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Developing a food literacy definition for South Africa

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Abstract

Food literacy has been advocated by many recent researchers as an individual or society's ability to better interact with their food and nutritional needs. These researchers maintain that current illnesses resulting from our lost ability to maintain good health by interacting sensibly with our food intake, can be 'reclaimed' if individuals and society developed improved food literacy levels. In this research a South African definition for food literacy as a construct, with its inherent sub-components and related domains, were developed using the Delphi methodology. Delphi is viewed as an excellent method to seek consensus or agreement from a sample of experts in a particular field. This Delphi application consisted of two primary rounds where a stable consensus definition for food literacy in South Africa was achieved. Between 76 and 71 eminent food experts from five occupation groupings (five experts fell out between round one and round two) participated in the Delphi process. This group identified six sub-components and agreed that they adequately supported the content of what food literacy entails. An additional third round was later used to ascertain the food experts' opinions regarding the inclusion (or uncertainty or exclusion) of 204 specific food literacy scale items, as part of the larger research to develop a food literacy measurement instrument.

Keywords: Food literacy, Delphi methodology, measurement instrument, scale items, South African consumers

Introduction

Worldwide, societies carry the so-called *double burden of malnutrition* (Cassidy, 2013:84). In 2014, around 1.9 billion adults in the world were *overweight or obese*, while 62 million were *underweight* (Demaio & Branca, 2018:1; Stuckler & Nestle, 2012:1), suggesting that something is seriously amiss in terms of human food provision and consumption (Mepham, 1996:xi). This has to be noted on household level as well as all areas systems of food provision in the hospitality industry where food is produced to reflect trends and signify people's lifestyles.

Data collected from 195 countries between 1990 to 2015 reveal that in 2015, obesity affected 107.7 million children and around 603.7 million adults worldwide, a period during which the prevalence of obesity has doubled in more than 70 countries whilst steadily increasing in most others (Collaborators, 2017:13). In 2010, overweight and obesity resulted in an estimated 3.4

million deaths globally, which translates into 3.9% of years of life lost and 3.8% of disability-adjusted life years (DALYs) (Ng, Fleming, Robinson, Thomson, Graetz, Margono, Mullany, Biryukov, Abbafati & Abera, 2014:1). Researchers directly correlate an increase in body weight with increased health risks such as coronary heart disease, type 2 diabetes, cancers (endometrial, breast, and colon), and hypertension, among others (Bhurosy & Jeewon, 2014:1). Another concern is the consequences of the so-called *nutrition transition*, where societies' diets often provide adequate energy, but the nutritional quality of their diets is often poor due to an excessive consumption of energy rich foods (Hawkes, 2018:113). Consuming too many refined carbohydrates, high fat and processed foods (Peters, Elsey, Newell & Hill, 2018:E189) increases the prevalence of overweight and obesity (Steyn & Mchiza, 2014:88). Admittedly, high-income countries currently bear the biggest economic burden of *non-communicable diseases* (NCDs) related to malnutrition, but due to economic and population growth in middle-income countries they will in future assume a larger share of this burden (Bloom, Cafiero, Jané-Llopis, Abrahams-Gessel, Bloom, Fathima, Feigl, Gaziano, Hamandi & Mowafi, 2012). Popkin (2017:77) shows a worldwide increase in the levels of consumption of nonessential foods that contain disproportionate amounts of added sugars and salt, as well as refined carbohydrates. Also contributing to malnutrition is the deficient intake of one or more micronutrients: apparently, 790 million individuals' daily dietary intake of important nutrients is insufficient (Haddad, Hawkes, Achadi, Ahuja, Ag Bendech, Bhatia, Bhutta, Blossner, Borghi & Eriksen, 2015:3; Myers, Smith, Guth, Golden, Vaitla, Mueller, Dangour & Huybers, 2017:258).

Despite evidence that some African countries in the Sub-Saharan Africa (SSA) region are fortunately still maintaining a higher consumption of healthy foods, due to their strong adherence to cultural tradition (Masters, Rosenblum & Alemu, 2018:800), health practitioners are concerned that generally, diseases related to excessive food consumption and unhealthy eating habits are reaching epidemic levels world-wide (Trapp, Hickling, Christian, Bull, Timperio, Boruff, Shrestha & Giles-Corti, 2015:759). Not surprisingly, therefore, recent research has reported noteworthy changes in the food choices and eating behaviour of some African people in SSA (Masters *et al.*, 2018:800).

The greater concentration of malnourished people is in Africa (Oyedele, 2017:252), particularly in South Africa, Swaziland and Lesotho, where people appear to be most affected by under- and over-nutrition (both exceeding 30%) (Haggblade, Duodu, Kabasa, Minnaar, Ojijo & Taylor, 2016:219). In South Africa, overweight and obesity among both adults and children is a growing public health problem: 36 504 (7%) of all deaths in 2000 could be attributed to excess body weight. In 2004, NCDs linked to dietary intake (cardiovascular diseases, diabetes mellitus, cancers, and respiratory disease) were responsible for 12% of the overall disease burden in South Africa (Igumbor, Sanders, Puoane, Tsolekile, Schwarz, Purdy, Swart, Durão & Hawkes, 2012:1) and the WHO projects that NCDs will contribute to a significant increase in the number of deaths in the next decade apart from adversely affecting the social and economic lives, and the general wellbeing of individuals and societies (Delaney & McCarthy, 2014:105; Kruger & De Villiers, 2011:121).

Renwick (2013:6) explains that the relationship between food and health is inextricably linked and finds expression in the environment, the people, their communities and their health. While food may simply be a means to survival for some, it is may also serve as a source of pleasure (as is evident in the attention that food is awarded in the hospitality industry as well as in media, including food channels on television), and as a vital means to achieve good health (Block, Grier, Childers, Davis, Ebert, Kumanyika, Laczniak, Machin, Motley & Peracchio, 2011:5). To the contrary, many people do not have a healthy relationship with food at all (Arena, McNeil, Sagner & Hills, 2017:422), which complicates any effort to understand people's eating behaviours and to educate people about healthy eating practices. Notwithstanding, and based on existing evidence of the persistent deterioration of individual and societal health, conventional linear approaches to solving current health problems appear to be failing. Therefore, a better understanding, acceptance and use of a broader transdisciplinary set of assessment metrics is needed (Queenan, Garnier, Nielsen, Buttigieg, De Meneghi, Holmberg, Zinsstag, Rüegg, Häsler & Kock, 2017:1).

