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# Chinese consumers' perceptions of immune health and immune-boosting remedies including functional foods

Lei Cong <sup>a</sup>, Phil Bremer<sup>a</sup>, William Kaye-Blake<sup>b</sup>, and Miranda Mirosa <sup>a</sup>

<sup>a</sup>Department of Food Science, University of Otago, Dunedin, New Zealand; <sup>b</sup>Department of Finance and Economics, PwC, Wellington, New Zealand

## ABSTRACT

To facilitate the successful design of functional foods designed to boost immunity and to guide the successful promotion of such products, to Chinese consumers, fundamental knowledge is required on how consumers perceive the concept of immunity, the steps they take to improve their immunity and what their general attitudes are toward new functional food products. To explore these issues, focus groups (n = 4) and in-home semi-structured interviews (n = 12) were conducted in Shanghai. Immunity was understood to be the defense system that protects the body, with perceived causes for poor immunity including irregular lifestyles, polluted air, and increased age. Participants believed that immunity could be changed by modifying their diet with either conventional or functional foods (including TCM-based foods), supplements (TCM or non-TCM containing), TCM medical gels, TCM patent medicine, and Western medicine all playing varying roles at enhancing immunity and protecting health at different stages of wellbeing.

## KEYWORDS

Immune health; functional foods; Chinese consumers; perceptions; focus group; in-home interview

## Introduction

Interest in foods designed to promote health is rising as consumers increasingly believe that foods are intended not only to satisfy hunger and provide necessary nutrients but also to improve their physical and mental wellbeing (Menrad, 2003; Roberfroid, 2000). The idea of “functional foods” was first described in ancient Vedic texts from India, and in Traditional Chinese Medicine (TCM). Functional foods reflect the oriental philosophy that: “Medicine and food have a common origin” (Henry, 2010). This is notwithstanding the fact that some authors believe that the term “Functional Food” is essentially a marketing term (Henry, 2010; Siró, Kápolna, Kápolna, & Lugasi, 2008). Different countries have differing views of functional food in terms of their definitions, scope, and regulatory framework and there is no single universally accepted definition for functional foods (Kaur & Singh, 2017). However, most countries describe functional foods as foods containing bioactive components and ingredients that provide additional health benefits

**CONTACT** Miranda Mirosa,  [miranda.mirosa@otago.ac.nz](mailto:miranda.mirosa@otago.ac.nz)  Department of Food Science, University of Otago, PO Box 56, Dunedin 9054, New Zealand

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beyond basic requirements and are capable of reducing the occurrence of certain diseases (Lau, Chan, Tan, & Kwek, 2012).

Among the various claims promoted for functional foods, immune health stands out as being of importance for consumers. Many studies have shown that in Western societies a wide range of consumers have a positive attitude toward immune-boosting foods including: consumers in California, USA who ate probiotics in dairy products to enhance their immunity (Bruhn et al., 2002); consumers in Des Moines and Harrisburg, USA, who were willing to pay more for intragenic products labeled as containing enhanced levels of antioxidants compared to products which did not state this (Colson & Huffman, 2011); adults in the USA who took multivitamins to maintain overall health and wellness (Dickinson, Blatman, El-Dash, & Franco, 2014); and adolescents in Australia who took a wide range of nutritional supplements to prevent the common cold (O'Dea, 2003).

There is also scientific evidence that functional foods have the potential to enhance immunity (Lopez-Varela, Gonzalez-Gross, & Marcos, 2002). Thus, given consumer demand for health and wellness products and the successful health outcomes that such products can achieve, it is not surprising that there is much commercial interest in the development of functional foods designed to boost immunity. Although the functional food market is showing significant growth worldwide, the Chinese market is particularly active and therefore attractive to Western manufacturers. China has one of the largest functional food market in the world (Bogue, Collins, & Troy, 2017; Hu, 2016). In 2013, Chinese consumers had the highest expenditure on health and wellness retail products, followed by consumers from Brazil, the United States, Russia, and Mexico (Bogue et al., 2017). To underpin the development of successful functional food products, it is vital to understand the perceptions of consumers in the intended target market (Sorenson & Bogue, 2005).

A survey in 2011 on health food consumption in China reported that 77% of consumers ranked “immune enhancement” as an important function, with 49% of consumers ranking “nutritional supplementation” and “antifatigue” as being the second equal most important functions (Medina, 2011). Health food is a very important component of functional foods and such products are required to receive approval and validation by the Chinese government. Of the 27 health claims for health foods, approved by the Chinese Ministry of Health, “enhancing immunity” is the health claim most frequently used (Anon, 2017a, 2017b).

Given the popularity of immune-enhancing foods in this market, surprising little is understood about Chinese consumers' perceptions of the causes and effects of poor immunity, or about the remedies they currently use to improve immunity. Likewise, academic knowledge of Chinese consumers' general attitudes to new functional foods is scant. Thus, with the overarching objective of providing advice to food marketers who wish to develop new

functional food products for the Chinese market, this study answers the following three key research questions:

RQ1: How do consumers define immune health and what do they perceive as being the causes and effects of poor immunity?

RQ2: What current remedies are consumers taking to help improve their immune health and what do they perceive as being the key differences between these remedies?

RQ3: What are consumers' attitudes toward new functional food products with immune-related health claims?

It is important to consider urban centers for such research, as consumers in these cities are more highly educated, have higher incomes, are more likely to have been exposed to Western concepts or brands and are more open to trying novel foods from overseas countries. As an international metropolis and the most developed city in China, Shanghai has gained the most exposure to Western (food) cultures in China (Liu et al., 2011; Wang, Gellynck, & Verbeke, 2015), which is why it was chosen for the current study.

