Peer review history for:

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HOW TO CITE:
Multi-stakeholder value creation and appropriation from food-related health claims [peer review history]. S Afr J Sci. 2024;120(5/6), Art. #14091. https://doi.org/10.17159/sajs.2024/14091/peerreview

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Reviewer F: Round 1
Date completed: 04 October 2023
Recommendation: Accept / Revisions required / Resubmit for review / Decline
Conflicts of interest: None declared

With regard to our policy on 'Publishing peer review reports', do you give us permission to publish your anonymised peer review report alongside the authors' response, as a supplementary file to the published article? Publication is voluntary and only with permission from both yourself and the author.

Yes/No

Comments to the Author:
Congratulations on a well written, very informative manuscript. The information presented is significant and should be brought to the attention of policy makers and producers of food with health claims.

There are two points of clarification on the methodology. 1) How Facebook was used to recruit respondents and 2) Did the sample include respondents from different cultures to ensure a true reflection of the views of South Africans?

The results are also silent on the general level of education of respondents specifically of 'consumers' included in the study.

I have indicated a few suggested editorial changes in the manuscript

[See Appendix 1 for Reviewer F's comments made directly on the manuscript]

Author response to Reviewer F: Round 1

Congratulations on a well-written, very informative manuscript. The information presented is significant and should be brought to the attention of policymakers and producers of food with health claims.

AUTHOR: Thank you for your kind observation and review of our paper.

The error message should be removed

AUTHOR: Thank you, the error has been corrected.

Do you mean "such as these"?

AUTHOR: Thank you for picking up the omission, the sentence has been corrected.

How Facebook was used to recruit respondents. Be more specific as to how this was done to allow for reproducibility

AUTHOR: We have elaborated on the paper by adding the following: "Consumer respondents were approached via Facebook through direct messaging based on their ability to inform the research question. A deliberate effort was made to exclude consumers who worked in the food or healthcare industries."

Did the sample composition consider cultural diversity? Did the sample include respondents from different cultures to ensure a true reflection of the views of South Africans?

AUTHOR: Thank you for an interesting point that made us reflect on our study.

The sample was not representative of the South African population. As is often stated about qualitative research and the choice of respondents, *respondents were selected based on their ability to inform the research question*. The profile of "professional" participants is therefore skewed in favour of an understanding of food labelling and value creation, regardless of ethnicity. The respondents reflected the demographics of the industry.

We did aim for the representation of alternative views (i.e., triangulation). This was done in two ways:

1. The professional participants reflect a diversity of opinions based on various roles related to food labelling, such as health professionals, food scientists, farmers, journalists, the public sector, the private sector, etc. These different role-players provided perspectives of the kind of value that can be created and to whom it is appropriated. Saturation was obtained after 37 interviews.
2. Consumers were interviewed to triangulate the views of professional participants.

Six of the 37 "professional" interviewees happened to be "black", "coloured", or "Indian", and 26 respondents were female. These were distributed across the different roles. Six of the twelve consumers were "black", "coloured", or "Indian".

From the data that we have, we are unable to see any observable patterns across gender or race at the point of saturation.

The results are also silent on the general level of education of respondents specifically of 'consumers' included in the study.

AUTHOR: While we required consumers to be able to respond to questions about food labels and value, this did not require any formal education.
Nonetheless, we have added the following sentence: "Seven of the 12 consumer respondents had a B-degree, while another four had a post graduate qualification. "

I have indicated a few suggested editorial changes in the manuscript.

AUTHOR: Thank you, we only found the corrections mentioned in 1. and 2. above. We had the document reviewed by another editor.

Reviewer N: Round 1
Date completed: 02 November 2023
Recommendation: Accept / **Revisions required** / Resubmit for review / Decline
Conflict of interest: None declared

Does the manuscript fall within the scope of SAJS?

Yes/No

Is the manuscript written in a style suitable for a non-specialist and is it of wider interest than to specialists alone?

Yes/No

Does the manuscript contain sufficient novel and significant information to justify publication?

Yes/No

Do the Title and Abstract clearly and accurately reflect the content of the manuscript?

Yes/No

Is the research problem significant and concisely stated?

Yes/No

Are the methods described comprehensively?

Yes/No

Is the statistical treatment appropriate?

Yes/No/Not applicable/**Not qualified to judge**

Do you believe somebody with more methodological expertise in the area of this study than you have needs to review this?

Yes/No

If yes, can you suggest the type of expertise needed.

Qualitative statistical analysis
Are the interpretations and conclusions justified by the research results?
Yes/Partly/No
Please rate the manuscript on overall contribution to the field
Excellent/Good/**Average**/Below average/Poor
Please rate the manuscript on language, grammar and tone
Excellent/**Good**/Average/Below average/Poor
Is the manuscript succinct and free of repetition and redundancies?
Yes/No
Are the results and discussion confined to relevance to the objective(s)?
Yes/No
The number of tables in the manuscript is
Too few/**Adequate**/Too many/Not applicable
The number of figures in the manuscript is
Too few/**Adequate**/Too many/Not applicable
Is the supplementary material relevant and separated appropriately from the main document?
Yes/No/**Not applicable**
Please rate the manuscript on overall quality
Excellent/**Good**/Average/Below average/Poor
Is appropriate and adequate reference made to other work in the field?
Yes/No
Is it stated that ethical approval was granted by an institutional ethics committee for studies involving human subjects and non-human vertebrates?
Yes/No/Not applicable
If accepted, would you recommend that the article receives priority publication?
Yes/**No**
Are you willing to review a revision of this manuscript?
Yes/No
Select a recommendation:
Accept / **Revisions required** / Resubmit for review / Decline
With regard to our policy on 'Publishing peer review reports', do you give us permission to publish your anonymised peer review report alongside the authors' response, as a supplementary file to the published article? Publication is voluntary and only with permission from both yourself and the author.
Yes/No
Comments to the Author: The review is well written, with few grammar mistakes. I suggest that the author include a table in the manuscript describing the stakeholders and what value they attached. This will assist in knowing who ascribes what value to the product. The author asked one question and did not explain what other questions were asked in the follow-up. Although the author stated that it is exploratory, the asking of only one question could mask the possibility of the participants only mentioning one value, and in this case, the economic value. Having a table on social value creation could distort the results. I suggest that the author include a table on the HI and environmental value. This will flow with the manuscripts.

[See Appendix 2 for Reviewer N's comments made directly on the manuscript]

Author response to Reviewer N: Round 1
The review is well written, with few grammar mistakes.
AUTHOR: Thank you for reading our paper, and for your kind response.
I suggest that the author include a table in the manuscript describing the stakeholders and what value they attached. This will assist in knowing who ascribes what value to the product.

Since the researcher has the data, it would be better if we could know which group mentioned which value in the tabular form. This will help researchers in knowing which group to target with what information.

AUTHOR: Thank you. This was a very valuable suggestion. The breakdown of the data provides deeper visibility of the results.

We do wish to warn against treating the results as statistical data. The data was qualitative. The number of participants who mentioned value does not reflect the depth of the insight or the number of times it was mentioned.

Having a table on social value creation could distort the results. I suggest that the author include a table on the HI and environmental value. This will flow with the manuscripts.

Social value creation was not one of the value mentioned earlier (it would be better if the author could maintain the flow of economic, environmental, and HI.

AUTHOR: Thank you for pointing this out. We also corrected the word “social” to “society” in the stakeholder column.

The author asked one question and did not explain what other questions were asked in the follow-up. Although the author stated that it is exploratory, the asking of only one question could mask the possibility of the participants only mentioning one value, and in this case, the economic value.

AUTHOR: The interviewers deliberately avoided leading questions. Open-ended questions were used, with follow-up questions such as “What other benefits are there from food labels, and who benefits from them? We have added an example of the follow-up question in the manuscript.

As the results show, many respondents did not mention all the forms of value, and we interpret that as not thinking about such value, rather than omitting mentioning it.

Food Labels with Health Claims in South Africa: Exploration of Value Creation and Appropriation

Abstract

Health claims are considered a means to add value to food and beverages, however, it is not always evident which stakeholders benefit and to what extent they benefit. In this paper, we extend the investigation of value creation and appropriation into the domain of food, specifically food labels. Using a qualitative approach, this study aimed to elucidate which forms of value can be created by legislating health claims on food labels. Of specific interest are health claims for bioactive compounds found in indigenous South African plants that form part of the food basket such as the herbal teas, rooibos and honeybush. The findings reveal that health claims have the potential to advance the sustainable development agenda in South Africa, but only if structures can be put in place to appropriate human and intellectual (HI) value, as well as environmental value. Currently, there is strong evidence for economic value creation and appropriation potential, but little clear evidence that HI or environmental value will be appropriated from health claims, especially if these health claims exclude benefits from bioactive compounds found in indigenous South African plants. If we could find a means to measure the HI and environmental value creation potential of health claims, using metrics that people understand, we may be able to develop strategies to ensure that such products can benefit stakeholders beyond economic value alone (i.e., more sustainable value creation). The findings could directly impact food labelling policy formulation, considering current draft regulations to implement health claims in South Africa.

Significance of the main findings

The plant biodiversity of South Africa offers opportunities for economic, human and intellectual (HI), and environmental value creation through legislated health claims on food labels. Without clear metrics for the HI and environmental components, economic value creation may dominate, but the value created might not be sustainable or appropriated by the desired stakeholders. Furthermore, since the current draft food labelling legislation for health claims excludes any bioactives from indigenous South African plants, much of the economic, HI and environmental value creation potential reported as potential outcomes for this research (e.g. funds to communities, knowledge preservation or biodiversity conservation) will not materialise.