One way to assist people to make more responsible decisions in response to environmental food cues that could advance their food well-being, is to enhance their food literacy, i.e. to promote people's "ability to collect and process relevant information to properly use food in a perspective of enhanced physical and psychic well-being" (Palumbo, 2016:100). Factors contributing to poor dietary practices are numerous and varied, and undoubtedly require an interdisciplinary approach to resolve the predicament (Velardo, 2015:385). There is consensus that individuals do not know enough about food and should become more informed. However, 'knowing food' does not solely refer to having the means or the ability to produce a meal, it also provides a fundamental means for making sense of our place in the world (Brosnan, 2008:572; Vileisis, 2008:52). Being informed about food is not confined to nutritional knowledge, but requires a broader understanding of aspects such as cooking skills, farming, agriculture, policy, culinary culture, and food traditions (Kimura, 2011:466). Tilman and Clark (2014:521) include the relevance of dietary choice and environmental sustainability in terms of human health in this broader understanding. An improved understanding of the critical indicators of people's food literacy levels would help people to develop a better relationship with food, and improve their overall well-being (Bublitz, Peracchio, Andreasen, Kees, Kidwell, Miller, Motley, Peter, Rajagopal & Scott, 2011:4). An urgent need therefore exists for a simple food literacy measurement that could be used as a norm to identify problems related to food consumption and to educate and facilitate change.

Researchers concur that food literacy is an intricate construct that integrates interrelated themes such as food production, procurement, preparation, processing, packaging, and even food choice and consumption (Murimi, 2013:195), which reflects the involvement of various disciplines and specialisation fields, including the hospitality industry that deals with food provision as part of their core business. Several attempts to define and measure food literacy have been published to date by Benn (2014); Block *et al.* (2011); Carbone and Zoellner (2012); Cullen, Hatch, Martin, Higgins and Sheppard (2015); Ronto, Ball, Pendergast and Harris (2016) but they could unfortunately not conclusively demonstrate the interrelatedness of food literacy, health literacy and nutritional literacy. Deciphering these relationships hence remains a challenge, more so because our interaction with food is culturally bound. A food literacy measure therefore needs to be culturally justified, e.g. developed in South Africa for South Africans where the instrument would be linguistically appropriate in terms of the broader society and would capture non-universal eating habits and traditions, which the various systems of food provision should be interested in. It is therefore necessary to first devise a formal definition of food literacy for a specific context such as South Africa, to eliminate confusion about the construct. Thereafter it could be optimised to customise a food literacy measurement instrument for the context.

Food literacy: a multi-dimensional construct

A focus on food well-being is proposed as a paradigm shift from the paternalistic normative relationship that humans tend to have with food and health, towards a positive psychological, physical, emotional and social relationship with food at individual as well as societal levels (Block *et al.*, 2011:6; Bublitz *et al.*, 2011:1). At the core of food well-being are five proposed dimensions, namely food socialization, food literacy, food marketing, food availability and food policy (Block *et al.*, 2011:6). Food literacy is therefore acknowledged as a means to address the growing and interconnected range of issues regarding food, including the power of transnational food corporations, the rise of various food movements, and the recurrence of global food crises (Sumner, 2013:80). Researchers concur that health, nutrition, and food literacy are closely linked with human health and that an understanding of the factors that contribute to poor dietary and lifestyle patterns is critical to develop effective educational and intervention programs.

Food literacy is therefore a complex and encompassing phenomenon (De Campo, 2011:i) that extends beyond nutritional recommendations and cookery lessons to foster important and vital connections between food, people, health and the environment on a theoretical as well as a practical level (Colatruglio & Slater, 2014:37). Vidgen (2016:11) explains that "food literacy" has emerged as a term to acknowledge the all-encompassing role that food and eating play in our lives, as well as the empowerment that is gained from adequately meeting one's food needs. A functional level of food literacy and food education is viewed as a critical enabler to improve the

sustainability of the contemporary food system (Kimura, 2011:466). As a reasonably new concept, food literacy is viewed as a means to address certain aspects of the global health predicament that can be explored as a potential facilitator for healthy food relationships (Colatruglio & Slater, 2014:37), as a means to alleviate poor dietary intakes including consequences on people's health, and increased concerns about how people feed themselves (Begley & Vidgen, 2016:17). In essence, food literacy describes the idea of proficiency in food-related skills, knowledge and behaviour, from micro to macro level food environments (Truman, Lane & Elliott, 2017:365) and offers an "integrated framework for investigating and understanding the factors shaping food intake and dietary patterns at an individual level" (Vaitkeviciute, Ball & Harris, 2015:650). The real challenge, however, would be to negotiate a successful integration across all domains (Bellotti (2010:33).

Food literacy: the target populations

Food literacy is not only proposed for those on the indulgent side of the scale. A highly food literate person in a disadvantaged situation who is faced with food insecurity could potentially benefit in terms of increased certainty about shortcomings to increase resilience and to maximize available resources, to hopefully derive some pleasure from their food (Gallegos, 2016:139). Food literacy researchers emphasise that practitioners and policy makers should invest in the possible benefits of a food literate society as the outcome expectations go beyond mere diet quality. Arguments in support of food literacy regard it as a mechanism to address food insecurity, complexities surrounding body weight and related health risks, as well as the emergence of NCDs (Narayan, Ali & Koplan, 2010:1196; Vidgen, 2016:81). Gallegos and Vidgen (2010:7) accentuate that even though increased food literacy may not be the cure-all to resolve all diet-related problems and diseases, it should be part of a multi-strategic approach to help all those living on either side of the scale.

Food literacy defined

The exact components of food literacy are not yet fully defined or understood, nor is it clear how they influence people's food choices (Gallegos & Vidgen, 2010:2). Researchers are unanimous that the concept should extend beyond a health perspective and that it should be viewed as "an essential life skill, irrespective of social class" to empower individuals to take control over what they eat and make use of nutrition recommendations for better health (Caraher & Lang, 1999:27; Gallegos & Vidgen, 2010:7). The development of a standardised instrument to measure South African food literacy was therefore deemed necessary to address a long-standing shortcoming. Probably the strongest inspiration for this research was the conclusion of Crocker (1998:1): "consumers do not know what is too much, what is not enough, and what is just right, and that often the right goods are nowhere to be found and even when they are eventually available consumers frequently fail to choose wisely".

