology and its perceived disproportionate burden across communities and within the national health system. As such, a survey was conducted to gather community perceptions of diabetes determinants and assess population uptake of NCD-related health promotion messaging.

Vanuatu’s second largest town, Luganville, was selected as the study site. This peri-urban locale was anticipated to capture a wider representation of responses than is typically found in rural “outer island” settings, while also being located outside of Port Vila, the administrative capital where health promotion activities are typically concentrated. The study utilized stratified random sampling of 7 sites to ascertain socio-economic and cultural diversity across respondents.

The survey was conducted over 1 week by eight Indigenous enumerators who did not have health or clinical backgrounds, yet who had collaborated in the design of the survey tool. Targeting individuals older than 18 years, demographic questions were close ended while questions pertaining to the cause of diabetes were open ended and permitted multiple responses. Survey questions were conveyed orally in Bislama, the national lingua franca. However, enumerators were permitted to provide further explanation of questions in English, French, or local dialects to aid in comprehension. Verbatim responses were recorded by enumerators.

Survey responses were compiled and collated by the study’s bilingual first author. Data familiarization and preliminary analysis utilized inductive reasoning to organize responses according to themes and respective subthemes. A subsequent coding system was developed and applied to all open-ended survey responses permitting quantitative content analysis. Statistical analysis was undertaken using IBM SPSS Statistical software version 25.
Results

This study surveyed 313 participants with 308 providing responses to the question of interest. There was a relatively even split between male (n = 152; 48.56%) and female (n = 161; 51.44%) participants. Age was collected from 308 participants (98.40%) in 10-year brackets from 18 to 74, and 75 years and older. Just over half of the sample were between the ages of 18 and 35 years old (53.89%). Information pertaining to education status was also recorded for 305 participants (97.44%). This information was categorized into 3 groups: those who had not attended formal schooling (n = 9; 2.95%), those who attended some or all of primary school (n = 88; 28.85%), and those who attended some or all of high school or higher (n = 208; 68.19%). No significant gendered differences were noted in educational attainment levels across the sample (Fisher’s exact test, \( P = .22 \)).

A total of 615 responses to the question (translating to) “what are the main causes of diabetes” were provided by 308 respondents. Five participants (1.6%) chose not to answer this question, while 100 respondents (31.9%) provided singular responses. The remaining 551 responses were shared by the 208 participants, meaning the majority of participants (68.1%) identified multiple causes of diabetes. There were no statistically significant demographic differences between those who elected not to answer or who provided single answers compared with the broader cohort.

Causes of Diabetes

Twenty-two distinct causes of diabetes were identified by the participants. Consumption of processed foods was the most common response, n = 151 (49.03%), followed by eating too much sugar, n = 114 (45.78%), and insufficient physical activity, n = 96 (31.17%). Table 1 shows the frequency and percentage of respondents who identified each cause.

Disaggregation of results demographically highlighted statistically significant relationships between men and the identification of insufficient physical activity (\( P = .0192 \)); those without formal education and the identification of drinking too much sugar (\( P = .0123 \)); and the identification of lack of dietary balance by those over the age of 35 (\( P = .0377 \)). While other associations were noted, these lacked statistical significance.

Alignment With the 4 × 4 Model for NCDs

Grouping dietary responses permitted an assessment of the responses in alignment with the 4 × 4 model used in NCD health promotion.\(^{17}\) Dietary-related factors included the following: “consumption of processed food,” “eating too much sugar,” “lack of dietary balance,” “drinking too much sugar,” “eating too much salt, oil, or butter,” and “eating too much island food.”

Augmentation of data in this manner demonstrated considerable recognition of the role of diet in the development of diabetes, with 278 respondents (90.26%) identifying dietary-related factors. By contrast, however, smoking and the harmful consumption of alcohol were insufficiently recognized by the sample with just one participant explicitly identifying smoking while one other identified smoking, alcohol, and the use of kava (Table 2).

In total, 288 respondents (93.5%) identified causes linked to the 4 × 4 model of conceptualizing NCDs. However, only 86 respondents (27.92%) identified 2 or more determinants aligning with this model. Eighty-four respondents (27.27%) identifying a combination of determinants relating to poor diet and insufficient physical activity. While 2 respondents (0.64%) identified 3 aligned determinants: poor diet, insufficient physical activity, and smoking in one instance, and insufficient physical activity and the combined response of smoking and the harmful consumption of alcohol in another. There were no statistically significant correlations between gender, age, or educational level, and greater identification of diabetes determinants aligned with the 4 × 4 model.