Introduction

In South Africa, as in much of the rest of the world, the growing incidence of n**Error! Bookmark not defined.**on-communicable diseases (NCDs) are of growing concern (1). Key drivers of NCDs

are more sedentary lifestyles and changes in the composition of our food (2–4). Research highlights that post 1994, South Africans have been eating fewer vegetables and consuming more kilojoules – many derived from sugar-sweetened beverages and processed foods (5). Not only is there an increase in diabetes-related mortality (7%, compared to a global average of 3%) (1), but also in the challenges of living with such a disease: reduced personal well-being, reduced capacity to work and increased healthcare costs (6–8).

Food labelling is considered a cost-effective tool in the fight against the rising NCD burden due to the potential it holds to communicate information about the nutritional properties of food (9). In particular, health claims on food labels can bridge the information gap that exists between the consumer's knowledge and the manufacturers' understanding of the intrinsic qualities of a food product (10). In South Africa, 'health claim' means an effect on the human body, including an effect on one or more of the following: (a) a biochemical process or outcome; (b) a physiological process or outcome; (c) a functional process or outcome; (d) growth and development; (e) physical performance; (f) mental performance; (g) a disease, disorder or condition; and (h) oral hygiene; (11). There are various means by which to establish such claims. Screening, identification and analysis of functional ingredients, analysis of mechanism of action, and development of agricultural products rich in these functional ingredients is a primary mechanism (12). Traditional medicinal use is another acknowledged method to establish a health claim, although not widely accepted in food legislation (13).

Japan is a good example of a country that has tailored food labelling and legislation to achieve better health outcomes and has an established history of allowing foods to carry a range of scientifically validated health claims (14). Food for Specialised Health Uses (FOSHU) was adopted by the Japanese government in 1991, followed by Food with Nutrient Functional Claims (FNFC) in 2001, and Food with Function Claims (FFC) in 2015 (15). The introduction of FFC unlocked new market growth in a sector that had essentially become stagnant after 2007 (15). One of the first primary processed products for which a claim was allowed was Japanese green tea, produced from the Benifuuki cultivar (16). In comparison with common green tea, Benifuuki is rich in *O*-methylated catechins, responsible for anti-allergic effects (17). With the recent expansion of FFC to include selected fresh produce, producers (i.e., farmers) can now also benefit from the system (12). Examples of FFC fresh produce are β-cryptoxanthin-rich Satsuma mandarins (12) and the corresponding claim 'This food contains β-cryptoxanthin, which reportedly maintains bone health; 3mg/day' (18).

South African legislation relating to health claims on food is still pending (11). Claims under consideration include function claims such as 'Beta-carotene functions as a tissue antioxidant and so keeps cells healthy' and reduction of disease risk claims such as 'Diets low in sodium may reduce the risk of high blood pressure, a disease associated with many risk factors, in some individuals'. Notably, there are no claims for plant bioactives such as mangiferin, aspalathin, and L-canavanine from the South African plants, honeybush, rooibos, and *Sutherlandia frutescens* (19–25), respectively. These plants have a long history of traditional use, including as herbal teas. Bioactive compounds of indigenous plants such these show promise in preventing and reducing risk factors for NCDs, although human studies are still needed.

Consumers, producers, non-governmental organisations, industry bodies, marketing agents and policymakers (to name but a few) all play a role in influencing food policy (26). When dealing with such a diverse collection of stakeholders, there are complementarities and trade-offs to consider and thus, a holistic view of value creation and appropriation from the perspective of these stakeholders could provide the ability to maximise the value 'pie' that can be created from food labels. This study examines the types of value that can be created by putting health claims on food labels in South Africa (including claims related to bioactives from indigenous plants). It also outlines the stakeholders for which value can be created and where it might be captured.

Methods

Study design and setting and recruitment

A pragmatic paradigm was used to answer the research question (27). To gain an in-depth understanding of potential value creation, in-depth qualitative interviews were conducted with a focused sample. The aim was not to make generalisations about the views of a larger population (27). The study was conducted in accordance with the Declaration of Helsinki, and approved by the Research Ethics Committee of [anonymised] prior to commencement of the research. Respondents provided informed consent before the start of the interviews. They were thanked for their contribution, but not compensated. Professionals were specifically recruited for their diverse professional qualifications to achieve maximum variation in perspectives. Professional contacts of the lead author were approached initially, followed by snowball sampling (accounting for approximately 50% of respondents). Consumer respondents were approached via Facebook.

Procedure

Prior to the interviews, the interview guide was tested with a convenience sample of three professionals. All interviews, typically 45 - 60 min long, were conducted in English via video conferencing between February and May 2020. Respondents were asked to share their views on what type of value could be created by incorporating health claims on food labels in South Africa. Based on their responses, follow-up questions were asked to gain additional insight or clarity. Interviews were conducted until theoretical saturation was achieved (28), i.e., when no new insights emerged from interviews. A final interview was then conducted to confirm that saturation had been achieved.

Data analysis and trustworthiness

The interviews were audio recorded, transcribed and coded (i.e., names assigned to segments of the interview transcripts, based on the content). The six capitals model of the International Integrated Reporting Council (29) was used as an initial guide to identify forms of value reported by participants (30). Thematic analysis was performed (31) whereby codes were arranged into groups with similar themes, resulting in three final themes pertaining to value creation through health claims on food labels. Trustworthiness was ensured through the process of respondent validation (also known as member checking) (32,33) and by ensuring a clear audit trail (34).

Results

Study sample characteristics

A total of 49 interviews were conducted with food-related professionals accounting for 35% (n = 13) of the professional sample, healthcare-related professionals for 32,5% (n = 12) and those not associated with either industry also for 32.5%. Details of the professional respondents, including potential conflicts of interest, are provided in Table S1 (Supplementary Information). Twelve consumer respondents were interviewed.

Value creation by food labels incorporating health claims

Respondents initially struggled to answer the question, ‘What forms of value do you think can be created by including health claims (including indigenous health claims) on food labels’. Better responses were obtained by rephrasing the question and replacing the term ‘value’ with ‘benefits’.

Using thematic analysis, we found support that food labels bearing scientifically validated health claims could add value in three domains, namely economic, human and intellectual (HI) and environmental; for a range of stakeholders including farmers or producers, businesses, government, individuals, communities, and society at large. It is important to note that health claims is both a manifestation of and tool for transferring 'knowledge value'. This was captured as intellectual value, incorporated into HI value.

Economic, HI and environmental benefits did not receive equal mentions (Table 1). Overall, the majority of respondents (n = 38; 77,6%) believe that food labels with health claims could generate economic value. Only two respondents (4,1%) directly highlighted environmental benefits, whilst approximately half of the respondents (n = 27; 55,1%) felt that health claims could create HI benefits. Some respondents mentioned broader HI and environmental benefits associated with labelling in general, but they did not explicitly link these to the presence of health claims. These are reflected as indirect mentions in Table 1. Illustrative quotes used to identify the value domains are available in Table S2 – S4 (Supplementary Material).

Economic value

Most respondents considered value creation potential of food labels with health claims to be primarily economic in nature but appropriated by different stakeholders.

Farmers, producers and businesses

Health claims were predominantly considered to benefit (in terms of economic value) businesses such as food manufacturers due to the commercial opportunity they present (P17). This relates specifically to opportunities to develop new products with claims that will drive product differentiation and enhance desirability – ultimately leading to increased sales or higher prices (P33, P13, P14, P21).

Health claims, according to respondent P24, would increase product appeal on the international market (thereby boosting market growth), as well as allow producers to charge higher prices for their products and generate higher profits. This was felt to be especially relevant when communities are highlighted as beneficiaries (P24), as consumers enjoy supporting such initiatives. Whilst respondents agreed that health claims could generate economic benefits for businesses, several raised concerns about whether such benefits would be evenly distributed between smaller and larger enterprises (P37) (i.e., appropriation bias to larger players).

Respondent E9 echoed the possibility of higher profits for all stakeholders in the value chain, starting with farmers and producers. Respondent P12 indicated that plant breeders could benefit

economically (financially) from the cultivation of specific plants with desirable properties (including substances that could be used to make health claims).

Finally, several respondents highlighted that the government would need to be wary of unscrupulous manufacturers and marketers who might make unsubstantiated claims to defraud consumers simply to make profits. The quote from Respondent C3 is illustrative: '*If I think about the average person, if you make a claim, it will probably create a hype and excitement and people will make decisions based on that [substance] being in a product… It's hard for a consumer to know whether it's a marketing claim or a scientific claim…I think there's too much chance of corruption*…'

Government

Health claims were also anticipated to result in a healthier public (P33), which spills over into economic value in the form of reduced healthcare spending for governments. If the public is not healthy, costs escalate, as articulated by P34: '*If our diabetics and hypertensives* [i.e., hypertensive patients] *are on treatment but they are very unhealthy and these conditions are poorly controlled, they cost us more money. They cost everybody else more money because of how medical schemes work - the healthy people subsidise the sick people. So, if you have more sick people, then the contributions go up, and we spend more on health, and the cost of health care just keeps going up, and up, and up.'*

Individuals, communities, and society at large

Links to economic value for individual consumers that can be derived from health claims were limited. Respondent P17 alluded to the idea that if consumers appropriately use health claim information, it could presumably lead to better health and more efficient spending (i.e., reduced personal financial health burden). This benefit, however, is not necessarily available to all. Respondent P27 highlighted that healthier products, including those with claims, frequently come at a higher cost to individual consumers, limiting the ability of lower-income consumers to reap such benefits. Respondent P37, also highlighted an important caveat for the appropriation of econoimic value to individuals: '*It really adds to the tools that you have at your disposal… to use labels to educate clients and patients. But it is within the limitations of saying that it is more your well-educated consumer that it will benefit, and it will probably not benefit the others* [less educated consumers] *because it will just make it more confusing'.*

Communities were highlighted as a potential beneficiary of economic value only in cases where the health claims were derived from indigenous knowledge (P12) and the source material is grown in such communities. In such cases, government protocols must be in place to guarantee that communities benefit. Respondent P11 expressed concerns around long-term monitoring and evaluation of such benefits, citing past challenges with Fairtrade rooibos where small-scale farmers did not experience all the anticipated benefits due to the greater efficiency of larger-scale farmers.