Research design and methodology

This mixed methodology exploratory research stretched over a two-year period from June 2016 to July 2018. The study employed both qualitative and quantitative research methodologies to extrapolate, as phase 1, a food literacy definition from South African experts working in various food-related fields. This was followed by phase 2, the compilation of a food literacy measurement scale that will be presented in a subsequent research report.

Introducing the Delphi technique

Following the example of a fairly recent, very successful Australian foods study (Vidgen & Gallegos, 2014), the Delphi technique was chosen as a means to elicit valuable opinions from experts to solve the complex problem of a suitable and relevant definition for food literacy in the South African context (Landeta & Barrutia, 2011:134). It was argued that the opinions of a group

of experts would be better to derive an appropriate definition and to validate related items for inclusion in a South African food literacy measurement instrument (Donohoe & Needham, 2009:417). Delphi allows researchers to shift away from reductionist, linear analysis, which has limited application in complex, interrelated issues emerging in 21st century social and biological sciences (Brown, 2007:136). The technique is ideal for instances where vague, unknown or even possibly contradictory opinions may exist, and where scientific confirmation to guide evidence-based decision-making is limited (Du Plessis & Human, 2007:15), and seemed appropriate for the development of a definition for food literacy. It is argued that the Delphi technique performs better than other group techniques – even where participants are anonymous – because repeated rounds of polling and controlled feedback allow content experts to converge on the truth, while the averaging of data removes possible errors (Bolger & Wright, 2011:1500). Expert panels are used in Delphi to endorse or reject opinions, assumptions, or as was the case in this research, to operationalise definitions (Rosowsky, Young, Malloy, Van Alphen & Ellison, 2018:372).

Even though theoretically it was quite challenging to identify specific all-encompassing characteristics for the Delphi technique, and while the technique has been criticised for lack of methodological value and utility (Donohoe & Needham, 2009:417) it was nevertheless considered advantageous for this research, for the following reasons:

- Potential to address a **social dilemma,** namely food literacy and related overweight and obesity problems experienced by a large portion of the world's population, including South Africans (Donohoe & Needham, 2009:417);
- Being an **inclusive, flexible, reflexive, highly structured process** that facilitates, without forcing consensus (Meijering, Kampen & Tobi, 2013:1607);
- Freedom to recruit **a heterogenic panel of experts** (namely food industry experts including culinary experts, food/ culinary academics, recipe and product developers, expert nutritionists and dieticians, food scientists, food media and food bloggers, food environmental experts and cultural food experts) based on their closeness to the subject to increase the variety of viewpoints and to stimulate new ideas (Hanafin, Brooks, Carroll, Fitzgerald, GaBhainn & Sixsmith, 2007:82);
- Ability of the researcher to **control communication and feedback**, usually in the form of a summary between each iteration (Meijering *et al.*, 2013:1607) that culminates as insight which in its totality is more than the sum of its parts (Donohoe & Needham, 2009:420). This is possible because participants have the freedom to voice contradicting viewpoints and can reconsider their stances independently between iterations, generating superior quality and relevant ideas;
- **Anonymous feedback** allows experts the freedom to **revise their opinions** during iterations (Meijering *et al.*, 2013:1607), reducing the 'bandwagon effect' that may result from major opinion;
- The technique provides **more accurate data** than methods where data is obtained from individuals or from interacting groups (Du Plessis & Human, 2007:15);
- It is an **effective and relatively inexpensive data collection method** (Yousuf, 2007:1) compared to, for example, personal interviews because experts are geographically dispersed and were allowed to respond in their own time, reducing pressure (Donohoe & Needham, 2009:417);
- It is a **resource-efficient method** that produces relatively rapid responses and greatly eases the administrative workload of the facilitator/ researcher (Bolger & Wright, 2011:1500), whilst generating outcomes that are reliable and can be generalised (Donohoe & Needham, 2009:420).

Implementation of the Delphi technique

The research entailed the implementation of Normative Delphi Method, executed in two rounds, with inclusion of an additional 'utilisation' round, which is excluded from the scope of this paper. It does however illustrate that Delphi can be combined with other research methodologies, such as scale development. In this research project, the results from the Delphi process fed into the

scale development process to accomplish a measuring instrument for food literacy. Figure 1 shows the two-round Delphi process, as well as the additional third round that was included in this research.