Discussion

Results from this study paint a complex picture of diabetes-specific health literacy in peri-urban Vanuatu. Majority of those surveyed (93.5%) identify at least one factor aligned with the NCD 4 × 4 model, which recognizes poor diet, insufficient physical activity, smoking, and the harmful consumption of alcohol as modifiable determinants of disease.\(^{17}\) However, less than one third (27.92%) of respondents

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Table 1. Identified Causes of Diabetes and Their Frequency.

| Cause of diabetes                              | Number of responses (% of respondents, n = 308) |
|------------------------------------------------|-----------------------------------------------|
| Consumption of processed foods                | 151 (49.03%)                                  |
| Eating too much sugar                         | 114 (45.78%)                                  |
| Insufficient physical activity                | 96 (31.17%)                                   |
| Lack of dietary balance                       | 81 (26.30%)                                   |
| Drinking too much sugar                       | 56 (18.18%)                                   |
| Genetics                                      | 49 (15.91%)                                   |
| Black magic and customary beliefs             | 23 (7.48%)                                    |
| Stress                                        | 22 (7.14%)                                    |
| Lack of self-discipline                       | 15 (4.87%)                                    |
| Eating too much island food                   | 9 (2.92%)                                     |
| Poison                                        | 7 (2.27%)                                     |
| Eating too much salt, oil, or butter          | 7 (2.27%)                                     |
| Lack of awareness                             | 6 (1.95%)                                     |
| Unsure                                        | 4 (1.30%)                                     |
| Eating the same foods too often               | 3 (0.97%)                                     |
| Eating at the wrong time                      | 2 (0.65%)                                     |
| Drinking bad water                            | 1 (0.32%)                                     |
| Smoking                                       | 1 (0.32%)                                     |
| Smoking, alcohol, and kava                    | 1 (0.32%)                                     |
| Lack of massage                               | 1 (0.32%)                                     |
| Cold food                                     | 1 (0.32%)                                     |
| Lack of sleep                                 | 1 (0.32%)                                     |
identified 2 or more determinants associated with this model. Furthermore, the identification of factors not linked with the traditional biomedical model of diabetes etiology was also common. This pluralistic community understanding of disease determinants points to the need for more fluid or dynamic health promotion messaging that responds to socially and culturally informed interpretations of ill health rather than solely behavioral or biomedical markers.

The consistent identification of dietary-related factors by a majority of respondents is a testament to national and local education and health promotion messaging. Widespread identification of the consumption of processed foods (49.03%) is particularly reflective of public recognition of the health harms associated with a global transition in the sale of these commodities. This recognition supports macro-level findings by Sievert and colleagues, who suggest that the increased consumption of energy-dense and nutrition-poor foods is likely to be particularly burdensome to the Pacific’s emerging economies.

The Bislama term for diabetes, siksuka, may also contribute significantly to an oversimplification of community conceptualizations of the causes of disease. Eating (45.78%) and drinking (18.18%) too much sugar were causes of diabetes explicitly identified by the cohort. A significant association between the identification of drinking too much sugar and lack of formal education was also apparent. With siksuka translating to “sick sugar,” it is likely that this literal interpretation may be contributing to a narrow and therefore inaccurate community understanding of diabetes, which may affect health-promoting behavior. This association may also have been unintentionally aided by donor-funded health promotion materials featuring sugar cubes—a product not used in Vanuatu—and depicting the number of teaspoons of sugar found in products. This finding points to a need for more nuanced approaches to diabetes-specific health promotion in order to overcome the identification of sugar as a specific product and instead foster a more comprehensive understanding of the dietary contributors to disease.