Through healthier choices, individuals can influence the market in the longer term and make healthier choices the more economical choices for society: '*If we start seeing a shift towards healthier foods, then economies of scale will drive down the costs and the unhealthier ones will become less popular.'* [C5].

Human and Intellectual (HI) value

Health claims have the potential to create HI value for individual consumers if they read the food label, interpret the information and then use the information to make food-based decisions that benefit their health (P27, P24, P13, P17). Apart from the economic benefit of better health described in the previous section, good health has value in itself in the form of quality of life, happiness, longevity, etc.

Whilst HI value of health cannot be appropriated by business (since it is a public good), it can be appropriated at an individual level in the form of increased (individual) knowledge about the benefits of products (due to claims). Respondent P16 spoke of the health platform that is well established for cranberries and the prevention of urinary tract disorders (i.e. when of consumers understand the benefit and this drives its demand). Health platforms, as a result of knowledge gain, lead back to economic value when this information drives demand for such products.

The potential for the sharing and preservation of traditional knowledge is an interesting result from the interviews. Only one respondent (P12) was able to expound on this, though. She emphasised the need of preserving such knowledge because younger generations are not always interested in doing so, and the knowledge may be lost as a result. Furthermore, Respondents P12 and P16 stated that applying this knowledge could result in economic benefits for communities by creating jobs (due to the cultivation of indigenous plants). However, concern was expressed about the materialisation and management of such benefits (Respondent P12, Table S3).

Environmental value

Overall, respondents made very little mention of the potential for health claims to create environmental value. Although two respondents (P18 and P19) pointed out that smaller businesses can differentiate their products by demonstrating greater care for the environment, they did not link this directly to health claims. The most significant references to environmental value from health claims concerned biodiversity preservation. Respondent P13, an entrepreneur and marketer of indigenous teas, explained how communities are preventing indigenous trees from becoming firewood, and protecting them from 'parasites', so that the leaves might be sold to her tea company. Her teas are widely linked to various health benefits based on traditional knowledge, although she does not make direct health claims on her products. Similarly, respondent P12 shared insights on how traditional healers are cultivating the plants used in their traditional herbal remedies, thereby contributing to biodiversity preservation. Respondent P25, using Fairtrade as an example, pointed out that due to various governance and certification procedures (and the cost involved), such programs do not represent the majority of products on the shelf and therefore their total impact is limited.

Integrated view of value creation

Based on interview responses, the key value creation ‘mechanisms’ from food labels with health claims, when such health claims are derived from indigenous products, were integrated into a system diagram (Figure 1). Reinforcing loop R1 shows that the consumption of products with health claims can lead to increased demand for such products, enticing farmers to cultivate indigenous crops, thereby increasing industry capacity, as well as subsequent supply. Increased supply generally has an inverse impact on product cost, hence the cost of such products could reduce in the longer term. In the short term, however, the higher cost of products with health claims would limit their consumption. As highlighted by respondents, economic, HI and environmental value may be created throughout this process, but the stakeholders appropriating the value do not remain constant. This is discussed further in the next section.

Reinforcing loop R2 shows that the consumption of products with health claims can improve personal health, potentially reducing the personal financial burden of ill health, and increasing expendable income. This additional expendable income can presumably also be spent on products with health claims – driving consumption (feeding into R1). At the population level, improved personal health drives the proportion of the public that are healthy which would reduce the public health burden (assuming real health benefits are attained from the consumption of food products with health claims). Finally, reinforcing loop R3 illustrates that the demand for products with health

claims can drive investment in research, increasing the level of proof for the health benefits of indigenous products, as well as driving consumption. In the process, indigenous knowledge is preserved.

Discussion

How, by whom, and for whom value is created are three perspectives of value that can influence food policymakers' decisions, and yet are poorly described in food labelling policy literature. Based on the interviews conducted, South Africa's biodiversity presents an opportunity for economic, HI and environmental value creation through health claims on food labels. However, the distribution across these domains is not equal. Health claims are only perceived as positive by specific target consumers - who need the product, understand the benefit, and can afford it. Similar findings exist in the literature (35), but what is pertinent for South Africa, is that these customers appear to be from higher-income and better-educated demographics, which are at odds with where benefits are most needed (i.e. in the lower income groups who are less educated and largely reliant on public health). So, whilst health claims can generate economic value for plant breeders, farmers, communities, and businesses, achieving that value may conflict with the HI value creation of making the wider society healthier. The wider public may be able to reap the HI value (health benefit) if individuals with greater purchasing power can push demand to the point where prices of products with health claims fall; however, this could be at the expense of farmers, communities, and businesses. In other words, in the longer term, value could slip [i.e. when value is created by one source but captured by another (36)] from the plant breeders, farmers, communities and businesses to the public.

A further challenge to value creation from health claims emanates from the question of whether consumers will understand the health claims, or what format they must take to sway consumer purchase decisions (assuming they can afford the product). Health claim formats have not been researched in South Africa. The increasing amount of information on food labels increases the complexity of consumer decision-making and can result in greater consumer scepticism toward food labels (37). Furthermore, we know that consumers are likely to receive the same claims differently based on their pre-established networks and beliefs (38). We also know that food labels (without health claims) are not well understood under current circumstances in South Africa (39), so adding more information might not have the desired effect i.e. of enhancing knowledge and health.

In the long run, health claims may lead to an increase in the number of 'health platforms', as more customers become aware of the benefits of specific products, thereby driving sales. This raises the question of how to create and grow such health platforms. One approach to accomplish this could be through marketing by businesses that have conducted the research or have access to research. Despite respondents in this study being sceptical about the motivation of companies making health claims (i.e. only to make money), we need to acknowledge that such companies represent one lever that can be used to establish ‘health platforms’ that can ultimately benefit the public.

The cost and time associated with validating health claims may be prohibitive for smaller players, and thus to benefit more stakeholders, the government would need to step in and make the research available to all. This is the situation in Japan with FFC (12). South Africa, unlike Japan, does not have approved health claims, so whilst the government's Bio-Economy strategy (40) is already driving research on various indigenous plants and other areas, it could be considered a waste of resources if claims are not legally permitted (i.e. value is not captured).

Without health claims, consumers cannot learn of benefits; knowledge cannot grow, be shared or preserved; ‘health platforms’ cannot form; less products may be sold; and thus little to none of the economic, HI or environmental value will be realised. This highlights the need to reconsider how health claims could be verified and implemented in South Africa. The Japanese FFC model might be the most advantageous to investigate for possible implementation in South Africa, bearing cultural differences in mind.

Various Fairtrade and other studies have shown that when products for the mainstream market are derived from communities that have never before participated in the economy, such trade has the potential to create jobs and address HI challenges related to poverty (41–43). The signing of the Rooibos Benefit Sharing Agreement in South Africa is a local example of international significance that has for the first time lead to funding streams for indigenous communities (44).

There is little doubt that health information about specific food products would enhance their sale and use – as highlighted by respondent P16 in his reference to the urinary tract ‘health platform’ for cranberry. Rooibos has benefited from global demand and distribution due to its perceived health benefits (20), although no such claims are presently allowed on products. Human studies substantiating the various health benefits of rooibos are required (45). Care should be taken, if

health claims are legislated, that sustainable value is created for multiple stakeholders rather than benefitting a few (as was the case in the past, with rooibos) (46).

Whilst environmental value can be created by labelling initiatives (43), the present study highlights two key challenges. Firstly, there is a low awareness of the environmental value creation potential of health claims. Consumers in South Africa often struggle to identify environmentally friendly goods and are unable to verify the environmental claims made by these goods (47). Secondly, the costs of verifying the environmental value could hamper the benefits. Without claims, there would be lower demand and less incentive to cultivate indigenous plants, reducing the potential for biodiversity preservation (48,49).

Lastly, health claims provide an opportunity to conserve the knowledge, as well as the possibility to create new knowledge as a result of further research (50). However, due to the cost and time involved, as well as current methodologies and practices, progress is slow (as evidenced by the limited number of human studies). It is perhaps time to adopt more innovative strategies and consider how the undertaking of research can be bolstered, better coordinated and the results quickly disseminated to all stakeholders, large and small.

Limitations

Given the qualitative methodology, the study remains explorative. Nevertheless, it can serve as a starting point for more research into long-term value creation from food labels with health claims or any other health-related on-pack mechanisms.

Conclusion

While the economic value creation potential of incorporating health claims on food labels already appears to be fairly well understood, the findings clearly indicate that more work is needed to close the gaps in understanding how HI and environmental value can be captured. If this is not done, the introduction of health claims is unlikely to deliver sustainable value for multiple stakeholders. This research also highlights a paradox: by boosting economic value for stakeholders such as producers, communities, and enterprises (increased demand and pricing, driven by health claims), a large percentage of the general population may be excluded from the benefit of better health. That is, without additional interventions, the wealthier and better educated in South Africa may be

the only ones who improve their health as a result of health claims. Of final concern is the fragmented approach to research on indigenous and other products, since value can only be fully appro~~a~~priated if health claims can legally be made. There are opportunities for long-term value creation, but more research is needed for a deeper understanding of what barriers exist and how to overcome them.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The associations of respondents to the food- and healthcare related industries have been clearly identified.

