

The impact of culture, religion and traditional knowledge on food and nutrition security in developing countries

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Deliverable 2.4: Qualitative analysis of the determinants of food and nutrition security in developing countries using case studies

The past years have witnessed the emergence of a huge body of case studies and empirical literature investigating the long-term determinants of food and nutrition security. By now it is well established that factors such as income, food prices and education are major determinants of food and nutrition security (Pieters, Guariso, and Vandeplass 2013). Headey (2013) for instance empirically tests the correlation between different drivers and food security indicators in a cross-country analysis. The author finds that economic growth is a strong predictor of the level of food and nutrition security in a country, in addition to other factors such as the growth in food production, female secondary education and access to health services.

In our study of the long-term drivers of food and nutrition security we have not aimed to replicate the existing literature, but have chosen to focus on five important drivers that are still poorly understood: (1) political reforms; (2) trade reforms; (3) culture; (4) religion and (5) traditional knowledge.

Analysis of drivers of food and nutrition security - Summary

Driver	Methodology	Deliverable
Political reforms	Quantitative analysis	Deliverable 2.3
Trade reforms	Quantitative analysis	Ongoing
Culture	Qualitative analysis	Deliverable 2.4
Religion	Qualitative analysis	Deliverable 2.4
Traditional knowledge	Qualitative analysis	Deliverable 2.4

Deliverables 2.3 and 2.4 aim to address these gaps in the literature by examining the food and nutrition security impact of these five drivers. Deliverable 2.3 quantitatively analyzes the role of political and trade reforms by exploiting the availability of cross-country data. Deliverable 2.4 analyzes the role of culture, religion and traditional knowledge using a qualitative approach, as data availability for these variables is limited or lacking. Note that beyond new contributions to the literature, both deliverables confirm the importance of previously known drivers of food and nutrition security such as income, education and access to health services.

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Abstract

This paper reviews case study literature on the role of culture, religion and traditional knowledge as drivers of food and nutrition security in developing countries. Various channels of impact are discussed, paying particular attention to the channel of health seeking behaviour. We document how culture, religion and traditional knowledge shape local diets, food preferences, intra-household food distribution patterns, child feeding practices, food processing and preparation techniques and health and sanitation practices. Although these effects are inherently localized and context-specific, some common observations emerge from the literature. The knowledge embedded in traditional food systems and traditional medicine can contribute to the improvement of food and nutrition security and public health, but is currently under-researched and underutilized. Inconsistencies between local and biomedical views on food and health restrict the effectiveness of information campaigns and public health care services. Nevertheless, local beliefs and practices appear to be adaptive, accommodating biomedical food and health information and practices in certain cases. Overall, the literature indicates that culture, religion and traditional knowledge deserve a more prominent place in food and nutrition security research and policy making.

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1. Introduction

One of the main challenges in improving global food and nutrition security is understanding its drivers. Previous work within the EU FOODSECURE project has conceptually identified various determinants of food and nutrition security. Although most determinants have been extensively investigated in the empirical literature, some important gaps remain. One is the role of political institutions in food and nutrition security. Deliverable 2.3 of the FOODSECURE project has aimed to improve our understanding of the role of political institutions by analysing the impact of a political regime transition on food security.

This paper complements Deliverable 2.3 by addressing three other gaps in the literature: the impact of culture, religion and traditional knowledge on food and nutrition security. Culture, religion and traditional knowledge involve a variety of potential drivers of food and nutrition security. Beliefs and practices regarding what and how to eat (e.g. food taboos), how to manage pregnancy and delivery, how to feed children or how to treat illness are shaped by a society's cultural and religious belief system and the body of traditional knowledge embedded herein. We discuss various channels through which culture, religion and traditional knowledge affect food and nutrition security by reviewing qualitative and – if available – quantitative case study research.

Throughout the paper, we pay particular attention to the impact on health and health seeking behaviour, as food and health are intimately linked. Health is a major determinant of food and nutrition security as it affects one's ability to (i) engage in productive activities to obtain food and (ii) absorb and utilize the nutrients incorporated in this food. Moreover, the reduction of morbidity and mortality is one of the main goals of improving food and nutrition security. The definition of food and nutrition security used for the FOODSECURE project illustrates the close link between food and health: “food and nutrition security is achieved when all people, at all times,

have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (Pieters, Guariso, and Vandeplass 2013:4).

We find that culture, religion and traditional knowledge affect food and nutrition security by shaping a community’s diet, food preferences, intra-household food distribution patterns, child feeding practices, food processing and preparation techniques, health and sanitation practices, traditional medicine and the accessibility and use of biomedical public health services. The food and nutrition security impact of culture, religion and traditional knowledge is inherently localized. Certain beliefs and practices may be harmful for one community and beneficial for another, depending on the specific diet and the social, economic and ecological environment (e.g. labour division, local food availability).

Nevertheless, some general trends can be distinguished. Significant life events such as pregnancy and childbirth are generally characterized by numerous cultural or religious beliefs and practices regarding food and health. These beliefs and practices substantially affect health seeking behaviour and traditional medicine. The use of traditional health care remains widespread, both in rural and urban areas, and has important implications for the provision of public health care. The traditional knowledge embedded in traditional medicine and traditional food systems has the potential to contribute to the improvement of food and nutrition security and public health, but is currently under-researched and underutilized. Culture, religion and traditional knowledge may thus affect food and nutrition security and health in various ways, and deserve a more prominent place in research and policy design.

2. Culture, religion, traditional knowledge and food

Culture and religion are complex notions that have no universally accepted definition: “The concept of religion is like the concept of culture. It is easy to use in ordinary discourse, but difficult to define precisely” (Dow 2007:4). Nevertheless, scholars have proposed several working definitions for culture. We follow Matsumoto & Juang (2012: 15) and define human culture as “a unique meaning and information system, shared by a group and transmitted across generations, that allows the group to meet basic needs of survival, pursue happiness and well-being, and derive meaning from life.” This meaning and information system involves a body of shared knowledge and learned experience that includes beliefs, practices, norms and values, and is shaped by the social, economic and ecological environment of a group (Fieldhouse 1995; Matsumoto and Juang 2012). Social institutions (e.g. social norms) and gender constructs can be considered elements of culture. An important aspect of culture is transmission: culture will only persist if it is transmitted from generation to generation through a socialization process (Fieldhouse, 1995; Matsumoto and Juang 2012). Although respect for tradition plays an important role in the transmission process, culture is not a rigid system. Culture is continuously changing, adapting to altered circumstances and incorporating new information (Fieldhouse, 1995).