Results from this study also demonstrate limited community recognition of tobacco and alcohol consumption as causes of diabetes. With tobacco consumption identified by just one respondent (0.32%) while one other identified smoking, alcohol, and kava use, majority of respondents failed to recognize the contribution of these harmful commodities to the development of diabetes. With global evidence demonstrating multinational tobacco and alcohol corporations’ and their affiliates’ strategic efforts to target markets in more sparsely regulated low- and middle-income countries, limited community understanding of the impact of these products is of particular concern. Ongoing government support for alcohol producers and high-level endorsement of a proposed tobacco factory in Vanuatu’s capital, Port Vila, in early 2020, have the potential to increase supply, reduce costs, and hence increase access to these health-harming commodities. It is, therefore, integral that future health messaging places a greater emphasis on the harms associated with these addictive commodities in order to stem public uptake and the resultant escalation of disease.

Finally, the breadth of causes identified by respondents should also be recognized and considered for further research examining the role of culture in community perceptions of disease etiology. Indeed, as a key example, 23 respondents (7.5%) cited “kastom” (traditional knowledge and practice) as a determinant of diabetes. Furthermore, seven respondents (2.3%) specifically identified “poison,” a common term for “sorcery,” as a cause for the development of diabetes. Given such considerations, contextual-specific messaging that accounts for pluralistic community understandings of health and illness appear far more appropriate in shifting community perceptions and potentially behaviors change than one-size-fits-all global heuristics.

Limitations

Research findings have been generated from a relatively small sample size, limiting the national generalizability of results. However, this sample represents 3.4% of Luganville’s adult population, giving some weight to findings in this peri-urban setting. The open-ended nature of the research question was integral to garnering genuine community perceptions; however, this may also have created the potential for misinterpretation of responses. Single-author coding is also a potential weakness of the study; however, robust discussion between authors, local enumerators and colleagues post data collection and during analysis was embedded to minimize this risk. This work demonstrates the benefits of codesigned research insofar as ensuring results are responsive to health system and community need and that the process itself is not just respectful but empowering to local actors. Greater engagement of local experts in data analysis, the presentation of results, and the creation of solutions would not only be desirable but also integral to future research in this space.

Conclusion

The economic and human resource constraints on the Vanuatu health system necessitate that NCDs, such as diabetes, are addressed in the most efficient manner. Effective primary
prevention is hence integral to safeguarding population health while also ensuring the sustainability of the nation’s health system. Responding to a need identified by local health and community actors, this research addresses the paucity in regional and Vanuatu-specific evidence of health literacy and, in particular, understandings of the region’s growing burden of diabetes. Findings demonstrate significant successes in health promotion activities to date, with widespread awareness of the links between diet and the development of diabetes. However, imprecise responses and limited recognition of tobacco and alcohol as contributors to disease, particularly in a climate of trade expansion into new markets, requires greater attention. Furthermore, and perhaps more important, critical reflection on these findings highlights the limits and potential unintended consequences of the 4 × 4 model and other global approaches to health promotion. Hence, while echoing calls for greater recognition of the importance of health promotion and improved health literacy as tools of disease prevention, caution must be taken to ensure that efforts build on sociocultural understandings of health and illness. Local ownership, nuanced and responsive messaging, and health literacy activities are, therefore, integral to fostering necessary dialogue to improve individual and population health.

Acknowledgments

We would like to acknowledge the integral support and insight provided by Daisy Unguna, Gordon Edward, Diana Bankon, Steven Garae, Fillia Bill, Daniel Borugu, Jonathan Boe, and Diana Dick of the Sanma Youth Council. We also owe a great deal of thanks to Siro Vagaha, Gloria Tarileo, Adeline Tobibi, Casimir Liwuslili, Dr. David Brain, and colleagues at Sanma Rural Health and the Northern Provincial Hospital. Finally, we would also like to acknowledge and thank the Australian Research Council for their role in funding this important work.

Author Contributions

Based on a research grant by JT, this study was codesigned by JT and LME. Data were collected by local enumerators, while data entry, collation, and analysis were undertaken by LME. The article was drafted by LME with critical revisions by JT.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by the Australian Research Council (Grant Number DP140104244).

Ethical Approval

Ethical approval for this study was obtained from the La Trobe University Human Ethics Committee (Ref: 2041-14). Research approval was also obtained from Vanuatu National Cultural and Vanuatu Ministry of Health (Ref: MOH/DG02/21-VT/mc) and the Vanuatu National Cultural Council (October 9, 2014) in compliance with the Vanuatu Cultural Research Policy.

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