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Figures

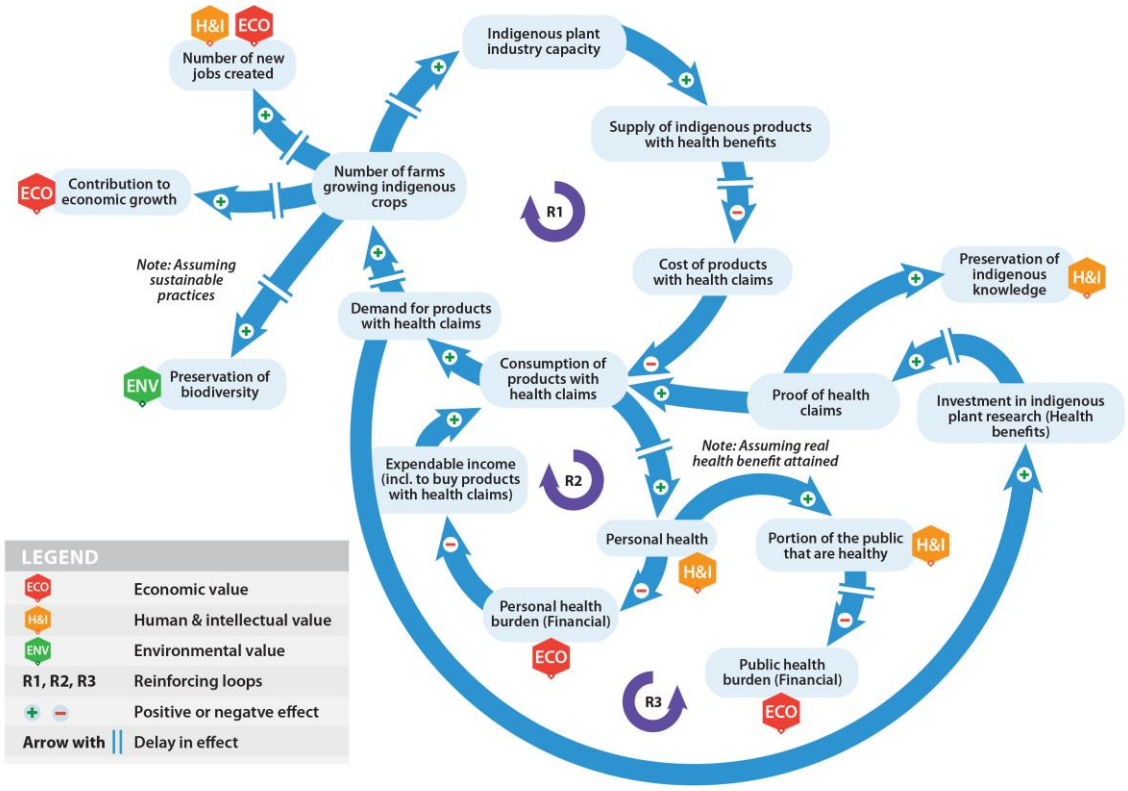

Figure 1. Systems diagram illustrating the economic, human and intellectual and environmental value creation potential of food products with health claims

516 **Table 1** The percentage of respondents envisioning economic, human and intellectual or
517 environmental value for food labels with health claims

Respondent	Economic (n/%)	Human and intellectual (n/%)	Environmental (n/%)
Yes	38 (77,6%)	27 (55,1%)	2 (4,1%)
Indirect, yes	0 (0%)	3 (6,1%)	11 (22,4%)
No	11 (22,4%)	19 (38,8%)	36 (73,5%)
TOTAL	49	49	49

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520 **Table S1. Educational background and occupation of professional participants**

Respondent	Highest education	Occupation	Conflict of interest
PR1	HND	Business Owner (Inform. Techn.)	NA
PR2	Bachelor	Marketing Consultant	NA
PR3	Masters	Researcher - Ethics	NA
PR4	BEd Hons	School Principal	NA
PR5	BEd Hons	Technology Teacher	NA
PR6	HND	Consumer Journalist	NA
PR7	HND	Financial Advisor	NA
PR8	Masters	Futurist	NA
PR9	PhD	Economist	NA
PR10	PhD	Political Economist	NA
PR11	PhD	Social Anthropologist	NA
PR12	PhD	Researcher - Horticulture	NA
PR13	Bachelor	Small Business Owner (Traditional use products)	F
PR14	PhD	Business Owner (Food Ingredients)	F
PR15	PhD	Food Scientist	F
PR16	HND	Director (Nutraceutical Company)	F
PR17	Masters	Director (Food Labelling Consulting)	F
PR18	Hons	Farmer (Tea Production)	F
PR19	MBChB	Director (Food Analysis Consulting)	F
PR20	BSc	Food Scientist	F
PR21	MSc	Multinational Research and Development Executive	F
PR22	BSc	Innovation Manager	F
PR23	BSc Eng; BCom LLB	Attorney	F
PR24	PhD	Researcher - Agriculture and Food	F
PR25	Bachelor	Research and Policy Coordinator	F
PR26	PhD	Nutrition Consultant	HC & F
PR27	HND	Nurse	HC
PR28	BSc Hons	Dietician	HC
PR29	MBChB	Doctor	HC
PR30	Masters	Researcher - Epidemiology	HC
PR31	Masters	Public Health Consultant	HC
PR32	PhD	Researcher - Non-Communicable Diseases	HC
PR33	BSc Hons	Dietician	HC
PR34	MBChB	Chief Healthcare Officer	HC
PR35	MBChB	Consultant to Department of Health	HC
PR36	Masters	Nutrition Consultant	HC
PR37	PhD	Lecturer - Nutrition	HC

521 HC: Healthcare and related industries; F: Food Industry; NA: Not related to food or healthcare industries

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523 **Table S2 Illustrative quotes for economic value creation**

Stakeholder	Participant	Illustrative quote
Individual	P12	You have your plant breeder's rights, which is a form of incentive to the plant breeder or the inventor, then you have the trademark. The money will come to the institution, and because I am the inventor, a certain percentage is supposed to come to me.
	P17	But if that information is made use of in the right manner, there is no doubt that it can contribute in maybe a smallish but still significant measure to the improvement in our quality of life Because if it's effectively utilised, you're making better choices, your health should theoretically improve and it should also enable you (at least in theory) to spend the money on food in the most cost effective manner.
	P27	I think the one thing that we have a problem with in South Africa is that our healthier choices are more expensive.
Business	P17	I think it's desirable to be able to make health claims, because from the consumers' side, it provides them with information which is essentially advantageous to their health and from commercial point of view, it's a commercial opportunity [for businesses]. Providing its legitimate, there's nothing wrong with it.
	P33	Very often in the higher income or higher LSM group, we will see people going for products which have got more of the nutrient content claims and, although they're not necessarily legal, the health claims and the reduction of disease risks claims.
	P13	The benefits I'm listing on [my product], they're based on research, but they mostly based on indigenous knowledge. If I have to take those things [i.e. claims] off, I'm completely lost as to my products… How are customers going to know that this is not just normal black tea? It's an indigenous wild tea and it has benefits... But with the current food regulations, I'm not able to communicate to the customer the way I need to communicate to the customer.
	P14	More products can be more specific for more specific needs. Which also creates more opportunity for producers.
	P21	I really want to make products better; design better products, if but you are unable to tell the consumer [the benefit] then no one's going to support that on-cost, because it can't be communicated.
	P24	Having a scientific claim helps in terms of if you want to trade your product internationally. You can actually increase the prices of products.
	P9	I think the whole value chain can benefit - from the producer onwards. If the producer knows that because his/her product will be sold with this claim, with this added value, the producer would probably also be able to negotiate a better price; because his/her product has a higher value than

		initially thought.
	P24	In some cases you'll find that the product, if it links to a community, [if it] beneficiates them… the higher the price that can be charged for a product.
	P 37	There's a lot of testing involved, which is quite expensive. So now you're almost giving more power to your larger food manufacturers, because they will have all these tools at their disposal, but your smaller food companies won't be able to afford to do the testing. They won't be able to put these claims on their products. They are at more of a disadvantage, which I think is also a shame.
Society	P12	If you look at indigenous knowledge; If I obtain the plant material from community x, or I use their knowledge because I know they eat A or B or C indigenous plant then a certain percentage must go back to them as well.
	P11	It costs them less to produce fair trade Rooibos than the small scale organizations [in] Nieuwoudtville and Wuppertal… The feedback of the small scale organization was that since there are big farms that produce Fairtrade rooibos, the market was saturated... Is it [better] to restrict the label and to protect some farmers who deserve it, or is it better to extend it, to expand it more and more.