There is even greater disagreement regarding an appropriate definition of religion compared to culture, but of-recurring themes in proposed definitions are notions of sacredness, beliefs in unobservable beings and the relation between humanity and the supernatural or a higher order of existence (e.g. Dow 2007; Stark 2004).

Traditional knowledge² refers to the knowledge system of a certain society that is embedded in a society’s cultural and religious belief system and has been passed on from

² The terms ‘traditional’, ‘indigenous’ and ‘local’ knowledge are frequently used in the literature, each having its own imperfections (Mazzocchi 2006). For simplicity, we have decided to use the term ‘traditional’ throughout the

generation to generation. The building blocks of traditional knowledge are often long periods of empirical observation that are interpreted within the cultural and religious belief system (Mazzocchi 2006). Similar to culture and religion, traditional knowledge is adaptive and responds to interactions with the environment and with other information channels (e.g. other cultures) (Mazzocchi 2006).

As our discussion indicates, it is not straightforward to distinguish between culture, religion and traditional knowledge. Traditional knowledge undoubtedly forms an important part of culture and religion as both a driver and an outcome. Religion is seen by some as a “cultural system” (e.g. Geertz en Banton 1966) while others see clear differences (Bonney 2004). For simplicity, we refrain from making a conceptual distinction and provide an integrated discussion of culture, religion and traditional knowledge.

There is wide agreement that culture, religion and the embedded traditional knowledge are major determinants of what and how we eat (Atkins and Bowler 2001a; Counihan en Van Esterik 2013; Fieldhouse 1995; Kittler, Sucher, and Nelms 2011; Sabaté 2004). From an evolutionary perspective, the search for food has played a fundamental role in the evolution of human culture (Matsumoto and Juang 2012). However, the biological necessity of food has become secondary to the meaning that food has acquired in human culture and religion (McCann 2013). Food is loaded with symbolic value in all societies. It has become a means of communication, of creating, affirming and reinforcing social relations, of expressing one’s personal or group identity (e.g. ethnicity, class, gender) and of connecting to the living or ancestral peer group (Atkins and Bowler 2001a; Fieldhouse 1995; Mintz and Du Bois 2002). Most religions have dietary rules such as fasting periods and food taboos that convey religious identity and intensity (Sabaté 2004).

paper because it stresses the aspect of intergenerational transmission and the link with culture. In addition, it is the most commonly used term in the context of medicine and health care, which figure prominently in this paper.

However, the importance of dietary rules and the degree to which they are observed can vary considerably over time and across religious groups, often in response to a changing environment (Sabaté 2004).

Food habits share the adaptive nature of culture, religion and traditional knowledge: “Food habits ... whereas they are basically stable and predictable they are, paradoxically, at the same time undergoing constant and continuous change. Change occurs over time because of ecological and economic changes leading to altered availability, discovery or innovation of foods and diffusion or borrowing of food habits from others. ... Notwithstanding this, every culture resists change; food habits, though far from fixed, are also far from easy to change.” (Fieldhouse 1995:2).

The process of transformation and modernization of food habits and the cultural and religious value of food has been documented in the literature (Lentz 1999; McCann 2005; 2009; Warde 1997). McCann (2005) for instance discusses how maize shifted from an inferior ‘European food’ after its introduction in the 16th-17th century to one of the most important staple crops in Africa. Distinct preferences regarding maize emerged in many countries, and especially in Eastern Africa white maize is preferred over yellow maize.³ According to McCann (2005) this preference for white maize did not arise until the 1920s and 1930s and can be traced back to politico-economic changes that altered the cultural valuation of white and yellow maize. The rise of cassava as a replacement for indigenous crops such as sorghum and millet in Africa, despite initial ambivalent or even negative attitudes towards the crop, is another example of fundamental changes in the cultural valuation of food (Lentz 1999).

³ For the continent as a whole white maize makes up over 90 % of the total maize crop (McCann 2005).

3. Beliefs and practices regarding food and health

Most societies are characterized by an interwoven set of specific beliefs and practices related to food and health, “including ways that food (and individuals) can become polluted, food classification systems, local explanatory models of illness (where food is perceived either as a causal agent or as a treatment), and normative patterns of favoring/disfavoring household members based on their age and gender.” (Gittelsohn, Thapa, and Landman 1997: 1742).

In this section we discuss how such beliefs and practices may affect food and nutrition security and health. As reproductive women and infants are particularly vulnerable groups in terms of food and nutrition security, the impact of beliefs and practices related to pregnancy, childbirth and the postpartum period have received a prominent place in this discussion.

3.1. Dietary rules: food proscriptions

Dietary practices often take the form of rules stating which foods should not be eaten, i.e. food proscriptions or taboos.⁴ Food proscriptions are usually temporary and selective, but food taboos may have an absolute nature. Some well-known examples of absolute food taboos are religious taboos, such as the pork taboo among Muslims and the Hindu beef taboo.⁵ In various communities absolute food taboos apply to animals that carry a particular symbolic value, such as a totemic animal (e.g. Chowdhury et al. 2014; Gadegbeku et al. 2013; Kideghesho 2009; Martínez Pérez and Pascual García 2013; Meyer-Rochow 2009; Onuorah and Ayo 2003). Among some Nigerian tribes for instance, there is an absolute taboo regarding the killing and eating of animals that are believed to have aided the tribe in wars in the past (Meyer-Rochow 2009). Absolute food

⁴ E.g. Barennes et al. (2007): Laos; Ebomoyi (1988):Nigeria; Englberger, Marks, and Fitzgerald (2003): the Federated States of Micronesia; Marchant et al. (2002): Tanzania; Martínez Pérez and Pascual García (2013): The Gambia; Meyer-Rochow (2009): Piperata (2008): Brazil; Sein (2013): Myanmar; Whitehead (2000): Papua New Guinea.