Focus groups and in-depth interviews were both used in the current study. Focus groups were used to generate information on collective views, so that group language or narratives benefiting later stages could be obtained (Bloor, Frankland, Thomas, & Robson, 2001; Gill, Stewart, Treasure, & Chadwick, 2008). In contrast, in-depth interviews were used to explore the views, experiences, beliefs, and/or motivations of individuals on specific matters. Therefore, interviews were particularly appropriate for exploring sensitive topics (e.g. their specific health issues), where participants may not have wanted to talk about such issues in a group environment (Gill et al., 2008). Interviews are especially insightful when the interviews are arranged in participants' homes: this enables the researcher to elicit the social world from the point of view of the respondent. For example, the respondent can be encouraged to provide examples of products to illustrate how they experience health issues and the interviewer can focus on these examples as media for exploring the ways in which the respondent is thinking, making-sense of, emotionally responding to, and deriving attitudes about these examples (Åkerlind, 2012).

The goal of the study was to better understand the views and personal experience of Chinese consumers living in Shanghai with regard to immune health, the different remedies they use to boost their immunity, and their general attitudes toward new functional foods with immunity-related claims. Four focus groups were conducted initially in order to collect a diverse and comprehensive range of consumers' opinions. An interview guide was

subsequently developed based on this initial data in order to further explore consumers' understanding by conducting 12 in-home interviews.

## **Methods**

### ***Participants***

Twelve in-home interviews and four focus groups were conducted in Shanghai, China, in October 2017. Six participants were recruited for each focus group and one participant was recruited for each in-home interview. The participants were recruited by a professional market research company and none of the participants had participated in a market survey in the past six months. Participants all had a middle-upper income (defined as monthly income of at least 12,000RMB) to ensure that they were likely to be in a financial position to purchase high-priced food products such as functional foods. Other inclusion criteria were that participants: fell into one of the specified age groups (25–40, the young group or 41–56, the senior group); perceived they had poor immunity; and had a relatively strong interest in food consumption and a strong interest in their health. Additionally, half the number of the participants in each focus group or interview either lived with or cared for someone that they also perceived as having poor immunity. This last criterion was included as it has been well documented that the consumer of a health product is not always the purchaser, for example, adults frequently purchase food items for their parents or for their own children (Lei, Strauss, Tian, & Zhao, 2015).

Ethical approval was obtained from the Otago Human Ethics Committee (17/123) prior to the commencement of the study. In total 36 adults participated in the study, 12 in in-home interviews and 24 in focus groups. The participants were selected to ensure that there was variation in gender, marital status and family structure (Table 1). The participants' written agreement to take part in an interview or a focus groups was based on fully informed consent and all participants are anonymized in this article on the study's findings.

### ***Role of the discussion moderator***

Data collection was in Mandarin. Four focus groups were carried out by an experienced qualitative moderator from the market research company used and each focus group lasted for approximately 90 min. All authors of this article observed and co-moderated all sessions in a purpose-built observation room. A simultaneous interpreter provided simultaneous English translation during sessions between the English-speaking research team and the participants.

**Table 1.** Participant summary of all sessions.

Session <sup>1</sup>	Age	Gender (M/F)	Married (Y/N)	Having child (Y/N)	Living with
INV1	25-40	F	N	N	Parents
INV2	25-40	F	Y	Y	Spouse & child & parents(in-law)
INV3	25-40	F	Y	Y	Spouse & child & parents(in-law)
INV4	41-56	F	Y	Y	Spouse & child
INV5	25-40	M	Y	N	Spouse & parent(s)
INV6	41-56	M	Y	Y	Spouse
INV7	41-56	M	Y	Y	Spouse
INV8	41-56	F	Y	Y	Spouse & child
INV9	25-40	M	Y	Y	Spouse & child
INV10	41-56	F	Y	Y	Spouse
INV11	25-40	M	Y	Y	Spouse & child
INV12	41-56	M	Y	N	Spouse & parent(s)
FG1	25-40	M (3)	Y (4)	Y (2)	Parents (2)
		F (3)	N (2)	N (4)	Spouse (2) Spouse & child (2)
FG2	25-40	M (3)	Y (4)	Y (1)	Parents (1)
		F (3)	N (1)	N (4)	Spouse (3)
			Not reported (1)	Not reported (1)	Spouse & child (1) Untold (1)
FG3	41-56	M (3)	Y (6)	Y (5)	Spouse (1)
		F (3)		N (1)	Spouse & child (5)
FG3	41-56	M (3)	Y (6)	Y (5)	Spouse (1)
		F (3)		N (1)	Spouse & child (5)

The corresponding author of this article conducted eight in-home interviews and the same moderator that ran the focus groups conducted four in-home interviews. Each interview session lasted for approximately 1 hour. In all interviews, authors of this article observed and asked additional questions where appropriate. Again, an interpreter provided simultaneous translation. In addition to asking questions from the interview guide, researchers were shown through the participant’s kitchen, as well as shown products that related to the questions (e.g. supplements, health food products, imported food products and TCM).

In order to obtain a range of ideas about immune health, reserachers asked participants to talk about their personal health issues and indicate those that they believed were relevant for immunity. Participants were also asked their opinions about the factors that they thought contributed to poor immunity. Afterward “catching a cold” was utilized as an example of a common immune-related health issue to allow participants to discuss the actions they took and the foods they ate at different stages of illness (e.g. healthy condition, anticipation of illness, the peak of illness and recovery from illness). This led to reflections on attitude toward foods as a remedy. Participants were also asked to discuss ways

<sup>1</sup>INV = interview; FG = focus group.

**Table 2.** An example of identified meaning units, condensed meaning units and nodes.

Identified meaning unit	Condensed meaning unit	Node
I think I've got low immunity which means I always feel that, and if I do something I just don't have enough energy to do that.	Don't have enough energy	Not energetic

to improve poor immunity and to explain where they got information from about immune health and possible remedies. The focus groups and interviews followed a path that was logical to the participants, rather than a structure imposed by the moderator, in order to draw on the consumers' own cultural values and evoke truthful interactions.