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526 **Table S3 Illustrative quotes for social value creation**

Stakeholder	Participant	Illustrative quote
Individual	P27	I do think that would have an impact. I think you would find the consumer would be more knowledgeable. I think they would take the time to understand what they're actually eating, what they drinking, and make a better informed decision.
	P24	If more [information] can be added to say that you should eat this product. If you can say a little bit more - more than just the basic nutrients - it would help consumers…Over time it will help consumers to become educated - growing knowledge over time.
	P13	To be honest, a lot of consumers are quite ignorant in terms of what food contains. Many people, you'd be shocked, don't know what beta carotene does. If we were able to make claims on food labels to say, “these carrots contain beta carotene, which is good for eyesight, and does [many other things]”, it would lead to a healthier society. People will say, “I need to buy carrots, because this is what it's going do for me [the benefit]”.
	P17	I think it's desirable to be able to make health claims, because from the consumer side it provides them with information which is essentially advantageous to their health and from commercial point of view, it's a commercial opportunity. Providing it is legitimate, there's nothing wrong with it.
Business	P16	Let's use cranberry as an example: if I stopped one hundred women in the street and asked, “have you heard that cranberry juice is good for urinary tract infections?”, ninety-five percent will say, “yes, I have I've read it somewhere, my girls told me at the book club, I heard about it in the aerobics class, I am aware of it”. If I put cranberry [in my product], I will get that [customer] buy in just by saying cranberry [on the label] - that's a health platform.
Social	P33	In this ideal world, everyone actually looks at a food product and makes an informed choice based on the reality of what that product is and how it’s going to affect them from a health point of view…. At the end of the day, it's all about improving the health status of the population.
	P12	The [institution] has several projects focusing on rural development. Making an impact, job creation and poverty alleviation, that's where part of the honeybush projects also falls in… If you claim something, you must also prove that you are protecting it, which I don't think is always happening or being done. If I claim honeybush I must also prove I am protecting the knowledge I have... A lot is getting lost because the kids are not interested…The knowledge is in the older people… And that is where government is trying now to conserve that information at least.
	P16	By using indigenous plants you’re adding value and creating jobs and [it has the] possible opportunity of exporting and getting foreign income into the local coffers. I mean, it's a win-win situation.
	P12	Currently, the Khoisan Council is claiming most of the knowledge on Honeybush and Rooibos, so the money will be paid over to the council. There are prescriptions how they should use it, but nobody

has really checked… That money should go back into the communities where it comes from.

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529 **Table S4 Illustrative quotes for environmental value creation**

Stakeholder	Participant	Illustrative quote
Business	P18	We're not so much concentrating on the health benefits when making the tea. We try to **do it sustainably**. We want to **sell a product and without destroying nature at all**.
	P9	For the big multinationals, the bottom line is money and they would go for products that are quick to produce and human nature says that the environment will come second whilst the smaller guys tend to be more have more of a conscience. I've met a lot of them over the years and I think that that approach is the more valid one, the one with more of a future… Is there a willingness for consumers and for the world at large to consider smaller products produced locally and with **more emphasis on being environmentally friendly and the health benefits** and being organically produced? I think there's a lot of scope for that… Sometimes I think that that is overplayed to some extent, and then people climb on that bandwagon for other reasons than the environment or health - then it becomes purely economic again; everybody wants financial gain.
Society	P13	It was like that in all of the communities we visited… The trees we are working with [also often] had parasites. So the longer these leaves are growing, the more the trees weaken. These trees were dying, and if they were not dying from parasites, they were being chopped [down]. People did not care in some villages; there was no sight of these trees anymore. So through our work, we are **creating conservation of these indigenous crops** because now it's becoming gold to them [the communities]. Having this tree and looking after it in my yard will bring me income because we buy the leaves from them once they've been harvested. And besides that, [we are] also exposing their products to the market, taking this tea that they've undermined, flavouring and packaging it nicely and putting it in shops in Bryanston and Sandton. They see that the knowledge of their forefathers was so important and valuable that in 2020, that knowledge can still do something for future generations.
	P12	The same is now [the case] with our traditional healers. They realize and understand that with urbanization and everything going on, their things [traditional plants] are getting limited; their [plant] products they are using. **They need to start understanding propagating it**, but then a lot of the [chemical] properties are changing; as soon as you start cultivating things that grow naturally.
	P25	There is that possibility, it's just how one does it and how one develops confidence in that label. So I think an example of that is like a Fairtrade label, where there is an organization that people trust that verifies that things are a fair trade and they verify that there's value to the community that's producing it, so once it gets a Fairtrade label then you know that you can trust that product, and **that it has got social benefits and environmental benefits**… [But] because of the research that has to go into it, it's not benefiting a majority of people.

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Food Labels with Health Claims in South Africa: Exploration of Value Creation and Appropriation

Abstract

Health claims are considered a means to add value to food and beverages, however, it is not always evident which stakeholders benefit and to what extent they benefit. In this paper, we extend the investigation of value creation and appropriation into the domain of food, specifically food labels. Using a qualitative approach, this study aimed to elucidate which forms of value can be created by legislating health claims on food labels. Of specific interest are health claims for bioactive compounds found in indigenous South African plants that form part of the food basket such as the herbal teas, rooibos and honeybush. The findings reveal that health claims have the potential to advance the sustainable development agenda in South Africa, but only if structures can be put in place to appropriate human and intellectual (HI) value, as well as environmental value. Currently, there is strong evidence for economic value creation and appropriation potential, but little clear evidence that HI or environmental value will be appropriated from health claims, especially if these health claims exclude benefits from bioactive compounds found in indigenous South African plants. If we could find a means to measure the HI and environmental value creation potential of health claims, using metrics that people understand, we may be able to develop strategies to ensure that such products can benefit stakeholders beyond economic value alone (i.e., more sustainable value creation). The findings could directly impact food labelling policy formulation, considering current draft regulations to implement health claims in South Africa.

Significance of the main findings

The plant biodiversity of South Africa offers opportunities for economic, human and intellectual (HI), and environmental value creation through legislated health claims on food labels. Without clear metrics for the HI and environmental components, economic value creation may dominate, but the value created might not be sustainable or appropriated by the desired stakeholders. Furthermore, since the current draft food labelling legislation for health claims excludes any bioactives from indigenous South African plants, much of the economic, HI and environmental value creation potential reported as potential outcomes for this research (e.g. funds to communities, knowledge preservation or biodiversity conservation) will not materialise.

Introduction

In South Africa, as in much of the rest of the world, the growing incidence of n**Error! Bookmark not defined.**on-communicable diseases (NCDs) are of growing concern (1). Key drivers of NCDs

are more sedentary lifestyles and changes in the composition of our food (2–4). Research highlights that post 1994, South Africans have been eating fewer vegetables and consuming more kilojoules – many derived from sugar-sweetened beverages and processed foods (5). Not only is there an increase in diabetes-related mortality (7%, compared to a global average of 3%) (1), but also in the challenges of living with such a disease: reduced personal well-being, reduced capacity to work and increased healthcare costs (6–8).

Food labelling is considered a cost-effective tool in the fight against the rising NCD burden due to the potential it holds to communicate information about the nutritional properties of food (9). In particular, health claims on food labels can bridge the information gap that exists between the consumer's knowledge and the manufacturers' understanding of the intrinsic qualities of a food product (10). In South Africa, 'health claim' means an effect on the human body, including an effect on one or more of the following: (a) a biochemical process or outcome; (b) a physiological process or outcome; (c) a functional process or outcome; (d) growth and development; (e) physical performance; (f) mental performance; (g) a disease, disorder or condition; and (h) oral hygiene; (11). There are various means by which to establish such claims. Screening, identification and analysis of functional ingredients, analysis of mechanism of action, and development of agricultural products rich in these functional ingredients is a primary mechanism (12). Traditional medicinal use is another acknowledged method to establish a health claim, although not widely accepted in food legislation (13).

Japan is a good example of a country that has tailored food labelling and legislation to achieve better health outcomes and has an established history of allowing foods to carry a range of scientifically validated health claims (14). Food for Specialised Health Uses (FOSHU) was adopted by the Japanese government in 1991, followed by Food with Nutrient Functional Claims (FNFC) in 2001, and Food with Function Claims (FFC) in 2015 (15). The introduction of FFC unlocked new market growth in a sector that had essentially become stagnant after 2007 (15). One of the first primary processed products for which a claim was allowed was Japanese green tea, produced from the Benifuuki cultivar (16). In comparison with common green tea, Benifuuki is rich in *O*-methylated catechins, responsible for anti-allergic effects (17). With the recent expansion of FFC to include selected fresh produce, producers (i.e., farmers) can now also benefit from the system (12). Examples of FFC fresh produce are β-cryptoxanthin-rich Satsuma mandarins (12) and the corresponding claim 'This food contains β-cryptoxanthin, which reportedly maintains bone health; 3mg/day' (18).

South African legislation relating to health claims on food is still pending (11). Claims under consideration include function claims such as 'Beta-carotene functions as a tissue antioxidant and so keeps cells healthy' and reduction of disease risk claims such as 'Diets low in sodium may reduce the risk of high blood pressure, a disease associated with many risk factors, in some individuals'. Notably, there are no claims for plant bioactives such as mangiferin, aspalathin, and L-canavanine from the South African plants, honeybush, rooibos, and *Sutherlandia frutescens* (19–25), respectively. These plants have a long history of traditional use, including as herbal teas. Bioactive compounds of indigenous plants such these show promise in preventing and reducing risk factors for NCDs, although human studies are still needed.

Consumers, producers, non-governmental organisations, industry bodies, marketing agents and policymakers (to name but a few) all play a role in influencing food policy (26). When dealing with such a diverse collection of stakeholders, there are complementarities and trade-offs to consider and thus, a holistic view of value creation and appropriation from the perspective of these stakeholders could provide the ability to maximise the value 'pie' that can be created from food labels. This study examines the types of value that can be created by putting health claims on food labels in South Africa (including claims related to bioactives from indigenous plants). It also outlines the stakeholders for which value can be created and where it might be captured.