⁵ See Harris (1985), Simoons (1994) or Counihan and Van Esterik (2013) for discussions regarding the historical origins of religious meat taboos.

taboos may also be explained by certain morphological characteristics (Meyer-Rochow 2009; Pezzuti et al. 2010; Seixas and Begossi 2001). Seixas and Begossi (2001) for instance find that the lizard is taboo among communities in South East Brazil because of its resemblance to an alligator or snake. Absolute taboos may also apply to animals that are deemed humanlike in nature or appearance, such as monkeys (Meyer-Rochow 2009; Seixas and Begossi 2001).

Temporary dietary rules apply during a certain life stage (e.g. childhood), state (e.g. pregnancy, illness) or at special events (e.g. circumcision, hunting, weddings). Martínez Pérez and Pascual García (2013) for instance find that among the Fullas in The Gambia, boys and girls should not eat certain foods such as pepper after circumcision because of the belief that eating pepper will result in pain during urination and slower recovery. Meyer-Rochow (2009) documents how men among the Kiriwina Islanders (Papua New Guinea) have to fast and drink large quantities of salt water before hunting (Meyer-Rochow 2009). Whitehead (2000) discusses selective food taboos in Papua New Guinea, where certain types of game meat are to be consumed by people of a certain age (children), social status (initiated men) and gender.

3.2. Dietary rules and the food-health nexus

Human societies have been relying on botanical medicine to deal with health problems long before recorded history (Tyler 2000), and each society is characterized by its own “culture of medicine” or ethnomedicine (Quinlan 2011:379). Ethnomedicine involves ethnophysiology – the way in which a society explains the human body and pathology – and the totality of knowledge, beliefs, practices and skills regarding the maintenance of health and the prevention, diagnosis, improvement and treatment of illness (WHO 2013). The term *traditional medicine* is often used to group together ethnomedicines that are different from the biomedical model of medicine used in most Western countries (Fabricant and Farnsworth 2001).

In most societies there is no clear distinction between food and medicine (Huffman 2001).⁶ In traditional medicine, components of the regular diet frequently have a therapeutic function as well. Food proscriptions and prescriptions are commonly used to prevent, treat and alleviate health problems and illnesses. Koo (1984) for instance finds that Chinese households in Hong Kong treat common symptoms and illnesses mostly through food prescriptions and proscriptions and proper timing and preparation of these foods. Odebiyi (1989) examines food taboos related to child and maternal health in Ile-Ife (Nigeria) and finds that food proscriptions and prescriptions are an integral part of beliefs regarding the causation and treatment of disease. Ma et al. (2000) describe how Chinese medicine has effectively used red yeast rice for centuries to improve blood circulation and lower cholesterol. Numerous other case studies document local plants and animals having both dietary and medicinal uses (e.g. Kunwar et al. 2012; Li et al. 2004; Seixas and Begossi 2001).

The importance of food in traditional medicine is explained by the fact that in nearly all ethnophysiologicals food and health are intimately related: food is often seen as a potential cause of or therapy for illness. In humoral theories of the body and pathology for instance, health is determined by a balance of opposing energies or elements (humours) and illness occurs when this balance is disrupted (Carmona et al. 2005; Patwardhan et al. 2005; Wiley 2002). Imbalances may be caused by metaphysical factors such as spiritual imbalance or physical factors such as food consumption.

Humoral views on health were integrated into local ethnophysiologicals around the world through historical interactions with the three great humoral traditions of the Greek, Chinese and Indian civilization (Foster 1987; Laderman 1987; Patwardhan et al. 2005).⁷ Through this process

⁶ Huffman (2001:652) gives the example of a Japanese saying “medicine and food are of the same origin”.

⁷ Arabic medicine for instance is strongly based on Greek humoral medicine, but has also been influenced by other traditions such as Ayurvedic and Persian medicine (Carmona et al. 2005). Some studies document that ethnophysiological beliefs similar to the Chinese, Greek and Ayurvedic humoral traditions pre-dated contact with

of cultural interaction, humoral theory gave rise to one of the most widespread ethnophysiological tenets across the globe: the hot-cold belief system.⁸ In this belief system, bodily states are classified as hot or cold, and excessive hotness or coldness is commonly believed to cause illness. Foods are classified as having a hot or cold nature as well. Overconsumption of certain foods may trigger excessive heat or cold and corresponding illness, which can in turn be treated by avoiding foods of the 'excessive' nature and consuming foods of the opposite nature (Gittelsohn, Thapa, and Landman 1997; Odebiyi 1989).

Pregnancy is commonly considered a hot state and the postpartum period a cold state (e.g. Goodburn, Gazi, and Chowdhury 1995; Kaewsarn, Moyle, and Creedy 2003; Levay et al. 2013; Raven et al. 2007; Radoff et al. 2013). Hence, pregnant and postpartum women often face a large number of food proscriptions and prescriptions based on the hot-cold belief. Often the consumption of certain foods is associated with a particular illness or health problem (e.g. Christian et al. 2006; Nag 1994; Liu, Petrini, and Maloni 2014; Onuorah and Ayo 2003). In parts of India it is believed that the consumption of papaya, a hot food, will cause abortion (Nag 1994). Rural women in Nepal believe that mangoes, a hot food, are good to eat during pregnancy in moderate quantities, but overconsumption of mangoes can cause abortion (Christian et al. 2006). This case illustrates a general observation: there is substantial variation in the classification of foods as hot or cold and in the perceived consequences of eating such foods between countries, regions, communities and even individuals (Christian et al. 2006; Community Studies Team and Chennamaneni 2007; Goodburn, Gazi, and Chowdhury 1995; Nag 1994; Piperata 2008; Sein

these cultures and hence originated independently (e.g. Messer 1987: Mesoamerican societies). Laderman (1987) notes that in the case of Malay humoral medicine, the Ayurvedic, Chinese and later Arabic humoral theories were easily adopted because of their congruency with pre-existing native views on health.