### ***Data analysis procedures***

The focus groups and interview sessions were transcribed based on the translator's simultaneous interpretation by a professional transcriber from a transcribing company. The data analysis, conducted by the lead author who is an English-speaking Chinese national, was based on both the Chinese recordings and English transcriptions. The qualitative data analysis software NVivo 11 was used to conduct a thematic analysis of the results.

By utilizing the method developed by Graneheim and Lundman (2004) and Landstrom, Hursti and Magnusson (2009), texts related to research questions were extracted and meaning units were identified based on selected texts. The meaning units were then condensed to form node titles, where a node is a collection of comments about a specific theme (see Table 2).

By merging similar nodes and considering the research questions, an open coding schema was developed. Nodes were moved iteratively between existing and new nodes arising from words appearing in identified meaning unit. The coding schema was further developed by verifying that no relevant identified meaning units had been left out and by ensuring that nodes were multi-exclusive. The coding schema was finalized based on discussions between the authors of this article.

## **Results**

### ***Participant definitions of immune health and the perceived causes and effects of poor immunity***

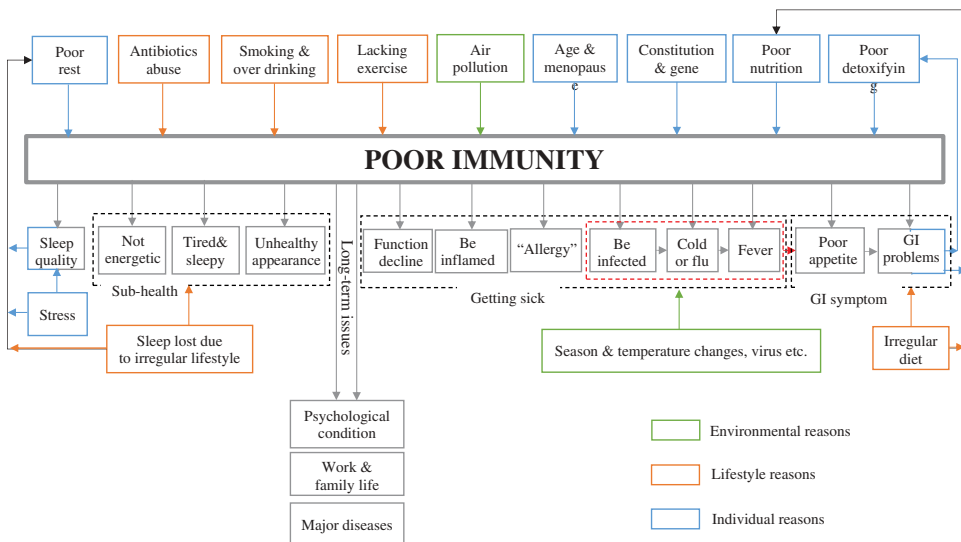
In order to discuss immune health in a language that participants were familiar with, their familiarity with the terms "immune system" and "immune health" were assessed. Technical terms such as "immune system" and "immune health" seemed not to resonate well with participants, while the term "immunity" (□□□) was widely recognized. Therefore, the study

used the term “immunity” in subsequent discussions. To participants, immunity was understood to be the defense system for the body, which protects the body from risks to their health, as one participant explained, “If you have good immunity, that means you have all the protection you need around you. Even in some bad environment, if somebody has got sick, or got a cold or flu, you can talk to him or her, you won’t be getting infected. (INV3, F)”. It is important to note that immunity was spoken about in a very holistic sense. Immunity and overall health were two concepts inextricably intertwined by participants. Based on the participants’ personal experiences, immune-related health issues, and their understanding of the factors that caused poor immunity, a schematic diagram illustrating the range of causes and effects of poor immunity was developed (Figure 1).

Participants attributed a wide range of factors as being causes of poor immunity, including environmental reasons (e.g. air pollution, season/temperature change), lifestyle reasons (e.g. irregular eating and sleeping, lack of exercises) and individual reasons (e.g. increased age, genetic makeup). Among these factors, environmental reasons, specifically air pollution and temperature change were mentioned the most frequently by participants, followed by age and poor sleep quality.

**Environmental reasons**

Changeable seasons and temperature, air pollution and exposure to a virus, were commonly talked about as having a direct connection with poor immunity. Many participants spoke of falling sick because of the cold and



**Figure 1.** A schematic illustration of participants’ immune health issues and their understanding of the causes and effects.



changeable weather. For instance, participants believed they were more likely to catch a cold or the flu in autumn and winter than in summer owing to the lower temperatures. All participants agreed upon the fact that poor air quality can have a negative impact on immunity. *“The bad air accumulates in your body. Gradually, your immunity goes down, and then you’re more likely to have inflammation or get sick. (FG4, F).”*

### **Individual reasons**

Individual reasons for poor immunity included age (sometimes closely connected with menopause for women), genetic makeup (so-called constitution by Chinese people) and the body’s ability to absorb nutrition. Among these reasons, an increase in age was believed to have the strongest link with decreased immunity. A widespread belief was that immunity began to decline from a certain age. Interestingly, there was a difference in opinion about the age at which immunity started to decrease. Many participants in the younger groups spoke of experiencing increased illness during the colder months and having less energy for late night activities from 30 onwards. However, senior group participants widely agreed they were very healthy and had good immunity in their 30s, but by 40 years of age they believed that because of decreased immunity, minor health issues happened more frequently, and that sleep quality and the body’s ability to absorb nutrients and detoxify decreased.