Methods

Study design and setting and recruitment

A pragmatic paradigm was used to answer the research question (27). To gain an in-depth understanding of potential value creation, in-depth qualitative interviews were conducted with a focused sample. The aim was not to make generalisations about the views of a larger population (27). The study was conducted in accordance with the Declaration of Helsinki, and approved by the Research Ethics Committee of [anonymised] prior to commencement of the research. Respondents provided informed consent before the start of the interviews. They were thanked for their contribution, but not compensated. Professionals were specifically recruited for their diverse professional qualifications to achieve maximum variation in perspectives. Professional contacts of the lead author were approached initially, followed by snowball sampling (accounting for approximately 50% of respondents). Consumer respondents were approached via Facebook.

Procedure

Prior to the interviews, the interview guide was tested with a convenience sample of three professionals. All interviews, typically 45 - 60 min long, were conducted in English via video conferencing between February and May 2020. Respondents were asked to share their views on what type of value could be created by incorporating health claims on food labels in South Africa. Based on their responses, follow-up questions were asked to gain additional insight or clarity. Interviews were conducted until theoretical saturation was achieved (28), i.e., when no new insights emerged from interviews. A final interview was then conducted to confirm that saturation had been achieved.

Data analysis and trustworthiness

The interviews were audio recorded, transcribed and coded (i.e., names assigned to segments of the interview transcripts, based on the content). The six capitals model of the International Integrated Reporting Council (29) was used as an initial guide to identify forms of value reported by participants (30). Thematic analysis was performed (31) whereby codes were arranged into groups with similar themes, resulting in three final themes pertaining to value creation through health claims on food labels. Trustworthiness was ensured through the process of respondent validation (also known as member checking) (32,33) and by ensuring a clear audit trail (34).

Results

Study sample characteristics

A total of 49 interviews were conducted with food-related professionals accounting for 35% (n = 13) of the professional sample, healthcare-related professionals for 32,5% (n = 12) and those not associated with either industry also for 32.5%. Details of the professional respondents, including potential conflicts of interest, are provided in Table S1 (Supplementary Information). Twelve consumer respondents were interviewed.

Value creation by food labels incorporating health claims

Respondents initially struggled to answer the question, ‘What forms of value do you think can be created by including health claims (including indigenous health claims) on food labels’. Better responses were obtained by rephrasing the question and replacing the term ‘value’ with ‘benefits’.

Using thematic analysis, we found support that food labels bearing scientifically validated health claims could add value in three domains, namely economic, human and intellectual (HI) and environmental; for a range of stakeholders including farmers or producers, businesses, government, individuals, communities, and society at large. It is important to note that health claims is both a manifestation of and tool for transferring 'knowledge value'. This was captured as intellectual value, incorporated into HI value.

Economic, HI and environmental benefits did not receive equal mentions (Table 1). Overall, the majority of respondents (n = 38; 77,6%) believe that food labels with health claims could generate economic value. Only two respondents (4,1%) directly highlighted environmental benefits, whilst approximately half of the respondents (n = 27; 55,1%) felt that health claims could create HI benefits. Some respondents mentioned broader HI and environmental benefits associated with labelling in general, but they did not explicitly link these to the presence of health claims. These are reflected as indirect mentions in Table 1. Illustrative quotes used to identify the value domains are available in Table S2 – S4 (Supplementary Material).

Economic value

Most respondents considered value creation potential of food labels with health claims to be primarily economic in nature but appropriated by different stakeholders.

Farmers, producers and businesses

Health claims were predominantly considered to benefit (in terms of economic value) businesses such as food manufacturers due to the commercial opportunity they present (P17). This relates specifically to opportunities to develop new products with claims that will drive product differentiation and enhance desirability – ultimately leading to increased sales or higher prices (P33, P13, P14, P21).

Health claims, according to respondent P24, would increase product appeal on the international market (thereby boosting market growth), as well as allow producers to charge higher prices for their products and generate higher profits. This was felt to be especially relevant when communities are highlighted as beneficiaries (P24), as consumers enjoy supporting such initiatives. Whilst respondents agreed that health claims could generate economic benefits for businesses, several raised concerns about whether such benefits would be evenly distributed between smaller and larger enterprises (P37) (i.e., appropriation bias to larger players).

Respondent E9 echoed the possibility of higher profits for all stakeholders in the value chain, starting with farmers and producers. Respondent P12 indicated that plant breeders could benefit

economically (financially) from the cultivation of specific plants with desirable properties (including substances that could be used to make health claims).

Finally, several respondents highlighted that the government would need to be wary of unscrupulous manufacturers and marketers who might make unsubstantiated claims to defraud consumers simply to make profits. The quote from Respondent C3 is illustrative: '*If I think about the average person, if you make a claim, it will probably create a hype and excitement and people will make decisions based on that [substance] being in a product… It's hard for a consumer to know whether it's a marketing claim or a scientific claim…I think there's too much chance of corruption*…'

Government

Health claims were also anticipated to result in a healthier public (P33), which spills over into economic value in the form of reduced healthcare spending for governments. If the public is not healthy, costs escalate, as articulated by P34: '*If our diabetics and hypertensives* [i.e., hypertensive patients] *are on treatment but they are very unhealthy and these conditions are poorly controlled, they cost us more money. They cost everybody else more money because of how medical schemes work - the healthy people subsidise the sick people. So, if you have more sick people, then the contributions go up, and we spend more on health, and the cost of health care just keeps going up, and up, and up.'*

Individuals, communities, and society at large

Links to economic value for individual consumers that can be derived from health claims were limited. Respondent P17 alluded to the idea that if consumers appropriately use health claim information, it could presumably lead to better health and more efficient spending (i.e., reduced personal financial health burden). This benefit, however, is not necessarily available to all. Respondent P27 highlighted that healthier products, including those with claims, frequently come at a higher cost to individual consumers, limiting the ability of lower-income consumers to reap such benefits. Respondent P37, also highlighted an important caveat for the appropriation of econoimic value to individuals: '*It really adds to the tools that you have at your disposal… to use labels to educate clients and patients. But it is within the limitations of saying that it is more your well-educated consumer that it will benefit, and it will probably not benefit the others* [less educated consumers] *because it will just make it more confusing'.*

Communities were highlighted as a potential beneficiary of economic value only in cases where the health claims were derived from indigenous knowledge (P12) and the source material is grown in such communities. In such cases, government protocols must be in place to guarantee that communities benefit. Respondent P11 expressed concerns around long-term monitoring and evaluation of such benefits, citing past challenges with Fairtrade rooibos where small-scale farmers did not experience all the anticipated benefits due to the greater efficiency of larger-scale farmers.

Through healthier choices, individuals can influence the market in the longer term and make healthier choices the more economical choices for society: '*If we start seeing a shift towards healthier foods, then economies of scale will drive down the costs and the unhealthier ones will become less popular.'* [C5].

Human and Intellectual (HI) value

Health claims have the potential to create HI value for individual consumers if they read the food label, interpret the information and then use the information to make food-based decisions that benefit their health (P27, P24, P13, P17). Apart from the economic benefit of better health described in the previous section, good health has value in itself in the form of quality of life, happiness, longevity, etc.

Whilst HI value of health cannot be appropriated by business (since it is a public good), it can be appropriated at an individual level in the form of increased (individual) knowledge about the benefits of products (due to claims). Respondent P16 spoke of the health platform that is well established for cranberries and the prevention of urinary tract disorders (i.e. when of consumers understand the benefit and this drives its demand). Health platforms, as a result of knowledge gain, lead back to economic value when this information drives demand for such products.

The potential for the sharing and preservation of traditional knowledge is an interesting result from the interviews. Only one respondent (P12) was able to expound on this, though. She emphasised the need of preserving such knowledge because younger generations are not always interested in doing so, and the knowledge may be lost as a result. Furthermore, Respondents P12 and P16 stated that applying this knowledge could result in economic benefits for communities by creating jobs (due to the cultivation of indigenous plants). However, concern was expressed about the materialisation and management of such benefits (Respondent P12, Table S3).

Environmental value

Overall, respondents made very little mention of the potential for health claims to create environmental value. Although two respondents (P18 and P19) pointed out that smaller businesses can differentiate their products by demonstrating greater care for the environment, they did not link this directly to health claims. The most significant references to environmental value from health claims concerned biodiversity preservation. Respondent P13, an entrepreneur and marketer of indigenous teas, explained how communities are preventing indigenous trees from becoming firewood, and protecting them from 'parasites', so that the leaves might be sold to her tea company. Her teas are widely linked to various health benefits based on traditional knowledge, although she does not make direct health claims on her products. Similarly, respondent P12 shared insights on how traditional healers are cultivating the plants used in their traditional herbal remedies, thereby contributing to biodiversity preservation. Respondent P25, using Fairtrade as an example, pointed out that due to various governance and certification procedures (and the cost involved), such programs do not represent the majority of products on the shelf and therefore their total impact is limited.

Integrated view of value creation

Based on interview responses, the key value creation ‘mechanisms’ from food labels with health claims, when such health claims are derived from indigenous products, were integrated into a system diagram (Figure 1). Reinforcing loop R1 shows that the consumption of products with health claims can lead to increased demand for such products, enticing farmers to cultivate indigenous crops, thereby increasing industry capacity, as well as subsequent supply. Increased supply generally has an inverse impact on product cost, hence the cost of such products could reduce in the longer term. In the short term, however, the higher cost of products with health claims would limit their consumption. As highlighted by respondents, economic, HI and environmental value may be created throughout this process, but the stakeholders appropriating the value do not remain constant. This is discussed further in the next section.