⁸ E.g. Ellis et al. 2007: Mali; Goldman, Pebley, and Gragnolati 2002: Guatemala; Kaewsarn, Moyle, and Creedy (2003): Thailand; Kim-Godwin (2003): cross-cultural; Levay et al. (2013): Bangladesh; Odebiyi 1989: Nigeria; Raven et al. (2007): China; Santos-Torres and Vásquez-Garibay 2003: Mexico; Sein (2013): Myanmar; Seixas and Begossi (2001): Brazil.

2013). One explanation for observed differences is religion. Goodburn, Gazi, and Chowdhury (1995) for instance find that in rural Bangladeshi communities the proscription to eat meat and fish after childbirth lasts one month for Hindu women and only seven days for Muslim women (see also Community Studies Team and Chennamaneni 2007).

Food and health are also strongly linked in ethnophysiology not based on the humoral tradition. In many societies, health and illness causation are explained by supernatural powers and relationships (Bessong 2008; Chapman 2006; Goodburn, Gazi, and Chowdhury 1995; Green and Makhubu 1984; Liddell, Barrett, and Bydowell 2005; Odebiyi 1989; Omonzejele 2008). Kale (1995:1182) describes the essence of the ethnophysiology found in several black South-African ethnicities: “Disease is a supernatural phenomenon governed by a hierarchy of vital powers. [...] These powers can interact, and they can reduce or enhance the power of a person. Disharmony in these vital powers can cause illness. Thus, ancestral spirits can make a person ill.” Omonzejele (2008) similarly stresses the importance of a spiritual equilibrium between the living and ancestral spirits in the Nigerian view on health: ancestors protect the living and thus need to be kept healthy, for instance through the offering of meals and traditional drinks. Numerous societies share the belief that evil spirits, witchcraft and the evil eye can cause illness (e.g. malaria) or other problems (e.g. miscarriage).⁹ Abubakar et al. (2011) for instance find that women in rural Kenya sometimes attribute severe malnutrition of their children to witchcraft.

The equilibrium between the living and the spiritual world can be disrupted when deities and ancestral spirits are offended, for instance by violating taboos. In Sub-Saharan countries it is

⁹ See for example Adams et al. 2005: Tibet; Arps (2009): Honduras; Beiersmann et al. (2007): Burkina Faso; Boatbil, Guure, and Ayoung (2014): Ghana; Chapman (2006): Mozambique; Choudhury and Ahmed (2011): Bangladesh; Comoro et al. (2003): Tanzania; Ellis et al. (2007): Mali; Englberger, Marks, and Fitzgerald (2003): Federated States of Micronesia; Goldman, Pebley, and Gagnolati (2002): Guatemala; Maslove et al. (2009): Africa; Obermeyer (2000): Morocco; O’zsoy and Katabi (2008): Iran-Turkey.

commonly believed that sexually transmitted diseases (STD's) or complications during childbirth are the result of the violation of (food) taboos (e.g. King 2000; Maimbolwa et al. 2003). Odebiyi (1989) finds that traditional Yoruba healers in Nigeria often interpret the occurrence or persistence of illness as a punishment for the violation of food taboos. Most healers would advise the client to avoid eating foods associated with the angered deity so as to avoid further offense. Rural Bangladeshi women believe that “pregnant women should not eat during the evening or on a moonless night, because doing so upsets Rahu (a Hindu god).” (Goodburn, Gazi, and Chowdhury 1995:24). Women of the Talensis from northern Ghana believe that child malnutrition can be caused by offending the Togib deity, for instance when the child eats dry flour or meat sacrificed to the deity (Boatbil, Guure, and Ayoung 2014). If the cause is the offense of the deity, a traditional healer is consulted to find out how the offended deity can be pacified.

Ethnophysiology may also involve a direct causal link between the consumption of certain foods and the occurrence of diseases or other health problems, without reference to supernatural powers (e.g. Ellis et al. 2007; Liamputtong et al. 2005; Martínez Pérez and Pascual García 2013; Meyer-Rochow 2009; Onuorah and Ayo 2003). Associations between certain foods and diseases are often explained by categorizing foods as strong and weak, or digestible and indigestible (e.g. Chowdhury, Helman, and Greenhalgh 2000; Gittelsohn, Thapa, and Landman 1997; Seixas and Begossi 2001). In other cases the causal mechanism may be unclear or unspecified, as is the case for the belief among the Fulla in The Gambia that eating pork or lizard will cause skin disease (Martínez Pérez and Pascual García 2013).

Cultural or religious dietary practices are frequently observed because of a belief that non-observance will cause physical or mental illness, slow down recovery from illness, lead to malformations or result in unfavourable characteristics such as stuttering or baldness (e.g. Odebiyi

1989). These fears are especially prevalent during the reproduction cycle: in many societies mothers fear that non-observance of dietary and health practices during pregnancy will lead to miscarriage, malformation of the baby or illness of the mother or baby (e.g. Lee et al. 2009). One common belief is that infants will acquire the characteristics of the proscribed animal or plant when it is eaten by the mother during pregnancy (e.g. Englberger, Marks, and Fitzgerald 2003; Liamputtong et al. 2005; Maimbolwa et al. 2003; Martínez Pérez and Pascual García 2013; Onuorah and Ayo 2003; Piperata 2008).

3.3. The impact of dietary rules on food and nutrition security and health

Cultural or religious dietary rules may affect food and nutrition security and health by affecting the quantities of food consumed, dietary diversity and the intake of nutrient-rich foods. Gender is an important factor in this context, as men and women tend to face different dietary rules and practices (e.g. Meyer-Rochow 2009). Some studies have argued that food restrictions may undermine the food and nutrition security of women and children in particular by preventing them from consuming nutrient-rich foods (Community Studies Team and Chennamaneni 2007; Gadegbeku et al. 2013; Martínez Pérez and Pascual García 2013; Nwajiuba and Okechukwu 2008; Onuorah and Ayo 2003).¹⁰

Gender may also matter in social norms regarding intra-household food distribution. Several studies document that women are expected to give preference to their husbands in the distribution of the quantity and/or quality of food (e.g. Community Studies Team and Chennamaneni 2007; Ene-Obong, Enugu, and Uwaegbute 2001; Gittelsohn, Thapa, and Landman

¹⁰ The impact of dietary rules during and after pregnancy on food and nutrition security and health of women and children is discussed in more detail in the next section.