### **Lifestyle reasons**

Lifestyle reasons for poor immunity included factors related to people’s daily lifestyle. For example, people cannot always eat when they need to eat and cannot sleep when they need to sleep and this was believed to impact on immunity. Additionally, a lack of exercise, smoking and excessive drinking and the over-use of antibiotics were all perceived to compromise immune health.

Participants believed that poor immunity could cause a spectrum of effects/consequences, ranging from acute health issues, such as the common cold/flu, right through to long-term issues including serious diseases such as cancer. Poor immunity and its effects were also believed to cause significant adverse impacts on their psychological health and affect both work and family life. The most common acute effects were grouped into four categories: getting sick; sub-health; sleep quality and GI (gastrointestinal) symptoms. Among these, getting sick and sub-health were the symptoms most frequently mentioned by participants and they were also considered to be the most important indicators of immunity status.

**Getting sick and sub-health.** Participants frequently reported they could easily get sick owing to their poor immunity which was further explained as easily getting minor health issues. Catching a cold or the flu and the

consequential symptoms (e.g. having a fever), skin “allergy” meaning rashes developed in the skin, being inflamed somewhere in the body (e.g. dental ulcer) and health issues due to the decline of body function (e.g. backache, shoulder ache, breathing, and palpitation problems, etc.) were all included in participants’ descriptions of “getting sick.” While acknowledging that other people also sometimes experienced these minor health issues, there was a commonly held belief that those with poor immunity were most at risk of being the first among their family members and colleagues to catch an illness and that the consequences of falling sick were worse for them than for others. The majority of participants tended to use the term “sub-health” to describe a range of symptoms including increased tiredness, a lack of energy and an unhealthy appearance (e.g. looking pale all the time).

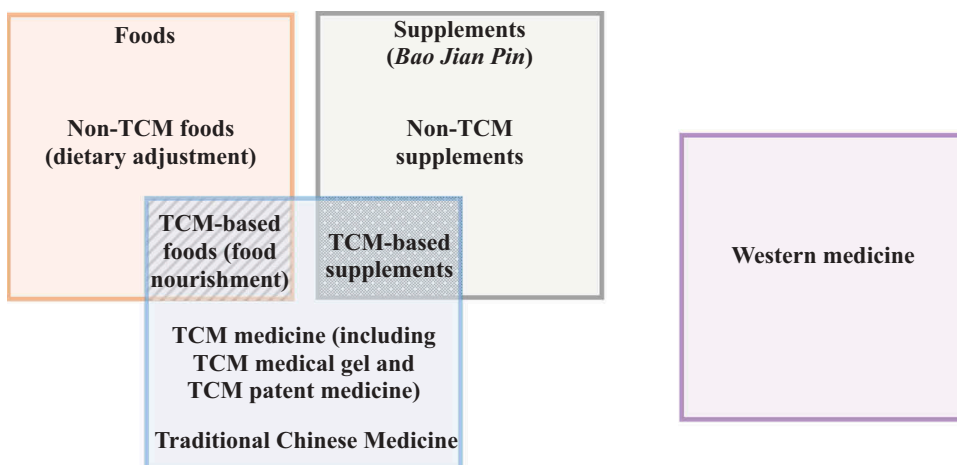
***Sleep quality and GI symptoms.*** Many people suffering from “poor immunity” reported experiencing poor sleep quality, which directly affected the quality of their daily life. It was not the amount of time spent sleeping *per se* that was problematic but rather the quality of sleep. Many participants connected poor sleep quality directly to poor immunity. This connection was spoken about in a cyclical manner; poor sleep led to poor rest and as a consequence poor immunity, meanwhile, poor immunity caused poor sleep. Similarly, there was another loop connecting GI symptoms and poor immunity. Poor appetite and GI problems (e.g. diarrhea and inability to digest food properly) were the main GI symptoms mentioned by participants. GI symptoms can lead to poor uptake of nutrition by the body and poor detoxifying by the body, which can lead to poor immunity. Poor immunity can cause poor appetite and GI problems.

### ***Current remedies that participants take to help improve their immune health and perceived key differences between these***

Participants discussed numerous remedies that could be used to improve poor immunity or treat acute illness (Figure 2). This array of remedies was used at different times to try to prevent illness (improve immunity) and/or combat the impact of illness.

### ***Non-TCM foods – dietary adjustment***

A healthy diet was perceived to be the key for good immunity and therefore good health. Food (non-TCM ones), while not always perceived as being the most convenient option, nor the most efficient way of absorbing nutrients, was considered to be the safest approach. It was widely stated that a healthy diet should contain a high intake of natural vegetables and fruits, especially ones rich in vitamins and dietary fiber, such as oranges, kiwifruit, or broccoli. Participants believed that natural vegetables and fruits were a good source of



**Figure 2.** Consumer-derived categorization of remedies that participants currently take to improve their immunity or to treat acute illness.

vitamins and dietary fibers, which can benefit immunity. Many participants preferred “natural or coarse” grains (e.g. oatmeal, coix seed, buckwheat, walnut, flax, Chinese yam, black rice, and sesame, etc.) over ‘processed’ foods (i.e. white rice, food made with flour) as these were perceived as having “original nutrition and better digestion.” Other methods of adjusting their diet included minimizing greasy foods (e.g. less cooking oil, less sugar, less salt, less fried food, and less spicy food) and increasing the consumption of high-protein foods (e.g. shrimp, fish, egg, bean curd, and milk). It is interesting to note that eating certain food was often mentioned as obtaining similar benefits as provided by Western medicine, for instance, garlic can help with antibacterial function; black fungus can soften people’s blood vessels; milk can help with sleep, etc. Supplying water was another frequently mentioned method that helped immunity. For example, when catching a cold, drinking warm or hot water was considered to be one of the most important ways of helping recovery.