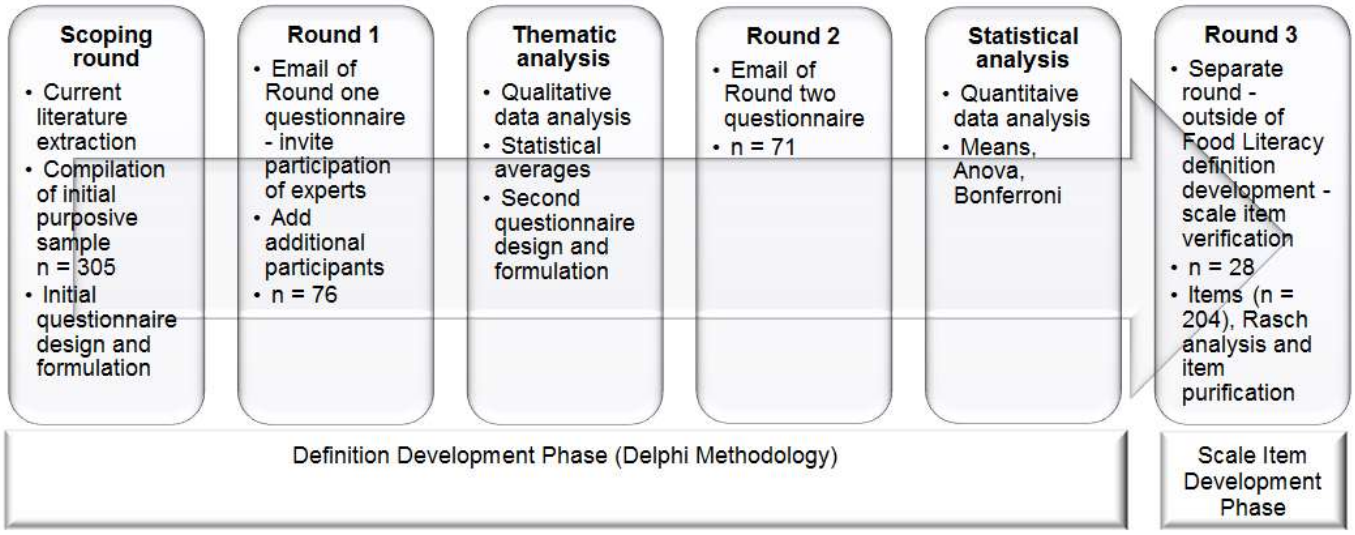

Figure 1: Research design process

The Scoping Round

This round aimed to generate a list of participants who would be willing to contribute in all the rounds of the research process. An initial purposive sample of possible participants was generated from various sources, which included a complete list of the 2017 "Eat Out Restaurant Guide" reviewers (acknowledging the important role of the system of food provision that is integral to the hospitality industry), the websites of the Association for Dietetics in South Africa; the Association for Food Scientists and Technologists; plus a list of the primary researcher's personal contacts. Publicly-available information regarding potential expert panellists is encouraged (Rowe & Wright, 2011:1489). As part of a co-nomination process, the researcher sent a field-protected Excel questionnaire to the list of possible participants, requesting them to nominate further respondents. This has the added advantage of confirming the standing of respondents nominating other individuals (Frewer, Fischer, Wentholt, Marvin, Ooms, Coles & Rowe, 2011:1523), who then also received the request for participation as well as the questionnaire.

The questionnaire required participants to provide their personal details, specifying their role in the broader field of foods and nutrition, and to indicate their willingness to participate in all further rounds of the research process. The scouting questionnaire provided valuable information about the experts' occupation, years in practice, qualifications, local and international experience, as well as self-reported knowledge regarding food and nutrition. Data collected were captured in an Excel document, and were imported into SPSS for easy analysis. Although self-rating on an ordinal scale is controversial, it is an accepted method to establish respondents' level of expertise (Goluchowicz & Blind, 2011:1530). Understanding that the number of experts in a panel could range from 10 to more than 1000, it was also noted that several studies were based on inclusion of 12 to 15 experts (McPherson, Reese & Wendler, 2018:406).

Round one data collection and analysis

In round one, the aim was to extract from food experts what they deemed important aspects that should be included in a food literacy definition for South Africans. Extracting the main construct and sub-components was achieved in this round together with a thorough review of the existing food literacy literature to guide the initial development, formulation and design of the initial questionnaire.

The first-round questions were carefully considered, well-phrased and definitive (Hasson, Keeney & McKenna, 2000:1011) and focused on the research question (i.e. how is food literacy defined in a SA context). Some scholars propose that an exploratory workshop precedes round one to increase response rates in subsequent rounds (Frewer *et al.*, 2011:1514). This was impossible due to the geographic dispersion of participants. Also, the time devoted to such an endeavour would have been discouraging.

The questionnaire was developed as a set of open-ended questions to encourage participants to freely respond to questions, generate ideas and identify new issues that should surface in subsequent rounds. Hasson and Keeney (2011:1698) further caution that open-ended first rounds complicate assessment of reliability. As encouraged by former researchers (Donohoe & Needham, 2009:422), a cover letter accompanied the first electronic questionnaire (1) to brief respondents on the intricacies of the Delphi technique; (2) to encourage their contribution in all subsequent rounds as only completed sets of data would be eligible for inclusion; (3) to provide an overview of the research project, detailing the time required to complete each round; (4) and to specify deadlines for submission of responses during each round. To mitigate the possibility that the expert panel might be disillusioned by the process, participants were informed from the outset of the project goals, the time that would be required from them, as well as how communication between the researcher and the participants would take place (Donohoe & Needham, 2009:422). Contact details of the primary and other researchers were provided.

The questionnaire, in Excel format, was kept as simple as possible to limit time for completion, so as not to discourage participation in subsequent rounds. Most cells in the Excel spreadsheet were locked, allowing respondents to complete questions in spaces provided specifically for that purpose.

Literature suggests that it is critical to time the Delphi procedure to avoid long weekends and holiday seasons, which would negatively affect responses and the stability of results (Day & Bobeva, 2005:111; Donohoe & Needham, 2009:422). The first questionnaire was sent to participants well before the Easter weekend of 2017, with a two-week return deadline. The researcher sent a follow-up email that intuitively also served as a reminder, to thank respondents for their participation, emphasising the value of their contributions in developing a definition for, as well as food literacy scale for the South African context. A reminder was sent out two days after the deadline had passed, to encourage responses (Hsu & Sandford, 2007b:3).

Initial data analysis entailed qualitative procedures to gain some insight into the nature and prevalence of responses that was required to develop the second questionnaire: qualitative coding through thematic analysis was used to deduce a comprehensive list of relevant sub-components with their domains in order to generate a food literacy definition required for evaluation during the next round (Brender, Ammenwerth, Nykänen & Talmon, 2006:127). Food experts' own definition of food literacy (including sub-components with related domains that they believed should constitute such a definition), formed the core focus in this section. This information was thematically analysed. Themes emerged from the data and were not imposed by the researcher, reflecting inductive analysis. To explain the emerging nature of the themes, in-depth research of existing literature on food literacy formed part of this analysis process (Dawson, 2002:115).

A combination of manifest and latent content was used to code the content. When facing a choice between validity and reliability, qualitative researchers face a fundamental choice between depth or specificity of understanding, and usually opt for depth to base their judgements on a broad range of observations and information, "even at the risk that another observer might reach a different judgement of the same situation" (Babbie & Mouton, 2001:388). Data generated was hence based on words, descriptions, accounts of situations or events, opinions, feelings and others, opposed to numerical values as is typical of studies where humans or human behaviour are the focus of the study (Walliman, 2010:128). During coding, similar themes were grouped to find a universal description for a specific group. Although the exclusion of infrequently occurring items goes against the Delphi principles, it is paramount to reduce large amounts of information which may cloud consensus (Hasson *et al.*, 2000:1012). Therefore, it was envisaged that including every construct

mentioned might eventually not be possible. The qualitative analysis was supplemented by statistical summaries to identify prominent overarching themes, thus quantifying responses by calculating means, medians, as well as upper and lower quartiles (Skulmoski, Hartman & Krahn, 2007:4).