1997; Martínez Pérez and Pascual García 2013; Nag 1994; Miller 1997).¹¹ Gittelsohn, Thapa, and Landman (1997) find that the relation between caloric intake and sufficient micronutrient intake is found to be weaker for adolescent girls and adult women. The authors explain this gender difference by dietary beliefs and practices during menstruation, pregnancy and lactation, and by the intra-household allocation of food in these communities. “While staple food items (i.e. rice, lentil soup, bread, etc.) are distributed fairly equally, side dishes usually containing more micronutrients (i.e. vegetables, meat, yogurt, *ghee*, etc.) are often preferentially allocated to valued household members, including adult males and small children (of both sexes).” (Gittelsohn, Thapa, and Landman 1997:1748).

Cultural or religious dietary practices may also positively affect food and nutrition security and health. Several scholars have argued that food proscriptions contribute to biodiversity and resource conservation, for instance by protecting certain species or areas from overexploitation.¹² Food proscriptions may also protect the community from health hazards (Meyer-Rochow 2009). Protection can occur indirectly: by tabooing vulnerable or rare animals and plants that are used in local medicine, the species is sure to remain available for medicinal purposes (Seixas and Begossi 2001). Taboos may also serve to protect human health directly. Anthropological studies have argued that food taboos regarding animals that have died from sickness may serve to prevent diseases from spreading to humans (e.g. Trant 1954). Taboos may also prevent people from eating poisonous or otherwise potentially dangerous animals (e.g. Begossi, Hanazaki, and Ramos 2004; Meyer-Rochow 2009; Seixas and Begossi 2001; Henrich and Henrich 2010; Kaewsarn, Moyle, and Creedy 2003). Henrich and Henrich (2010) provide quantitative evidence for this hypothesis.

¹¹ According to Community Studies Team and Chennamaneni (2007), women living in low-income communities in Hyderabad (Pakistan) are the last ones to eat even when they are pregnant.

¹² See for instance Cinner (2007); Colding and Folke (1997); Colding and Folke (2001); Dudley, Higgins-Zogib, and Mansourian (2009); Jones, Andriamarivololona, and Hockley (2008); Lohani 2010).

The authors show that temporary food taboos for pregnant or lactating women in Fiji apply to a select number of marine species that are likely to be most toxic, and that adherence to these taboos decreases the probability of fish poisoning by 30 percent during pregnancy and 60 percent during lactation.

3.4. Beliefs and practices related to pregnancy, childbirth and the postpartum period

In most cultures women and children are considered to be particularly vulnerable during pregnancy, childbirth and the postpartum period (Piperata 2008). These stages are therefore frequently characterized by various beliefs and practices designed to protect the physical and spiritual health of the mother and infant, by determining amongst others when, what and how the mother and infant eat and when what type of health care is needed.¹³

The implications of such cultural or religious beliefs and practices for the food and nutrition security and health of women and children can be substantial. The problem of malnutrition is particularly pressing during pregnancy and lactation, when energy and nutrition needs are higher (Levay et al. 2013; Piperata 2008). In addition, the nutrition and health status of a child are strongly dependent on the nutrition and health status of the mother before, during, and after pregnancy. “Maternal malnutrition has been linked to low birth weight, which in turn results in high infant morbidity and mortality. [...] [F]etal malnutrition harms health status in later life, and in fact predisposes one to increased incidence of non-communicable diseases.” (Oniang and Mukudi 2002:1-2). According to the World Health Organization (WHO 2010), inadequate postpartum care

¹³ E.g. Adams e.a. (2005): Tibet (China); Arps (2009): Honduras; Barennes et al. (2007): Laos; Berry (2006): Guatemala; Chapman (2006): Mozambique; Choudhury and Ahmed (2011): Bangladesh; Iliyasu et al. (2006): Nigeria; Lori and Boyle (2011): Liberia; Maimbolwa et al. (2003): Zambia; Obermeyer (2000): Morocco; O’zsoy and Katabi (2008): Turkey-Iran; Piperata (2008): Brazil; Santos-Torres and Vásquez-Garibay 2003: Mexico.

remains prevalent in some regions, contributing significantly to high mother and infant morbidity and mortality rates.

Beliefs and practices regarding pregnancy, childbirth and the postpartum period are highly culture-specific. “What constitutes appropriate management of pregnancy varies cross-culturally, from numerous mandates for behavioural change and a long list of taboos to minor modifications of pregnant women’s diet or activity patterns (Wiley 2002: 1089). Nevertheless, some general trends can be identified. Attacks from evil spirits, witchcraft and the evil eye are greatly feared during pregnancy in many societies (e.g. Maimbolwa et al. 2003). Many women prefer to deliver at home “in the care of unskilled birth attendants who nevertheless understand the norms and practices associated with childbearing in their culture” (Lori and Boyle 2011: 456). Postpartum beliefs and practices are commonly characterized by seclusion and dietary and work restrictions, which aim to protect the mother and newborn and allow the mother to recuperate from childbirth (Kim-Godwin 2003).

3.4.1. Dietary rules for pregnant and postpartum women

In some societies women face various food proscriptions during pregnancy (e.g. Choudhury and Ahmed 2011; Ebomoyi 1988; Englberger, Marks, and Fitzgerald 2003; Liamputtong et al. 2005; Maimbolwa et al. 2003; Martínez Pérez and Pascual García 2013; Sein 2013), while in others there are few or none (e.g. Adams et al. 2005; Christian et al. 2006; Wilson 1973). The postpartum period in contrast seems to be generally characterized by food proscriptions and prescriptions (e.g. Iliyasu et al. 2006; Kim-Godwin 2003; Lundberg and Thu 2011; Piperata 2008; Raven et al. 2007).