### **TCM-based foods**

There was a large emphasis on incorporating foods with known medical benefits, mostly TCM benefits, into the everyday diet, which was called *food nourishment* (□□) by participants. The participants explained how they seek out these foods because of the benefits they contain. For example, they used Ginseng to supply Qi<sup>2</sup> to aid energy levels and long-term immunity, as well as sea cucumbers and fish glue to improve their immunity owing to their collagen and high-quality protein content. The most frequent ways to

<sup>2</sup>A TCM term, pronounced *chi*, denotes vital energy and is an essential substance for maintaining the activities of life. According to the principles of TCM, human physiological functions are maintained by Qi; the *zang-fu* or internal organs; blood; bodily fluids; and *jing-luo* or meridians and collaterals (Lao, Xu, & Xu, 2012).

consume these products were in soups or tea. Key examples of food nourishment that were often frequently discussed or shown to the research team include ginseng, cordyceps sinensis, sea cucumber, fish glue, and goji berries.

### ***Supplements (including TCM-based and non-TCM based)***

Supplements were taken on a regular basis by almost all of the participants even when they did not have acute health issues. Researchers were shown what were often quite extensive arrays of different types of supplements, which were kept in kitchen cupboards, left out on dining room tables or carried in handbags. When asked, participants explained that many of their supplements were linked explicitly to improving their immunity. Supplements could be grouped into TCM-based or non-TCM ones. For instance, ganoderma spore powder and ginseng liquid were typical TCM-based supplements while non-TCM supplements included vitamin supplements, fish oil or protein powder. Common supplements that were discussed (and often shown to the research team), were multivitamin tablets, protein powder, fish oil, and ganoderma spore powder. The convenience of taking supplements to maintain good health was widely acknowledged. Supplements were seen to be an easier, more practical and less time-consuming option for ensuring nutritional needs were met compared with eating food. Supplements were also seen to offer ‘better absorption’ than foods as illustrated in the following quote: *“I do not eat a lot, plus poor absorption, so that leads to the deficiency of all kinds of ingredients. Some of the ingredients that we get from Centrum (a vitamin supplement brand) are not available from our regular food ... and that’s what I like to get from Centrum (FG2, M).”*

### ***Medicine (including TCM medicine and Western medicine)***

In addition to TCM-based foods and TCM-based supplements, other TCM products were categorized as being medicine, either TCM medical gels<sup>3</sup> (□□) or TCM patent medicine<sup>4</sup> (□□□). TCM medical gels were frequently used in winter to improve immunity and overall health, TCM patent medicine was more frequently consumed when the participants thought they were catching a cold in order to minimize the impact of the cold. There was a clear belief that Western medicine did not overlap with foods, TCM, or supplements. Western medicine was considered as being appropriate to use only when cold symptoms such as a sore throat, coughing or fever persisted, because Western medicine was perceived as

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<sup>3</sup>Also translated as TCM paste, with the form of thick liquid, is a traditional method of TCM decoction.

<sup>4</sup>A sort of Chinese drug that is used on the basis of understanding TCM syndrome of patients and is guided by TCM theory. It usually contains more than one Chinese medication. Innovation of TCM patent medicine now mainly includes four methods: innovation of those ancient famous and effective prescriptions; summarizing new clinic experience according to the needs of consumers and changes of diseases; innovation of effective prescriptions descended through family; reform of the traditional dosage form (Xiong, Wang, Zhang, & Li, 2015; Zhang, Liu, & Kang, 2016).

being the most effective approach to control these more acute symptoms. However, while accepting its effectiveness, there was widespread concern about the side effects of Western medicine, especially if used on a regular basis, as the following participant explained “[If taking Western medicine for long term], we maybe have got a kind of resistance to it in our body. So, I always try to avoid Western medicine if it is possible. (INV1, F).” Further evidence of participants’ concerns about the side effects of Western medicine, was that it was frequently stated that it should not be used in the early stages of cold development, as it was too strong for mild symptoms and may accumulate side effects in the body.

### **Food versus supplement**

Chinese consumers believed that there was a clear difference between food and supplements (*Bao Jian Pin*). However, in the legislation, *Bao Jian Pin* is the shortened name of *Bao Jian Shi Pin* (保健食品), whose common translation is Health Food. Under the *Chinese National Standard for Food Safety – Health Food* (GB 16740–2014), a health food is defined as “any food claiming to have specific health functions, or to supplement nutrition with vitamins and minerals for a specific functional purpose. A health food is designated as being useful for specific consumers, able to regulate bodily functions, is not designed to treat disease, and does not cause any acute, sub-acute or chronic negative effects when consumed by humans” (Anon, 2014). While participants perceived supplements to be equal to health foods, it is apparent that, from a regulatory perspective, health food covers supplements and can also include some functional food products. The regular way for Chinese people to distinguish between food and supplements is in the format of the product. Participants believed that tablets, capsules, and oral liquid were typical supplement formats, because their effective ingredients have been processed and concentrated, while food covered meals, natural foods, beverages, snacks, etc. An example of using a product format as the distinction criteria is that vitamin gummies were considered to be a food rather than a supplement, because the format is similar to candy.

### **Consumption regimen for managing remedies**

Different categories of the abovementioned remedies were used at different stages of wellness and illness. Participants had well-ordered consumption regimens for managing food, medicine, and supplements around bouts of illness. According to participants, different items should be consumed at different times depending on the condition of a person’s health, owing to their perceived efficiency and side effects. Figure 3 summarizes this regimen, which was described consistently across participants. Using the categories summarized in Figure 2, Figure 3 shows how the consumption of foods, medicines, and supplements changes over time. Each column represented



\* Adjusting the diet

\*\* Also called “food nourishment” by participants

\*\*\* Including TCM-based and non-TCM based

**Figure 3.** Consumption solutions for improving immunity taken by research participants during different stages of catching a cold/flu (Healthy condition = preventive stage; Anticipation of illness and Peak of illness = cure stages; Recover from illness = convalescent stage). \* Adjusting the diet\*\* Also called “food nourishment” by participants\*\*\* Including TCM-based and non-TCM based

a different stage of wellness or illness and the different products are listed down the left-hand side. The boxes are shaded to show whether participants indicated normal use compared to extra use or effort.