Round two

In round two the aim was to specify the important constructs and possible sub-components that were deduced from round one and aligned in a narrative, to formulate a definition of food literacy. In this round the formulated definition with sub-components and domains were verified by the food experts and consensus was reached regarding the definition. The second questionnaire was hence generated from the first round data, and was sent to participants to evaluate the outcomes of the previous round. Participants could assess their own contributions in terms of the summarised responses that reflected the views of the sample (Di Zio & Pacinelli, 2011:1566), and were allowed to comment further. Statistical analysis was used to aggregate responses that could be scrutinised as part of the review. Again, a follow-up email served as a reminder of the value of every individual's contribution, and to stimulate a high response rate.

Round three

An additional round, which was not initially anticipated when the research project was conceptualised, was included in the research. In this round, the food experts were asked to evaluate 204 proposed scale items on a 3-point Likert-type scale: 1 (include), 2 (uncertain), 3 (exclude). Food experts where given the opportunity to rephrase scale items or comment on scale items that were developed to represent the important constructs/ themes in the definition, that were intended for inclusion in the food literacy measurement instrument. They were finally requested to propose new scale items that could be included in the measurement instrument addressing the individual sub-components with their respective domains, but all the while taking the latent variable of food literacy into account. The 204 proposed items were sent to all the participating food experts, in an Excel document with space next to each item to indicate their level of inclusion/exclusion, additionally to a space for any additional comments or new scale items.

Results

Despite some notion that "there is no standard approach to analyse data from Delphi rounds" a noticeable procedure emerged in former Delphi studies (Keeney, McKenna & Hasson, 2010:65; McPherson *et al.*, 2018:406). During the "scoping around" round, which served to elicit reactions and to introduce this research (Donohoe & Needham, 2009:424), an initial database of 272 possible experts for possible inclusion in the study, was compiled. They recommended 33 additional experts' names and contact details, who received the same invitation and questionnaire. A sample size of 305 participants was considered adequate, considering the reality of an eventual lower response rate. In the following section, the subsequent rounds are reported, specifying the data analysis for each round and presenting the results needed to proceed to the next.

Scouting round and round one

A total of 78 responses were received following an invitation to 305 potential participants from across South Africa and from different, relevant specialisation fields. In the interest of common courtesy and ethical standards, the researcher refrained from sending another reminder to the remaining 227 experts who failed to respond in time (Day & Bobeva, 2005:109). Adequate response rates are indicated as 52.7% for individuals and 35.7% for individuals who are recruited through organisations (Baruch and Holtom (2008:1139), while a 31% to 33% retrieval for online versus on-paper survey response-rate data is reported (Nulty (2008:301).

Compared to other Delphi studies that have reported response rates as low as 12% (Day & Bobeva, 2005:111), this study's 24% response rate was accepted considering the busy schedules and long working hours of food industry experts (Frewer *et al.*, 2011:1515) and the requirement of having to participate in all three rounds for inclusion in the study. Of the 78 replies, two declined further

participation, resulting in 76 useful responses. The opt-in/ opt-out option that has become popular in Delphi studies, allowing people the freedom to participate or not after every round (Brown, 2007:142), was discouraged in this study.

During the scouting round, one respondent queried the indicators for the 10-increment Likert-type scales, where participants had to self-report their own food- and nutritional knowledge by assigning numerical values. The researcher neglected to include the word "least" at the zero end of the scale and the word "most" at the top end of the scale. This oversight was corrected and a clarification note was sent to the 305 respondents with a revised questionnaire specifying that '0' equalled 'least' and '10' equalled 'most" for both scales, suggesting that participants could revise their previous answers if they wished to do so. However, none of the others experienced any confusion and did not request revision. Some of the respondents found the process of opening the Excel file, completing, saving and then returning it as cumbersome.

Although most of the respondents found the process simple enough, these respondents inputs may highlight the need to identify participants with a fair degree of computer skills in similar research in the future. One participant, who found the procedure difficult, decided not to participate further, despite a recommendation to print the document, complete it by hand and to return a scanned, photographed or faxed copy. Unfamiliarity with the Delphi process could also have discouraged prolonged participation since the process may have appeared complicated and time-consuming (Brown, 2007:142).

Demographic characteristics of the sample

Table 1 reveals that food experts who participated in this study had served on average 18.98 years (SD 11.12 years) in their respective fields and were therefore eminently qualified to contribute to a food literacy definition for South Africa. Only one respondent infrequently worked outside the borders of South Africa. Apart from occupational expertise, participants were predominantly, even exclusively, experienced South Africans.

Table 1: Years of work experience

	N	Minimum	Maximum	Mean	SD
Years in practice	76	0	44	18.98	11.12

Five broad areas of specialisation were extrapolated from the data (Hsu & Sandford, 2007a:3), namely:

Group 1: (n = 18) Food journalists, food magazine editors, food magazine publishers, food guide editors and cookbook authors;
Group 2: (n = 18) Retail promoters, product developers, responsible sourcing advocates, recipe developers, food scientists, food technologists and other individuals working in research and development;
Group 3: (n = 11) Government representatives, lecturers, cookery school teachers, school teachers, academics;
Group 4: (n = 14) Dieticians, human nutritionists;
Group 5: (n =15) Chefs, restaurateurs, cooks, caterers, food service managers.

The number of participants in each area was considered adequate based on previous research that considered the inclusion of between 10 and 18 individuals per heterogeneous group (Goluchowicz & Blind, 2011:1530) or 10 to 15 individuals per homogenous group (Hsu & Sandford, 2007a:3) adequate. Inevitably, a larger sample would reduce group error, but would complicate managing the Delphi process as well as data analysis (Skulmoski *et al.*, 2007:10).

Table 2 indicates that most respondents (75%) possessed a tertiary qualification; only six acquired experience through in-service training, while five chose not to disclose their qualifications.

Table 2: Participant's qualifications

	Frequency	Percentage
No qualification reported	5	6.6
Certification	2	2.6
Degree	57	75.0
Diploma	6	7.9
In Service Training	6	7.9
Total	76	100.0

Table 3 reveals participants' subjective evaluation of their personal knowledge of food and nutrition, rated on a scale of 1 (lowest score) to 10 (highest score). The group viewed themselves more knowledgeable about food (Mean = 7.44; SD 1.33) than nutrition (Mean = 6.93; SD 1.67).