Reinforcing loop R2 shows that the consumption of products with health claims can improve personal health, potentially reducing the personal financial burden of ill health, and increasing expendable income. This additional expendable income can presumably also be spent on products with health claims – driving consumption (feeding into R1). At the population level, improved personal health drives the proportion of the public that are healthy which would reduce the public health burden (assuming real health benefits are attained from the consumption of food products with health claims). Finally, reinforcing loop R3 illustrates that the demand for products with health

claims can drive investment in research, increasing the level of proof for the health benefits of indigenous products, as well as driving consumption. In the process, indigenous knowledge is preserved.

Discussion

How, by whom, and for whom value is created are three perspectives of value that can influence food policymakers' decisions, and yet are poorly described in food labelling policy literature. Based on the interviews conducted, South Africa's biodiversity presents an opportunity for economic, HI and environmental value creation through health claims on food labels. However, the distribution across these domains is not equal. Health claims are only perceived as positive by specific target consumers - who need the product, understand the benefit, and can afford it. Similar findings exist in the literature (35), but what is pertinent for South Africa, is that these customers appear to be from higher-income and better-educated demographics, which are at odds with where benefits are most needed (i.e. in the lower income groups who are less educated and largely reliant on public health). So, whilst health claims can generate economic value for plant breeders, farmers, communities, and businesses, achieving that value may conflict with the HI value creation of making the wider society healthier. The wider public may be able to reap the HI value (health benefit) if individuals with greater purchasing power can push demand to the point where prices of products with health claims fall; however, this could be at the expense of farmers, communities, and businesses. In other words, in the longer term, value could slip [i.e. when value is created by one source but captured by another (36)] from the plant breeders, farmers, communities and businesses to the public.

A further challenge to value creation from health claims emanates from the question of whether consumers will understand the health claims, or what format they must take to sway consumer purchase decisions (assuming they can afford the product). Health claim formats have not been researched in South Africa. The increasing amount of information on food labels increases the complexity of consumer decision-making and can result in greater consumer scepticism toward food labels (37). Furthermore, we know that consumers are likely to receive the same claims differently based on their pre-established networks and beliefs (38). We also know that food labels (without health claims) are not well understood under current circumstances in South Africa (39), so adding more information might not have the desired effect i.e. of enhancing knowledge and health.

In the long run, health claims may lead to an increase in the number of 'health platforms', as more customers become aware of the benefits of specific products, thereby driving sales. This raises the question of how to create and grow such health platforms. One approach to accomplish this could be through marketing by businesses that have conducted the research or have access to research. Despite respondents in this study being sceptical about the motivation of companies making health claims (i.e. only to make money), we need to acknowledge that such companies represent one lever that can be used to establish ‘health platforms’ that can ultimately benefit the public.

The cost and time associated with validating health claims may be prohibitive for smaller players, and thus to benefit more stakeholders, the government would need to step in and make the research available to all. This is the situation in Japan with FFC (12). South Africa, unlike Japan, does not have approved health claims, so whilst the government's Bio-Economy strategy (40) is already driving research on various indigenous plants and other areas, it could be considered a waste of resources if claims are not legally permitted (i.e. value is not captured).

Without health claims, consumers cannot learn of benefits; knowledge cannot grow, be shared or preserved; ‘health platforms’ cannot form; less products may be sold; and thus little to none of the economic, HI or environmental value will be realised. This highlights the need to reconsider how health claims could be verified and implemented in South Africa. The Japanese FFC model might be the most advantageous to investigate for possible implementation in South Africa, bearing cultural differences in mind.

Various Fairtrade and other studies have shown that when products for the mainstream market are derived from communities that have never before participated in the economy, such trade has the potential to create jobs and address HI challenges related to poverty (41–43). The signing of the Rooibos Benefit Sharing Agreement in South Africa is a local example of international significance that has for the first time lead to funding streams for indigenous communities (44).

There is little doubt that health information about specific food products would enhance their sale and use – as highlighted by respondent P16 in his reference to the urinary tract ‘health platform’ for cranberry. Rooibos has benefited from global demand and distribution due to its perceived health benefits (20), although no such claims are presently allowed on products. Human studies substantiating the various health benefits of rooibos are required (45). Care should be taken, if

health claims are legislated, that sustainable value is created for multiple stakeholders rather than benefitting a few (as was the case in the past, with rooibos) (46).

Whilst environmental value can be created by labelling initiatives (43), the present study highlights two key challenges. Firstly, there is a low awareness of the environmental value creation potential of health claims. Consumers in South Africa often struggle to identify environmentally friendly goods and are unable to verify the environmental claims made by these goods (47). Secondly, the costs of verifying the environmental value could hamper the benefits. Without claims, there would be lower demand and less incentive to cultivate indigenous plants, reducing the potential for biodiversity preservation (48,49).

Lastly, health claims provide an opportunity to conserve the knowledge, as well as the possibility to create new knowledge as a result of further research (50). However, due to the cost and time involved, as well as current methodologies and practices, progress is slow (as evidenced by the limited number of human studies). It is perhaps time to adopt more innovative strategies and consider how the undertaking of research can be bolstered, better coordinated and the results quickly disseminated to all stakeholders, large and small.

Limitations

Given the qualitative methodology, the study remains explorative. Nevertheless, it can serve as a starting point for more research into long-term value creation from food labels with health claims or any other health-related on-pack mechanisms.

Conclusion

While the economic value creation potential of incorporating health claims on food labels already appears to be fairly well understood, the findings clearly indicate that more work is needed to close the gaps in understanding how HI and environmental value can be captured. If this is not done, the introduction of health claims is unlikely to deliver sustainable value for multiple stakeholders. This research also highlights a paradox: by boosting economic value for stakeholders such as producers, communities, and enterprises (increased demand and pricing, driven by health claims), a large percentage of the general population may be excluded from the benefit of better health. That is, without additional interventions, the wealthier and better educated in South Africa may be

the only ones who improve their health as a result of health claims. Of final concern is the fragmented approach to research on indigenous and other products, since value can only be fully appro~~a~~priated if health claims can legally be made. There are opportunities for long-term value creation, but more research is needed for a deeper understanding of what barriers exist and how to overcome them.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The associations of respondents to the food- and healthcare related industries have been clearly identified.

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Figures

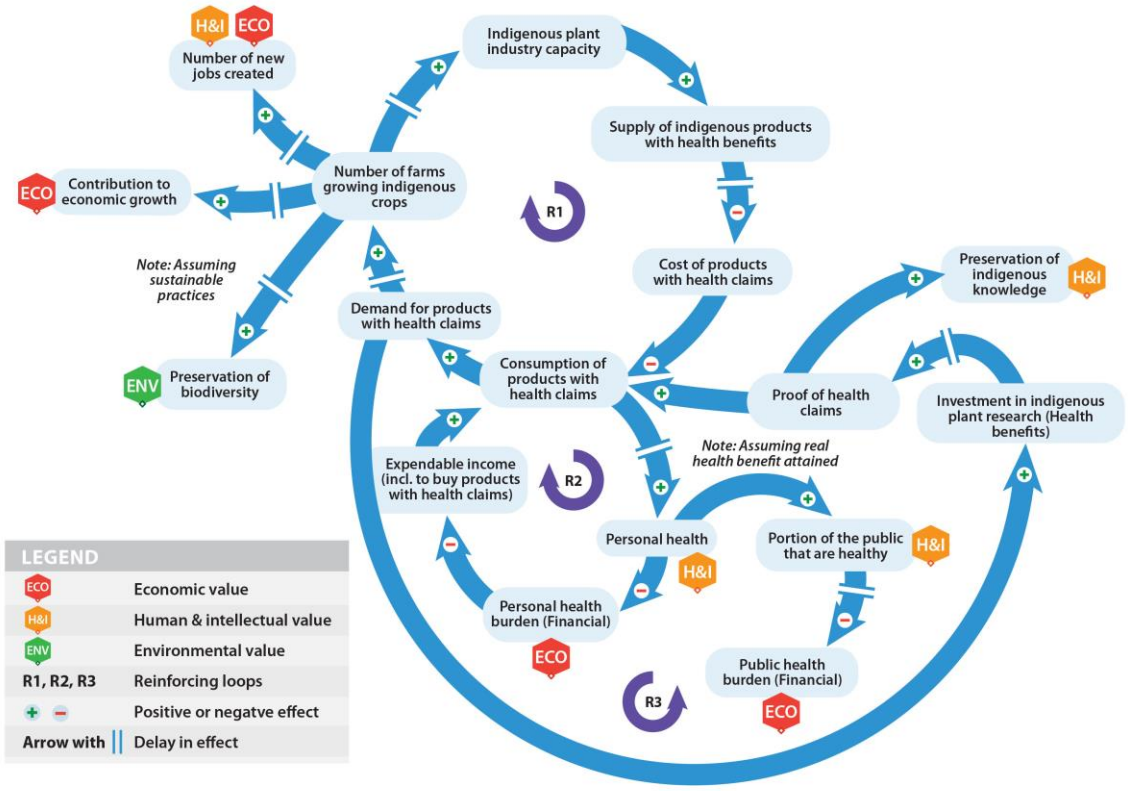

Figure 1. Systems diagram illustrating the economic, human and intellectual and environmental value creation potential of food products with health claims

516 **Table 1** The percentage of respondents envisioning economic, human and intellectual or
517 environmental value for food labels with health claims

Respondent	Economic (n/%)	Human and intellectual (n/%)	Environmental (n/%)
Yes	38 (77,6%)	27 (55,1%)	2 (4,1%)
Indirect, yes	0 (0%)	3 (6,1%)	11 (22,4%)
No	11 (22,4%)	19 (38,8%)	36 (73,5%)
TOTAL	49	49	49

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520 **Table S1. Educational background and occupation of professional participants**