In [Figure 3](#), it can be seen that the methods for maintaining good overall health (first column) were essentially the same as the methods for recovering from acute health issues (last column). Foods (including non-TCM and TCM-based ones), supplements and TCM medical gel, were frequently utilized for improving immunity at these times. Therefore, all food-based products were applied at the preventative stage and the convalescent stage. Compared with the general use of TCM-based foods, TCM gel was perceived to be suitable only for the elderly. Generally speaking, all these four solutions were perceived to have low or no side-effects, meaning that it was possible to consume them on an ongoing long-term basis. TCM patent medicine and

Western medicine, were only taken when acute health issues had occurred. Due to the different expectation of efficiency and concerns of side effects, these two kinds of medicine were used at different stages of illness.

It was important to note that, when acute health issues occur, participants discontinued TCM-based foods (e.g. Ginseng tea and Sea Cucumber soup), TCM medical gel and supplements as they were concerned the ingredients in them could interfere with the effectiveness of Western medicine. However, non-TCM foods were perceived as being safe to consume during all stages and some particular items were taken in extra amounts for specific benefits, e.g. extra oranges or kiwifruit for obtaining large amounts of vitamin C. This approach highlights that non-TCM foods were perceived as being the safest option by participants.

In conclusion, all participants appeared to use a combination of methods to achieve their health-related goals, a point illustrated by the following participant. *“You can just never have too many things that are good for your health. (INV7, M).”* However, when participants chose certain foods, supplements and medicines, they were relying on a well-organized structure that linked the products to their health states. Different products were considered to be appropriate and effective at specific stages of wellness and illness. Participants stated that products should be used during certain stages but not at other stages to support good immunity. Using a product in the wrong stage of illness could even harm immunity.

### **Consumers' attitudes toward new functional food products with immune-related health claims**

#### **Knowledge of functional foods**

Very few participants had a clear idea of functional foods. However, after they were provided with an explanation and Yakult was discussed as an example of a probiotic drink they acknowledged that they were familiar with some products that could be considered functional foods, although they were not familiar with the term.

#### **Preferred format**

Participants were divided on whether they would prefer to consume a “functional product” as part of food or simply as a supplement. Participants with a food preference thought that having an extra benefit within a food would be convenient. *“We are having multiple supplements every day so we would just want it to be some into food. (FG4, F)”* *“It would be a happy process to take it and no burden. (FG4, M)”* Participants with a supplement preference thought that having to eat a fortified food on a regular basis to obtain a benefit could be a challenge. *“If you put it into a supplement, you know what you are taking and what the benefits are. If you put it in some kind of food, not every family member will eat it. (FG3, M)”* For those who would like food formats, they stated that they



would like to consume functional foods in a convenient and practical way, to fit in with their daily diet with a variety of formats including: meals (e.g. rice dinner + selenium), natural foods (e.g. eggs + calcium), beverages (e.g. juice + fiber), and snacks (e.g. cereal bars + protein).

### **Preferred ingredients**

Green, natural, and fresh ingredients were considered to be important. *“Natural, grain, that’s natural. Vegetables, fruits, yes, juice, that’s very natural. (FG1, F)”* *“We want something more natural. (FG1, M)”* *“I really trust organic or green, so that’s natural. (FG3, M)”* So too was the fact that the product contained no chemicals, no artificial additives or preservatives, no hormones, no GM material. *“You cannot tell me an ingredient I’ve never heard of or something chemical. Don’t tell me that. (FG4, F)”* *“Now, you say it’s genetically modified, sorry, no to that. (INV5, M).”* Natural or herbal extracts were considered favorably. *“It’s from some plants. Plant-based that’s going to help. If it’s high-tech or technical, I don’t trust them. (INV10, F).”* Taste was considered to be highly important for functional foods, as most participants were not willing to compromise taste for health benefits.

### **Preferred production process**

Participants believed that as China has had multiple food-based scandals in recent years, the production process must be evident to consumers. *“You’ll be able to track down the whole process. Like, a QR code, or barcode, you can scan it and you’ll be able to track down the whole manufacturing process, or better, you should invite us, like, if it’s a milk manufacturer, invite us to visit the farm, the factory, how they make all those. That would be more convincing. (FG1, M)”* Whilst this was not a ‘must have’, participants stated that they would like to know how any high-level technology used throughout the process aids with the quality of the product. Natural has to do with the product itself (whole food or recognizable as food) and the origin of the food (it clearly comes from a cow). However, participants did not seem to think that processing in itself made food not-natural and they wanted the processing to happen in high-tech facilities.