Table 3: Participant's self-reported knowledge in regard to Food and Nutrition

	n	Minimum	Maximum	Mean	SD
Self-reported Food Knowledge	76	3.0	10.0	7.44	1.33
Self-reported Nutrition Knowledge	76	3.0	10.0	6.93	1.67

Proposed definitions for Food Literacy

Round one produced respondents' self-constructed definitions that were used to identify relevant and prominent constructs for inclusion in the final definition, for example:

- "Food literacy is the knowledge and understanding of ingredients, cooking and eating and their relationship with health, environment, history, culture and economy".
- "The development of an understanding of what we eat, the nutritional value of food items, the availability of such products in our water scarce country, the effective and sustainable production of these products and the understanding of the impact it may have on the environment and our natural resources".
- "To be food literate is to understand what you are eating – the quality of your food – this takes into consideration where it's from, how was it grown and how was it processed. Food literacy also encompasses understanding the nutrients of the food. This includes knowing what is harmful and how what you eat is linked to your health. Another level of food literacy is understanding global cuisine".
- "Food literacy is an emerging term that described the understanding between food produced, procured, prepared and consumed based on food choice and culture, and its effect on nutrition outcomes. It includes (physical and economical), sufficiency, safety and overall diet quality to meet nutrient needs".

Literature suggests that no items should be added during Delphi analysis and that participants' wording should be used with minimal editing (Hasson *et al.*, 2000:1012). The following themes emerged from the latent content coding:

- *Theoretical knowledge and understanding of food*
- *Culinary math/ conversions*
- *Mindful/ ethical and sustainable food production and sourcing*
- *Everyday cooking behaviour & skills*
- *Balanced diet/ nutrition*
- *Cultural and social understanding of food*
- *Economic implications of food*
- *Food safety*
- *Food security*
- *Food supply and procurement*
- *Menu planning/ food trends*
- *Individual food choices*

Manifest content coding revealed additional themes and constructs not extracted from the definitions, although mentioned by food experts for inclusion in a formal food literacy definition, namely:

- *To all South African groups*
- *Food combinations*
- *Presentation of food*
- *Social understanding of food*
- *Conscientious consumption*
- *Simple language*

Additional comments made by food experts that were noted, include:

- *"It is difficult in South Africa to determine Food Literacy without some mindfulness of poverty and inequality"*
- *"That humans take pleasure in the process or activities (such as cooking and eating) that primarily satisfies a biological need"*
- *"That there should be an awareness of a link between income and food literacy"*
- *"Food security"*

The following definition for food literacy, including six sub-components with their respective domains was extrapolated through thematic analysis of the data generated in round one, to be forwarded to round two for eventual statistical verification:

In a South African context, *"Food literacy refers to an individual's knowledge, skills and behaviour as demonstrated through the sourcing, consumption as well as the nutritional, economic, safety and social aspects of food"*.

The six sub-components with their domains that were used for the development of items to be included in a food literacy measurement tool were:

Procurement (sourcing) – consumers are competent in acquiring (obtaining, buying, purchasing) from the available accessible food source wisely

Financial (economics) – consumers are competent in terms of their own financial ability in acquiring (buying, purchasing) from the available accessible food source wisely and without wastage

Consumption – consumers are competent to make informed choices to plan, prepare and eat meals, incorporating competencies such as store and cook food, interpret and adapt recipes and use equipment

Nutrition – consumers are competent in addressing health and wellbeing by incorporating competencies such as the selection, preparation and consumption of health promoting foods and practices

Food safety – consumers are competent in food safety when handling, preparing and storing food in a manner that will prevent food borne illnesses

Social – consumers are competent to consider their culture, ethnicity, trends, entertainment and status in food choices

Round Two

The Delphi technique requires that responses from round one are analysed to form the basis for the second round questionnaire (Brender *et al.*, 2006:127; Hanafin *et al.*, 2007:87). After completion of this analysis, the second round questionnaire was mailed to the 76 participants who completed round one. Also referred to as the Distillation Stage, repeated attempts at opinion-seeking and subsequent analysis are used to establish whether the Delphi procedure had reached a critical point and can be

terminated (Day & Bobeva, 2005:108). The second iteration afforded participants an opportunity to confirm whether their opinions as expressed in the previous round were adequately accommodated, and provided them an opportunity to change or expand their round one responses in the light of a summary of the other respondents' contributions (Skulmoski *et al.*, 2007:4).

Only 71 of 76 the round one participants returned their second-round questionnaires, despite the researcher's caution that the contributions of participants (based on their unique codes) who failed to complete all the rounds would be discarded. While such strict adherence to Delphi guidelines may be questioned, it is an effective mechanism to ensure research rigour (Landeta & Barrutia, 2011:146). The retention rate of 93.4% between round one and two is acceptable viewed in context of the study of Frewer *et al.* (2011:1517), where only 64% of the round one participants continued to round two. The number of round one participants who were retained was probably due to the researcher's reminder email. Only 67 of the 76 participants answered all the questions: some indicated that were not 'qualified' to report on particular constructs which they did not regard as relevant to their fields of expertise.

An opinion convergence was calculated through a quantitative rating of statistical parameters of the constructs contained in the proposed definition (Di Zio & Pacinelli, 2011:1566). The statistical procedures were used to garner information about the collective judgements of respondents and to calculate consensus (Hsu & Sandford, 2007a:4; Rosowsky *et al.*, 2018:373), specifically through the calculation of frequencies, means, standard deviations (SD), One way Anova as well as a post hoc Bonferroni Test (Skulmoski *et al.*, 2007:4).

Round two data (see Table 4) was captured to determine food experts' level of agreement (on a scale from 1 – 10) with the proposed definition for food literacy, as well as how much they believed each of the six sub-components (with expanded definitions obtained from the first iteration) should be retained as part of the final definition (see Table 5). A four-point Likert-type scale was applied (1 = not relevant at all; 2 = uncertain; 3 = relevant; 4 = highly relevant) to give participants an opportunity to voice their opinions concerning further refinement in comment boxes (Kauko & Palmroos, 2014:313).