Respondent	Highest education	Occupation	Conflict of interest
PR1	HND	Business Owner (Inform. Techn.)	NA
PR2	Bachelor	Marketing Consultant	NA
PR3	Masters	Researcher - Ethics	NA
PR4	BEd Hons	School Principal	NA
PR5	BEd Hons	Technology Teacher	NA
PR6	HND	Consumer Journalist	NA
PR7	HND	Financial Advisor	NA
PR8	Masters	Futurist	NA
PR9	PhD	Economist	NA
PR10	PhD	Political Economist	NA
PR11	PhD	Social Anthropologist	NA
PR12	PhD	Researcher - Horticulture	NA
PR13	Bachelor	Small Business Owner (Traditional use products)	F
PR14	PhD	Business Owner (Food Ingredients)	F
PR15	PhD	Food Scientist	F
PR16	HND	Director (Nutraceutical Company)	F
PR17	Masters	Director (Food Labelling Consulting)	F
PR18	Hons	Farmer (Tea Production)	F
PR19	MBChB	Director (Food Analysis Consulting)	F
PR20	BSc	Food Scientist	F
PR21	MSc	Multinational Research and Development Executive	F
PR22	BSc	Innovation Manager	F
PR23	BSc Eng; BCom LLB	Attorney	F
PR24	PhD	Researcher - Agriculture and Food	F
PR25	Bachelor	Research and Policy Coordinator	F
PR26	PhD	Nutrition Consultant	HC & F
PR27	HND	Nurse	HC
PR28	BSc Hons	Dietician	HC
PR29	MBChB	Doctor	HC
PR30	Masters	Researcher - Epidemiology	HC
PR31	Masters	Public Health Consultant	HC
PR32	PhD	Researcher - Non-Communicable Diseases	HC
PR33	BSc Hons	Dietician	HC
PR34	MBChB	Chief Healthcare Officer	HC
PR35	MBChB	Consultant to Department of Health	HC
PR36	Masters	Nutrition Consultant	HC
PR37	PhD	Lecturer - Nutrition	HC

521 HC: Healthcare and related industries; F: Food Industry; NA: Not related to food or healthcare industries

522

523 **Table S2 Illustrative quotes for economic value creation**

Stakeholder	Participant	Illustrative quote
Individual	P12	You have your plant breeder's rights, which is a form of incentive to the plant breeder or the inventor, then you have the trademark. The money will come to the institution, and because I am the inventor, a certain percentage is supposed to come to me.
	P17	But if that information is made use of in the right manner, there is no doubt that it can contribute in maybe a smallish but still significant measure to the improvement in our quality of life Because if it's effectively utilised, you're making better choices, your health should theoretically improve and it should also enable you (at least in theory) to spend the money on food in the most cost effective manner.
	P27	I think the one thing that we have a problem with in South Africa is that our healthier choices are more expensive.
Business	P17	I think it's desirable to be able to make health claims, because from the consumers' side, it provides them with information which is essentially advantageous to their health and from commercial point of view, it's a commercial opportunity [for businesses]. Providing its legitimate, there's nothing wrong with it.
	P33	Very often in the higher income or higher LSM group, we will see people going for products which have got more of the nutrient content claims and, although they're not necessarily legal, the health claims and the reduction of disease risks claims.
	P13	The benefits I'm listing on [my product], they're based on research, but they mostly based on indigenous knowledge. If I have to take those things [i.e. claims] off, I'm completely lost as to my products… How are customers going to know that this is not just normal black tea? It's an indigenous wild tea and it has benefits... But with the current food regulations, I'm not able to communicate to the customer the way I need to communicate to the customer.
	P14	More products can be more specific for more specific needs. Which also creates more opportunity for producers.
	P21	I really want to make products better; design better products, if but you are unable to tell the consumer [the benefit] then no one's going to support that on-cost, because it can't be communicated.
	P24	Having a scientific claim helps in terms of if you want to trade your product internationally. You can actually increase the prices of products.
	P9	I think the whole value chain can benefit - from the producer onwards. If the producer knows that because his/her product will be sold with this claim, with this added value, the producer would probably also be able to negotiate a better price; because his/her product has a higher value than

		initially thought.
	P24	In some cases you'll find that the product, if it links to a community, [if it] beneficiates them… the higher the price that can be charged for a product.
	P 37	There's a lot of testing involved, which is quite expensive. So now you're almost giving more power to your larger food manufacturers, because they will have all these tools at their disposal, but your smaller food companies won't be able to afford to do the testing. They won't be able to put these claims on their products. They are at more of a disadvantage, which I think is also a shame.
Society	P12	If you look at indigenous knowledge; If I obtain the plant material from community x, or I use their knowledge because I know they eat A or B or C indigenous plant then a certain percentage must go back to them as well.
	P11	It costs them less to produce fair trade Rooibos than the small scale organizations [in] Nieuwoudtville and Wuppertal… The feedback of the small scale organization was that since there are big farms that produce Fairtrade rooibos, the market was saturated... Is it [better] to restrict the label and to protect some farmers who deserve it, or is it better to extend it, to expand it more and more.

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526 **Table S3 Illustrative quotes for social value creation**

Stakeholder	Participant	Illustrative quote
Individual	P27	I do think that would have an impact. I think you would find the consumer would be more knowledgeable. I think they would take the time to understand what they're actually eating, what they drinking, and make a better informed decision.
	P24	If more [information] can be added to say that you should eat this product. If you can say a little bit more - more than just the basic nutrients - it would help consumers…Over time it will help consumers to become educated - growing knowledge over time.
	P13	To be honest, a lot of consumers are quite ignorant in terms of what food contains. Many people, you'd be shocked, don't know what beta carotene does. If we were able to make claims on food labels to say, "these carrots contain beta carotene, which is good for eyesight, and does [many other things]", it would lead to a healthier society. People will say, "I need to buy carrots, because this is what it's going do for me [the benefit]".
	P17	I think it's desirable to be able to make health claims, because from the consumer side it provides them with information which is essentially advantageous to their health and from commercial point of view, it's a commercial opportunity. Providing it is legitimate, there's nothing wrong with it.
Business	P16	Let's use cranberry as an example: if I stopped one hundred women in the street and asked, "have you heard that cranberry juice is good for urinary tract infections?", ninety-five percent will say, "yes, I have I've read it somewhere, my girls told me at the book club, I heard about it in the aerobics class, I am aware of it". If I put cranberry [in my product], I will get that [customer] buy in just by saying cranberry [on the label] - that's a health platform.
Social	P33	In this ideal world, everyone actually looks at a food product and makes an informed choice based on the reality of what that product is and how it's going to affect them from a health point of view…. At the end of the day, it's all about improving the health status of the population.
	P12	The [institution] has several projects focusing on rural development. Making an impact, job creation and poverty alleviation, that's where part of the honeybush projects also falls in… If you claim something, you must also prove that you are protecting it, which I don't think is always happening or being done. If I claim honeybush I must also prove I am protecting the knowledge I have... A lot is getting lost because the kids are not interested…The knowledge is in the older people… And that is where government is trying now to conserve that information at least.
	P16	By using indigenous plants you're adding value and creating jobs and [it has the] possible opportunity of exporting and getting foreign income into the local coffers. I mean, it's a win-win situation.
	P12	Currently, the Khoisan Council is claiming most of the knowledge on Honeybush and Rooibos, so the money will be paid over to the council. There are prescriptions how they should use it, but nobody

has really checked… That money should go back into the communities where it comes from.

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529 **Table S4 Illustrative quotes for environmental value creation**

Stakeholder	Participant	Illustrative quote
Business	P18	We're not so much concentrating on the health benefits when making the tea. We try to **do it sustainably**. We want to **sell a product and without destroying nature at all**.
	P9	For the big multinationals, the bottom line is money and they would go for products that are quick to produce and human nature says that the environment will come second whilst the smaller guys tend to be more have more of a conscience. I've met a lot of them over the years and I think that that approach is the more valid one, the one with more of a future… Is there a willingness for consumers and for the world at large to consider smaller products produced locally and with **more emphasis on being environmentally friendly and the health benefits** and being organically produced? I think there's a lot of scope for that… Sometimes I think that that is overplayed to some extent, and then people climb on that bandwagon for other reasons than the environment or health - then it becomes purely economic again; everybody wants financial gain.
Society	P13	It was like that in all of the communities we visited… The trees we are working with [also often] had parasites. So the longer these leaves are growing, the more the trees weaken. These trees were dying, and if they were not dying from parasites, they were being chopped [down]. People did not care in some villages; there was no sight of these trees anymore. So through our work, we are **creating conservation of these indigenous crops** because now it's becoming gold to them [the communities]. Having this tree and looking after it in my yard will bring me income because we buy the leaves from them once they've been harvested. And besides that, [we are] also exposing their products to the market, taking this tea that they've undermined, flavouring and packaging it nicely and putting it in shops in Bryanston and Sandton. They see that the knowledge of their forefathers was so important and valuable that in 2020, that knowledge can still do something for future generations.
	P12	The same is now [the case] with our traditional healers. They realize and understand that with urbanization and everything going on, their things [traditional plants] are getting limited; their [plant] products they are using. **They need to start understanding propagating it**, but then a lot of the [chemical] properties are changing; as soon as you start cultivating things that grow naturally.
	P25	There is that possibility, it's just how one does it and how one develops confidence in that label. So I think an example of that is like a Fairtrade label, where there is an organization that people trust that verifies that things are a fair trade and they verify that there's value to the community that's producing it, so once it gets a Fairtrade label then you know that you can trust that product, and **that it has got social benefits and environmental benefits**… [But] because of the research that has to go into it, it's not benefiting a majority of people.

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