### **Preferred origin**

Participants thought that the origin of the food was of critical importance for the following reasons: (1) Being free of pollution, so that food ingredients could grow up under a good environment. *“No pollution there. New Zealand milk powder, Australian milk powder, they’re famous. (INV4, F);”* (2) Strict food standard and government supervision, with New Zealand coming top amongst countries discussed for this requirement in consumers’ mind-sets. *“Yes, if it’s milk, the best one is from New Zealand, Australia, they are the best. (FG2, M)”* *“Australia, New Zealand, yes, any kind of food, milk, bread, all would be okay.*



*They won't make false claims anyway. (FG2, F);* (3) the provision of authorized certificates was seen as being important as further evidence of the reliability of food products. Interestingly in addition to being from a global standard (FDA, EU, WHO, etc.), some participants also considered additional certification from the Chinese Government to be important. *"It should be certified. Not Chinese one, FDA would be good"* and *"If you're going to sell that in China, you need that Chinese certification too, otherwise you won't be able to see that in China. (FG3, M)"*

### **Preferred brands and manufacturers**

Participants stated that global well-known brands carried the most credibility. *"The brand should be a big brand. A global brand. Well-known. (INV12, M)"* *"Not a big brand? Oh, that's not going to work, not enough. I'm not going to accept it. For me, the brand is the top priority. We should know that brand. (FG2, M)"*

## **Discussion**

### **Poor immunity causes and effects**

The overall role of immunity in participants' daily health was widely confirmed and immune health was perceived as underpinning all aspects of everyday life, affecting both work and family life. This finding helps to explain why Chinese people have a preference for functional foods with health claims related to boosting immunities, as mentioned in the introduction (Section 1) and results (Section 3.1).

Chinese people are concerned about their overall health (and therefore immune health). Evidence for this is the popularity of the idea that *"I am under sub-health condition"*, which was initially a marketing term promoted by media reports (Bunkenborg, 2014). Proponents of the sub-health claim, state that only a minority of people can be said to be truly healthy and while another minority is ill, the majority of the world's population actually fall between these extremes (Bunkenborg, 2014). The results from the current study supports this idea. Although there were no clear indicators to clinically establish the existence of sub-health, participants believed that they were in this condition, which triggered them to take actions to improve their immunity.

There are multiple reasons to explain Chinese people's strong concern about their health. One possible reason is that many participants seem trapped in the inertia of their lives and find it difficult to make changes. For example, despite stating that an irregular lifestyle can cause gastrointestinal (GI) health issues and sleep problems, which can cause poor immunity, participants were rarely willing to change their lifestyle. It is hard for participants to make big changes to their lifestyle; therefore, many choose

relatively modest methods to improve their quality of life and enhance their immunity, such as consuming remedies or taking massages or cupping. This is consistent with people's accustomed understanding of life in developed areas of China, especially metropolises like Shanghai. According to a 2018 survey of the cost of city living, Shanghai and Beijing were, respectively, ranked the 7<sup>th</sup> and 9<sup>th</sup> most expensive places to live (Anon, 2019). The high living cost brings great stress on people's lives, making it difficult for people to reduce their heavy workloads. In 2018 a study reported that 81.9% Chinese employees believed that they were overworked and 80% of them had less than 5 hours per week for exercise (Han, 2018). In this context, people hope to use modest ways to improve their perceived poor immunity.

Another important reason for concerns around their health arises from the occurrence of episodes of severe and persistent smoggy weather in China in recent years. Previous research on Chinese people's perceptions about air pollution has identified that air pollution is considered a serious problem that affects their quality of life (Liu & Mu, 2016; Liu et al., 2016). It is therefore not surprising that the greatest perceived concern about air pollution was the risk that it was posing to their health, with 62% of 1050 Beijing residents agreeing or strongly agreeing with the statement "my health has been very much affected by air pollution" (Johnson, Mol, Zhang, & Yang, 2017). Chinese people in online discussions have also expressed concern about the impact of air pollution on immune health and the overall importance of the immune health on health in general (Cong, Bremer, & Miroso, 2019). These findings are in line with the current study, which found that air pollution was considered to be one of the most important causes of poor immunity.

Participants' attention to immune health was positively related to age. It was obvious that older people paid greater attention to their immune health. Reaching a certain age was the trigger that older participants used to take supplements or food nourishment aimed at improving their immunity, with many people stating "*everyone is eating this,*" highlighting the popularity of supplements and food nourishment within this age group. This finding is consistent with other research which found that age is positively associated with the behavior of seeking health benefits (Lalor, Madden, McKenzie, & Wall, 2011; Lynam, McKevitt, & Gibney, 2011). For example, in a study in Ireland it was reported that elderly participants were more likely to make specific purchases to maintain their health status, such as the purchase of dairy products claiming to help to boost their immune system (Lalor et al., 2011). Due to greater health awareness, younger participants also agreed that reaching a certain age, which was relatively younger than the senior group perceived, was a good reason to pay attention to immune health. For example, they may start to increase their intake of fruits and vegetables. However, for younger participants, a common reason for taking supplements was to combat a perceived deficiency, such as taking multivitamin tablets to

help improve a low vitamin intake caused by an irregular diet or being a picky eater, or owing to their genetic makeup.

### **Current remedies to help improve their immune health**

Immunity status was believed to be able to be changed through eating appropriate foods. There was a very structured understanding of the interactions between diet and wellness, which meant products were used during specific stages of wellness to support immunity. Remedies for preventing illness or at the convalescent stage, were normally used over a long-term basis, such as adjusted dietary intake of non-TCM foods (e.g. eating fruits, vegetables, and yogurt); TCM-based food nourishments (e.g. ginseng tea and sea cucumber soup) and immune-boosting supplements (e.g. protein powder, vitamins, fish oil). However, when acute health issues occurred, only non-TCM foods were continued to be consumed by the participants, with the consumption of both supplements and TCM-based foods being suspended. This finding differs from that of Barnes *et al.* who stated that participants from an Australia university continued to take dietary supplements (e.g. vitamin C, fish oil, and herbal supplements) during illness or injury to alleviate symptoms (Barnes, Ball, Desbrow, Alsharairi, & Ahmed, 2016).