Bolger and Wright (2011:1512) explain that this way of encouraging reasoning provides excellent cues of what the truth entails. Although not a prescribed norm, many studies view 80% as an adequate indicator of agreement (Falzarano & Zipp, 2013:99); with 66.6% or greater as "sufficient" consensus (Rosowsky *et al.*, 2018:372). Tables 4 and 5 indicate acceptable consensus with the definition and sub-components to proceed with the findings.

Table 4: Agreement with the pooled definition

Likert scale (1 – 10)	n	Minimum	Maximum	Mean	SD
Level of agreement	70	4	10	8.43	1.54

Table 5: Agreement with six sub-components

Constructs included Likert scale (1 – 4)	n	Minimum =1	Maximum = 4	Mean	SD
Sourcing	71	1	4	3.63	.59
Consumption	71	1	4	3.54	.61
Nutrition	67	2	4	3.57	.70
Economics	70	2	4	3.41	.73
Food Safety	71	1	4	3.61	.67
Social	68	1	4	3.37	.81

The different occupation groups' self-reported knowledge of nutrition that may have influenced their comments are presented in Table 6.

Table 6: Occupation groups' self-reported knowledge of nutrition

	N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
1.Food media representatives	17	6.41	1.28	0.31	5.76	7.07	4.0	8.0
2.Retail, development, technologists	17	6.65	1.84	0.45	5.70	7.59	4.0	10.0
3.Academia, government, educators	10	6.20	1.93	0.61	4.82	7.58	3.0	8.0
4. Dieticians, human nutritionists	13	8.31	1.11	0.31	7.64	8.98	7.0	10.0
5. Chefs, restaurateurs, food service managers	14	7.14	1.51	0.40	6.27	8.02	5.0	10.0
Total	71	6.93	1.67	0.20	6.54	7.32	3.0	10.0

ANOVA (Analysis of variance) was performed to distinguish possible significant differences among the five occupation groups and the dependent variable (MacDonald & Headlam, 2015:30), revealing only one significant difference (p = .01) (see Table 6), within the "occupation group" and self-reported "Knowledge of human nutrition". Differences among the different occupation groups and their consensus about the other phenomena, as indicated in Table 7, i.e. self-reported Food Knowledge; Agreement about the definition as well as inclusion of the sub-components *Sourcing; Consumption; Nutrition; Economics* and *Food Safety* were not statistically significant (p>0.05).

Table 7: One way Anova – Occupation group / dependent variables

		Sum of Squares	Df	Mean Square	F	Sig.
Knowledge Food (Max = 10)	Between Groups	13.73	4	3.43	2.07	.10
	Within Groups	109.73	66	1.66		
	Total	123.47	70			
Knowledge Nutrition (Max = 10)	Between Groups	36.56	4	9.14	3.82	.01
	Within Groups	158.08	66	2.40		
	Total	194.65	70			
Definition Agreement (Max = 10)	Between Groups	20.72	4	5.18	2.37	.06
	Within Groups	142.42	65	2.19		
	Total	163.14	69			
Sourcing (Max = 4)	Between Groups	1.19	4	.30	.84	.50
	Within Groups	23.29	66	.35		
	Total	24.48	70			
Consumption (Max = 4)	Between Groups	1.01	4	.25	.68	.61
	Within Groups	24.65	66	.37		
	Total	25.66	70			
Nutrition (Max = 4)	Between Groups	1.10	4	.28	.54	.70
	Within Groups	31.35	62	.51		
	Total	32.45	66			
Economics (Max = 4)	Between Groups	1.77	4	.44	.82	.52
	Within Groups	35.21	65	.54		
	Total	36.99	69			
Food Safety (Max = 4)	Between Groups	1.26	4	.32	.70	.60
	Within Groups	29.70	66	.45		
	Total	30.96	70			

Social (Max = 4)	Between Groups	2.70	4	.68	1.03	.40
	Within Groups	41.11	63	.65		
	Total	43.81	67			

A post hoc Bonferroni test was performed to specify the significant differences among the different groups' self-reported knowledge of nutrition. A statistically significant difference ($p<0.05$) was confirmed for the knowledge of the group of dieticians/ human nutritionists (group 4: M = 8.31), that was significantly higher than all the other occupations ($p<0.05$) excluding the "chefs/ restaurateurs" (group 5: M = 7.14; p = 0.55) although the self-reported nutrition knowledge of the latter was not significantly higher than that of the other three occupation groups (see Table 8).

Table 8: Post hoc Bonferroni outcomes for Knowledge of Nutrition and Occupation groups

(I) Occupation groupings	(J) Occupation groupings	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.Food media representatives	2.0	-.24	.53	1.00	-1.78	1.31
	3.0	.21	.62	1.00	-1.58	2.00
	4.0	-1.90*	.57	0.01	-3.55	-.24
	5.0	-.73	.56	1.00	-2.35	.89
2.Retail, development, technologists	1.0	.24	.53	1.00	-1.31	1.78
	3.0	.45	.62	1.00	-1.34	2.24
	4.0	-1.66*	.57	0.05	-3.32	-.00
	5.0	-.50	.56	1.00	-2.12	1.13
3.Academia, government, educators	1.0	-.21	.62	1.00	-2.00	1.58
	2.0	-.45	.62	1.00	-2.24	1.34
	4.0	-2.11*	.65	0.02	-4.00	-.22
	5.0	-.94	.64	1.00	-2.80	.92
4. Dieticians, human nutritionists	1.0	1.90*	.57	0.01	.24	3.55
	2.0	1.66*	.57	0.05	.00	3.32
	3.0	2.11*	.65	0.02	.22	4.00
	5.0	1.17	.60	0.55	-.57	2.90
5. Chefs, restaurateurs, food service managers	1.0	.73	.56	1.00	-.89	2.35
	2.0	.50	.56	1.00	-1.13	2.12
	3.0	.94	.64	1.00	-.92	2.80
	4.0	-1.17	.60	0.55	-2.90	.57

*. The mean difference is significant at the 0.05 level.

No further noteworthy comments were made in any of the comment boxes that required the definition or the integration of sub-components to be altered. The respective definitions that demarcated the domains of the various sub-components were rephrased for improved clarity, particularly to guide the development of the food literacy scale items in the next section of this research. Considering the outcomes of the second questionnaire, the researcher decided that no further rounds were necessary. It has been hypothesised before that if highly skilled experts are included, one is more likely to obtain correct first-round predictions, and panellists are less likely to change their initial assessment (Goluchowicz & Blind, 2011:1530).