A common dietary practice during pregnancy is so-called ‘eating down’: women eat less because of the belief that plentiful eating will result in a large infant and cause difficulties during

childbirth, or because they believe that food takes up space from the baby (e.g. Nag 1994; Nichter and Nichter 1983). Given the increased energy and nutrition needs during pregnancy, eating down is likely to undermine the food and nutrition security status of the mother and foetus. Although the underlying ethnophysiological beliefs are documented to be widespread in South-Asia (Nag 1994), Christian et al. (2006) find that these beliefs do not necessarily translate into the practice of eating down. The authors show that the practice of eating down is uncommon among women in rural Nepal, even though women share the belief that the baby shares space with food in the mother's body. Most women in fact maintain that the diet is not restricted during pregnancy and that a pregnant woman is encouraged to eat nutritious foods such as fruits, vegetables, dairy products, meat and fish.

Some studies conclude that food proscriptions during pregnancy and the postpartum period (and possibly menstruation) may contribute to malnutrition of women and children (Gittelsohn, Thapa, and Landman 1997; Lee et al. 2009; Marchant et al. 2002; Martínez Pérez and Pascual García 2013; Santos-Torres and Vásquez-Garibay 2003). Other studies argue that the impact of dietary rules is limited, because many of the proscribed foods are not commonly available or affordable, are substituted by other foods, are rarely included in the regular diet or are proscribed for a limited period of time only (Ene-Obong, Enugu, and Uwaegbute 2001; Goodburn, Gazi, and Chowdhury 1995; Kikafunda et al. 1998; Levay et al. 2013; Piperata 2008). Choudhury and Ahmed (2011) for instance report that women identified cultural food restrictions during pregnancy as a reason for decreased protein intake, but also point out that the proscribed foods would not be available to these women in the absence of such restrictions. Various studies therefore conclude that endemic food shortages – due to for instance agricultural seasonality – and income constraints are likely to have a larger impact on mother and child nutrition than cultural/religious

dietary rules and practices. Yet other studies find that food restrictions have a limited impact on food and nutrient intake because women do not observe the restrictions (e.g. Ene-Obong, Enugu, and Uwaegbute 2001; Huybregts et al. 2009; Levay et al. 2013). In some cases respondents report few food proscriptions for pregnant and postpartum women and prescriptions that improve nutrition, such as the recommendation to eat meat, fish, fruits, vegetables or dairy products (Adams et al. 2005; Christian et al. 2006; Ebomoyi 1988; Kaewsarn, Moyle, and Creedy 2003; Wiley 2002). However, poverty is often identified as a barrier to following these beneficial prescriptions (e.g. Adams et al. 2005; Christian et al. 2006; Liamputtong et al. 2005).

It may not always be straightforward to evaluate the impact of cultural dietary rules on food and nutrition intakes. Dietary rules are often interwoven with other beliefs and practices that may simultaneously affect the diet through other channels. Piperata (2008) provides an illustrative example of such interactions. The author quantitatively examines the food and nutrition intake of postpartum women in the eastern Amazon in Brazil. She finds that adherence to the traditional dietary and behavioural restrictions of the postpartum period (*resguardo*) is very high. Both energy expenditure and energy intake are lower during the *resguardo*, but protein intake is close to protein needs and thus higher than usual. Dietary restrictions only minimally contribute to the lower energy intake: most tabooed foods are rarely included (and some never) in the usual diet and the most important sources of calories are not taboo. The main cause of lower energy intake is work restrictions, which keep women from their usual subsistence food production and processing tasks (e.g. manioc processing). As men do not take over these tasks, possibly due to the strong gender division of labour in this community, the availability of important energy sources in the household is generally lower during *resguardo*. In consequence, the energy intake of women in *resguardo* is lower as well. The sufficient protein intake is likely due to the social norm that husbands are

expected to provide their wives in resguardo with sufficient proteins. This may also contribute to the fact that husbands do not engage in food producing and processing activities usually performed by their wives, but allocate their time to hunting and fishing activities. Given these findings, Piperata (2008) stresses the importance of not considering cultural dietary rules in isolation. She suggests to take a more holistic approach and look at the entire set of beliefs and practices when evaluating the harm or benefits of postpartum practices.

3.4.2. Child feeding beliefs and practices

The cultural management of the postpartum period generally involves beliefs and practices regarding breastfeeding and supplementary feeding of the newborn. These practices are of particular importance to the short-term and long-term food and nutrition security of the child. The scientifically advised recommendation is to exclusively breastfeed infants for the first 6 months after birth, and to supplement breastfeeding afterwards for up to two years with safe and nutritious complementary foods (WHO and UNICEF 2003).¹⁴ Another recommendation is to initiate breastfeeding within an hour after birth, which ensures that the newborn is fed colostrum (Semega-Janneh et al. 2001). Colostrum is packed with micronutrients and antibodies and provides some vital health benefits to the newborn (Uruakpa, Ismond, and Akobundu 2002).

In many societies breastfeeding is considered as incomplete feeding, and it is believed that the child needs supplementary solid food or liquids to quench its thirst and develop properly (e.g. Bezner Kerr et al. 2008; Englberger, Marks, and Fitzgerald 2003; Kakute et al. 2005; Santos-Torres and Vásquez-Garibay 2003; Semega-Janneh et al. 2001). Women in rural Cameroon reported additional reasons for early food supplementation (Kakute et al. 2005). First, they felt

¹⁴ When the mother is HIV positive, the optimal feeding strategy is more complex because of the risk of transmission to the infant, although the benefits of breastfeeding may outweigh the risk of transmission. Some recent evidence indicates that the risk of transmission may even be lower with exclusive breastfeeding (Bezner Kerr et al. 2008).

pressured by elders to obey this traditional practice and did not want to create conflicts. Second, the women insisted that all family members should receive part of the highly valued family farm produce, including newborns. Third, they were not allowed sexual contact during breastfeeding. Adams et al. (2005) report that newborns in rural Tibet are fed butter to affirm the bond with the household and provide spiritual protection.