There are currently very few commercially available processed and pre-packed (e.g. beverages and snacks) foods that consumers eat to enhance their immunity. Although home-made TCM-based food nourishments were commonly consumed, participants complained that their preparation was “*less convenient*” than store-bought ready to eat foods. Chinese consumers stated that the most important advantages of new functional foods were that they would be easy, practical, and quick to consume. These advantages largely relate to Chinese people’s high-pace lifestyles. A previous study in Belgium showed that working households were less likely to spend time on cooking than non-working households (Daniels & Glorieux, 2015), a finding which is likely to reflect the situation in China. Owing to China’s rapid socioeconomic development, people’s eating patterns have been fundamentally changed (Yu, Veeck, & Yu, 2015). In many Chinese cities, especially a metropolis such as Shanghai, people have become accustomed to working or studying for many hours a day (Han, 2018). Busier schedules for adults and school children means that family members are more likely to reduce the time they spend cooking and choose less time-consuming food options (Veeck, Yu, Yu, Veeck, & Gentry, 2014), such as patronizing fast food restaurants, choosing processed food products or eating snacks (Yu *et al.*, 2015).

The current study showed that TCM treatment thinking profoundly influences Chinese people’s actions. The long-standing use of TCM in China has embedded the belief that food and medicine come from the same source and both are of equal importance in preventing and treating disease (Weng & Chen, 1996). In the current study all participants had used TCM at some

stage for healing chronic disease or for health maintenance. The popularity of TCM-based foods and TCM-based supplements was further evidence of the widespread acceptance of TCM.

### ***Attitudes toward new functional food products with immune-related health claims***

It is apparent that poor immune health was perceived to occur owing to a number of reasons, for example, an irregular lifestyle, polluted air and increased age. Previous literature has reported that consumers do not always make direct connections between such concerns and the foods that they eat. For example, foods were not perceived as being able to combat air pollution directly as people could not envisage food being able to help remove particulate pollutants from their lungs (Cong, Miroso, Kaye-Blake, & Bremer, 2019). With the now-expanded understanding of immunity (including definitions and perceived causes/effects) that this study provides, it becomes more obvious that there are possible links to be made between perceived causes of poor immunity and functional food solutions. For example, rather than selling a product that combats air pollution (which consumers would find hard to believe), a claim of “improving immunity” would be more meaningful.

Owing to numerous highly publicized scandals in the Chinese food industry, food safety is a significant concern for Chinese consumers. Thus, in line with previous research, Chinese consumers held positive attitudes toward food products designed to be safe (Liu, Pieniak, & Verbeke, 2013). This was showed in the current study as participants’ had a preference for natural/organic ingredients, products being additive/preservatives free, being produced in the transparent and traceable production process, and very importantly, there was a clear preference for products from countries with clean environments, strict legislative systems, and authorized certifications. This finding is similar to an earlier study which reported that Chinese consumers were more willing to choose organic products from developed countries, because food safety was the most important reason for Chinese consumers to buy organic foods and they had more confidence in the production standards from these countries than in China (Pedersen, Aschemann-Witzel, & Thøgersen, 2018).

### **Conclusions and practical implications**

This study revealed that there is strong potential for the increased use of functional foods to address Chinese consumers’ life concerns and demands, such as combating the effects of air pollution, mitigating the impacts of an irregular lifestyle, or helping with immune health issues caused by age, with the remedy form differing according to the timing/stage of development, and

the severity of the illness. Understanding this connection will obviously aid with positioning and promoting future products. Chinese consumers distinguished between food and supplements based on the product format, with TCM-based foods and supplements being best suited to preventive and convalescent stages of health, while non-TCM foods were believed to be the safest solution to be applied in all stages of illness. Communicating how and when these foods should be consumed will help consumers understand how this new category of food fits into their existing regiment. For example, a functional beverage that claims to improve immunity by enhancing sleep would best be positioned as a conventional food product (e.g. developing the functional ingredients to be safe for a drink even during illness, and displaying the product with other soft drinks in the supermarket). There appears to be many opportunities for functional food manufactures to better leverage the TCM effect by utilizing TCM elements, such as developing health claims conforming to TCM thinking, which will undoubtedly be beneficial for promoting immune-boosting functional food products in China.

Attitudes to functional foods were on the whole positive. There appear to be market segments who prefer the format of new 'functional' remedies (i.e. a food versus a supplement). Consumers' attention to food safety suggested that producers should use multiple methods to communicate the safety of their products to consumers, such as processing products in countries perceived as having clean environments, strict legislative systems and authorized certifications, utilizing natural ingredients rather than synthetic ones, and using traceable production process. Given the low number of participants in the current study, it is difficult to draw many conclusions, except that people did have preferences and could explain them. However, compared with the mature market for immune-boosting supplements, there are very few functional foods available in a processed, pre-packed formats available in the market, which can boost consumers' immunity on a long-term basis, a shortage which suggests that further commercialization of such foods is worthwhile.

This study provides a first attempt to describe the current 'landscape' of immune health, and in particular, the role of immune health-boosting functional foods, as perceived by Chinese consumers. While the qualitative nature of this study allowed for an in-depth understanding of consumers' perceptions, future studies should include quantitative methodologies, such as surveys, providing more generalizable data from a larger sample size. For example, a questionnaire could be used to investigate consumers' preferences of and willingness to pay for functional food products with specific attributes. Given the size of China, its cultural and linguistic differences and the geographical spread of the Chinese market, consumers in developed cities may well have differing perceptions on functional foods and air pollution. It will, therefore, be important to collect data from the metropolises in different

regions of the East, such as Beijing, Guangzhou and Shenzhen, to enable regional differences to be explored. Further research could also determine whether consumers in different age groups differ in their acceptance of function foods, or whether Chinese consumers with different household structures (e.g. couples having young children versus couples without children) differ in their attitudes toward immune-boosting functional foods.

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## ORCID

Lei Cong  <http://orcid.org/0000-0002-5430-7345>

Miranda Miroso  <http://orcid.org/0000-0002-4476-3793>

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