Round three

A formal third round was deemed unnecessary based on participants' consensus regarding the proposed definition for food literacy and the Delphi process was terminated. However, a later

decision was made to request food experts to participate in another round to assist with the generation of items that would aptly represent the construct and sub-components with their respective domains included in the definition. Twenty eight food experts provided feedback regarding scale items that were sent to them for review, and their rating of scale items were used to determine initial inclusion of the scale items or not, as was done in a fairly recent study (Thorn, Brookes, Ridyard, Riley, Hughes, Wordsworth, Noble, Thornton and Hollingworth (2018:641). Details of this round are not relevant to this report and are merely mentioned to explicate the process.

Significance/Interpretation

The most critical deliverable of this research, in context of applying the Delphi methodology, was the perspectives obtained from various stakeholders operating in a diverse range of food industry contexts towards a food literacy definition for South Africa. It was important to find a definition from participants who deal with food in their daily work, such as food media specialists, food retail specialists, product developers, experts dealing with responsible ethical production and trade of food, recipe developers, food scientists, food technologists, legislators and other government representatives, food teachers and lecturers, dieticians, human nutritionists and chefs. These industry experts contributed not only from their unique professional perspectives, but also as South Africans who have a very close relationship with food and nutrition on a daily basis.

A food literacy definition for South Africa could have many applications in the fields of dietetics and nutrition, policy making, education curriculum inputs, industry and economic applications as well as contributing to the academic body of knowledge. However, the definition alone would not be directly useful in the ongoing global fight against individual and societal illnesses arising from people's deteriorating ability to interact with their daily food and nutritional needs. Defining a food literacy definition and the related constructs with their unique domains was the first step in a larger study to develop a measuring instrument that can be employed to determine individuals' food literacy levels that can be used to indicate shortcomings in terms of specific sub-components of the phenomenon. This can suggest proper avenues for interventions and training, such as when an individual may have moderate overall food literacy levels, but his/her sub-component of economics may be exemplary, while their nutrition sub-component is poor. A quantifiable measure of food literacy at individual and societal levels can be invaluable in terms of nutritional interventions, for employment scrutiny, to develop policies for those who are negatively affected by their daily interaction with their food intake, and many more.

Quality of the research

In this research, round one took on a qualitative format which allowed respondents unlimited and uninhibited input regarding their thoughts. The two questionnaires for round one and two were submitted to other faculty members for input and comments, but no noteworthy changes were suggested at these stages. The trustworthiness of the research can therefore be ascertained in context of the credibility where careful identification of the principal researcher's decisions, actions and potential biases in the study were upheld by other faculty members.

All the results that contributed towards this research's credibility – research in terms of origin, development, results and quality – were made available to the participants and the broader community. Since this research forms part of an academic Doctor of Philosophy degree, it will naturally be available to everyone (Landeta & Barrutia, 2011:146). Adhering strictly to the Delphi methodology, which has been meticulously documented to provide an audit trail, ensured that this research is dependable and rigorous (all the surveys are still available for scrutiny). Transferability

and confirmability may not immediately be possible until further research in regard to food literacy in South Africa is conducted (McPherson *et al.*, 2018:407).

Limitations

As this Delphi exploratory research followed examples from an Australian study to develop a formal food literacy definition, it was considered unnecessary to pilot test the individual questionnaires prior to their use (Vidgen & Gallegos, 2014). Pilot testing would have increased the time limits significantly, and as the aim of the larger research was to develop a measuring instrument for food literacy, it was paramount to formulate consensus definition first. Literature further suggested an exploratory workshop before round one to increase response rates in subsequent rounds (Frewer *et al.*, 2011:1514), which was considered impractical based on the geographic location of participants and because the time required would have discouraged participation of many of the participants who already had to commit to participation in three rounds with quick turn-around times. However, an extensive literature review contributed to the scoping round, as well as round one. The validation in Delphi Methodology involves the amalgamation of several food experts' views, and subjective bias in the inherent amalgamation process may have resulted in a slightly different version (Parente & Anderson-Parente, 2011:1709) although the researcher is satisfied that ample opportunity was given for comments and revision.

Ethics

Conducting research where human subjects are involved, as in this research where participants contributed to the development and extraction of a definition for food literacy in South Africa, required voluntary participation, and consent of the participants to use their views without disclosing their identities. The right to self-determination, anonymity and confidentially were maintained throughout this research (Shariff, 2015:6). Keeping the electronic survey questionnaires relatively short, improved comprehension and negated response fatigue (Perrault & Nazione, 2016:274).

Ethical approval for this research was granted by the Faculty of Natural and Agricultural Sciences' Ethics Committee of the University of Pretoria (EC160901-068). No other potential conflict of interest was reported by the authors.

Conclusion

The Normative Delphi method was used successfully in this research project to reach consensus on a Food Literacy definition and relevant sub-components with their respective domains for South Africa after two rounds. A third round was merely used to request participants' input regarding scale items that were required to develop a measuring instrument for food literacy. The suggested importance of food literacy in the health and well-being of individuals and societies cannot be underestimated. Arriving at a consensus-based definition for food literacy contributed to the development of a measuring instrument that will be available to measure individuals' food literacy levels in future. The consolidated food literacy definition for South Africa as extracted from the ±70 participating South African food experts is:

Food literacy refers to an individual's knowledge, skills and behaviour as demonstrated through the sourcing, consumption as well as the nutritional, economic, safety and social aspects of food.

The definition that was developed in an Australian context (Vidgen & Gallegos, 2014:54), by means of the Delphi methodology and involving 43 participating Australian food experts is**:**

Food literacy is composed of a collection of interrelated knowledge, skills and behaviours required to plan, manage, select, prepare and eat food to meet and determine intake.

The two definitions concur in terms of the relevance of knowledge, skills and behaviour in a broader context. Importantly, though, the South African definition pertinently refers to, and specifies the **sourcing** of food (that will address sustainable practices, which is a highly relevant topic at the moment in terms of which foods are included on menus), as well as detail pertaining to the **nutritional value, economic**, **safety** and **social aspects** related to food consumption. The South African definition is more specific and provides valuable guidelines in terms of the content of a measurement scale that aptly describes the construct. As such, it may eventually be applied to identify shortcomings in the way that food is dealt with at home and in the food industry, and to facilitate food education that will improve the well-being of societies.

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