The early termination of breastfeeding is not always related to cultural beliefs and practices, but may be driven by socio-economic circumstances. Some studies report that women are unable to continue breastfeeding because they are forced to continue working on the family farm or engage in paid labour outside the house (e.g. Community Studies Team and Chennamaneni 2007; Kakute et al. 2005; Semega-Janneh et al. 2001). A new pregnancy may also be a reason for the early termination of breastfeeding (Community Studies Team and Chennamaneni 2007). Semega-Janneh et al. (2001) report that in rural Gambia breastfeeding can be terminated early because of a switch to bottle feeding. The authors find that both men and women showed substantial support for bottle feeding, considering it part of the modernization process.

Other common practices related to child feeding are the discarding of colostrum because it is considered impure or unhealthy and delaying the first breastfeeding for a few hours or even days (Aubel, Touré, and Diagne 2004; Englberger, Marks, and Fitzgerald 2003; Kakute et al. 2005; Martínez Pérez and Pascual García 2013; Semega-Janneh et al. 2001). Even when the colostrum is not discarded, the infant may be fed something else immediately after birth (Geçkil, Şahin, and Ege 2009).

The early termination of breastfeeding or early supplementation with food and water has important nutrition and health implications. A reduced intake of breast milk decreases the absorption of essential micronutrients and antibodies and increase the incidence of diseases due to

bacterial infection (e.g. diarrhoea) or malnutrition (e.g. beriberi) (Barenes et al. 2007; Fouts and Brookshire 2009). Barenes et al. (2007) for instance find that in Laos the traditional practice of early supplementary rice feeding is associated with stunting. When supplementary food at a young age consists of unclean water or is otherwise contaminated, the risk of bacterial infections and disease increases considerably as well. Discarding the colostrum implies that the infant is denied micronutrients and immunization and growth components that are essential for its physical and cognitive development.

3.4.3. Symbolism and supernatural beliefs

Concrete beliefs and practices regarding pregnancy, childbirth and the postpartum period are incorporated into a broader culture-specific knowledge and belief system. This system is frequently characterized by mystic supernatural beliefs and symbolism, especially during significant life events such as pregnancy and childbirth. As Lefkarites (1992:385; cited in Liamputtong et al. 2005) writes about childbirth: “Childbirth is a significant human experience, its social meaning shaped by the culture in which birthing women live. Cultures throughout the world express the meaning of childbirth through different beliefs, customs and practices. These diverse cultural interpretations are part of a larger integrated system of beliefs concerning men, women, family, community, nature, religion, and supernatural powers.”

In many cultures in South Asia, North Africa and the Middle East (e.g. Morocco and Egypt), blood for instance carries a heavy symbolic meaning (Obermeyer 2000). In Morocco, the blood from childbirth is believed to be exceptionally powerful and may be used for sorcery. Therefore only a highly trusted person receives the responsibility of dealing with blood from delivery. Women who could not find a trustworthy person reported to prefer giving birth in a

hospital as they did not fear the use of witchcraft by the medical personnel. Hence, this belief in the power of blood may positively affect the probability of giving birth in a hospital.

In several South- and South-East-Asian countries blood and death are considered polluting (Adams et al. 2005; Kaewsarn, Moyle, and Creedy 2003). In rural Tibet women believe that one can become spiritually polluted by coming in contact with polluted objects or persons. Blood and death are polluted, as well as people who frequently come into contact with this (midwives and doctors). The blood of childbirth is also considered to be polluting, and women therefore often give birth in animal sheds outside the house to protect the house and family members from pollution. This increases the risk of infections and can hamper access to heat and boiled water. For the same reasons, women are reluctant to let others help with delivery as they might become polluted as well (Adams et al. 2005).

In several societies women conceal their pregnancy and childbirth for fear of attracting attacks from spirits, witchcraft or the evil eye (Adams et al. 2005; Arps 2009; Ayaz and Yaman Efe 2008; Chapman 2006; Lori and Boyle 2011; Wiley 2002). Wiley (2002) for instance suggests that young women in Ladakh (India) may be unable to eat more and more nutritious foods during pregnancy because they cannot ask for extra food without drawing attention to the pregnancy and attracting the greatly feared evil eye. Arps (2009) mentions the belief in supernatural causes of disease as one of the reasons why Miskito women in Honduras prefer to give birth at home. At home they have multiple medical services at their disposal, as traditional midwives tend to have knowledge of traditional medicine, which can treat supernatural causes of illness, and rudimentary knowledge of biomedical health care, which the women believe can cure disease of natural causes. In contrast, at formal medical institutions such as hospitals the only option available to women is biomedical health care, which women believe cannot treat illness caused by supernatural forces

and thus constitutes a significant risk (see also Chapman 2006). Fear of attacks from spirits and demons may also prevent women from travelling to formal health care services, even when complications arise during pregnancy and delivery (e.g. Adams et al. 2005).

Some protective measures against witchcraft or the evil eye are inconsequential in the context of health care seeking. O'zsoy and Katabi (2008) report how in Turkey and Iran, even though many traditional practices have been abandoned, over 90 % of women (of about 140 interviewed) used traditional practices such as wearing blue beads or keeping the Koran inside the room to protect themselves and their child from the evil eye.

3.4.4. Individual variation in beliefs and practices

Several studies show individual variation in adherence to specific restrictions and rules and the duration of certain practices (e.g. Adams et al. 2005; Goodburn, Gazi, and Chowdhury 1995; Kaewsarn, Moyle, and Creedy 2003; Laderman 1987; Liamputtong et al. (2005); Sein 2013). Often this individual variation is related to the socio-economic situation of the women and the extent of support and help she can rely on (Liamputtong et al. 2005; Obermeyer 2000). Liamputtong et al. (2005) in particular discusses how women seemed to attempt to find a balance between practicality and daily living conditions on the one hand and respecting tradition and the advice of elders on the other hand; for some women certain practices were impossible to follow because they could not rely on a social network for help. Other women seemed not to follow certain practices because they deemed them to be impractical or did not believe in the benefits. Not sharing the underlying beliefs about the benefits and harms of certain practices and rules is a second common reason for individual variation in adherence to cultural/religious practices. Meyer-Rochow (2009) gives the example of the Lese women of the Ituri forest in Africa, who secretly violate dietary restrictions

during pregnancy or eat other foods that supposedly counteract the negative consequences of eating the prohibited foods.

Lee et al. (2009) find a preferential adherence to the traditional practices of *yuo yuezi* among Chinese women living in Hong Kong. The majority of women continue to observe certain traditional antenatal practices such as avoiding to eat snake and drinking medicinal herbal tea (over 90 %), or avoiding to jump, move heavy objects and wear high-heeled shoes (over 80 %). However, other traditional practices such as avoiding to eat turnip and lettuce and certain behavioural restrictions were not followed by the majority of women, even though the observed and non-observed restrictions are founded on the same beliefs. The authors report that it is unclear why certain practices are observed and others not, but point out that it is of interest to investigate this phenomenon of preferential observance of cultural practices. They suggest a possible explanation for the continued observance of certain practices: women may value the rest, social support and protection offered by certain practices (e.g. restrictions on heavy work) that are built on the premise that women are vulnerable after pregnancy. Piperata (2008) supports this argument: she finds that women in the Amazon (Brazil) value the cultural postpartum practice of *resguardo* because of the social support, the official recognition of their new status as a mother, the rest, the exemption of household duties and work and, importantly, the fact that the *resguardo* gives them more time to care for the newborn and establish a mother-child bond (see also Barennes et al. (2007)). Another possibility is that contemporary women deem certain traditional practices such as avoiding nutritious foods (turnip, lettuce) as useless or unfavourable and decide not to observe these practices, while other practices may still be considered useful or favourable.

3.4.5. Rural versus urban areas

Although more prevalent and more powerful in rural areas, traditional cultural/religious beliefs and practices relating to pregnancy and the postpartum period are found to be observed by women in urban communities (Barenes et al. 2007; Lee et al. 2009; Raven et al. 2007; Santos-Torres and Vásquez-Garibay 2003). Nevertheless, some studies also document limited adherence to cultural/religious food restrictions in urban settings. Levay et al. (2013) for instance find that women living in an urban slum in Dhaka, Bangladesh had accurate biomedical knowledge of what to eat during pregnancy, and this knowledge was received from both health care workers and elders. The women were aware of food taboos but none of them reported to adhere to them, (except for one).¹⁵ Gadegbeku et al. (2013) find that 60 % of 200 interviewed male adults living in Accra, Ghana was aware of the existence of food taboos, but only 37 % shared the underlying beliefs and adhered to the taboos.

Another relevant question in this regard is whether migrants continue to adhere to cultural/religious beliefs and practices. Chowdhury, Helman, and Greenhalgh (2000) examine food beliefs and eating habits among 40 first-generation Bangladeshi migrants living in Great Britain. The authors find that individual food choices are in large part determined by economic factors such as the availability and affordability of food items, and by culture. The main cultural determinants of the diet are religious restrictions on food such as the Islamic pork taboo and regional or ethnic food habits. Food choices are further determined by the notions of strong and weak foods and digestible and indigestible foods, a classification occasionally used in South-Asian countries. The diet of migrants generally did not shift to British or ‘Western’ foods but included more high-end Bangladeshi foods such as meat and traditional sweets. Atkin (2013) argues that

¹⁵ The authors point out the possibility that these women were unwilling to talk about traditional practices for fear of judgement by the surveyors.

interstate Indian migrants stick to the food habits of their state of origin, even when these habits result in a lower caloric intake.

4. Adaptability and integration

Cultural or religious beliefs and practices regarding food and health may be consistent or inconsistent with biomedical recommendations. Maslove et al. (2009) for instance document beliefs in Sub-Saharan Africa about malaria being caused by excessive heat, wind or cold, eating certain foods and drinking dirty water. Incorrect information about the causes of malaria will likely result in ineffective prevention measures (Maslove et al. 2009). An incorrect view of the human body may lead to ineffective or even counterproductive action. A previously discussed example is the practice of eating down to give space to the baby or limit the size of the baby. However, incorrect information regarding the human body does not necessarily translate into erroneous diagnosis and treatment of illness and health problems. In rural Dominica, for instance, it is believed that the human body contains an organ called the ‘worm bag’ which houses worms; if not controlled properly, worms may grow in size and number, spread into other organs and cause disease (Quinlan, Quinlan, and Nolan 2002). Nevertheless, the five commonly used plants to treat intestinal worms showed biochemical properties that suggest them to be effective treatments.

Cross-cultural postpartum practices that aim to prevent postpartum haemorrhage – an important cause of maternal morbidity and mortality – appear to be consistent with biomedical health practices (Abrams and Rutherford 2011, cited in Radoff et al. 2013). Similarly, many cultures share the belief that the placenta should leave the body of the women, which also corresponds to biomedical knowledge. However, practices used to expulse the placenta vary, with some practices being possibly effective in expulsing the placenta and others ineffective or harmful to the mother (e.g. Berry 2006; O’zsoy and Katabi 2008). Obermeyer (2000) finds that the general

ethnophysiology of pregnancy and childbirth among Moroccan women is not inconsistent with biomedical recommendations. For instance, blood is believed to be poisoning when it remains inside the body of the mother, but there is also a great fear of excessive bleeding during pregnancy. This local knowledge is supported by biomedical knowledge regarding the dangers of childbirth (Obermeyer 2000). Cultural beliefs and practices do not in themselves prevent safe home deliveries or prevent women from using biomedical health care service, and as a result women seek both informal traditional care and formal biomedical care. However, the author also reports that women believe that some illnesses or complications have supernatural causes and cannot be cured by biomedical medicine. As formal medical personnel often rejects supernatural beliefs and explanatory models, women may choose to consult traditional health care when the cause of a disease is perceived as supernatural (see also Arps 2009; Chapman 2006). If traditional health care fails to offer an adequate diagnosis and treatment, the patient may be exposed to severe health hazards.

Studies that examine the complete spectrum of cultural and religious beliefs and practices related to food and health generally conclude that certain beliefs and practices may be beneficial while others might be harmful (e.g. Adams et al. 2005; Barennes et al. 2007; Iliyasu et al. 2006; Liu, Petrini, and Maloni 2014; Lundberg and Thu 2011; O'zsoy and Katabi 2008; Raven et al. 2007). Many scholars argue that existing cultural and religious practices should be discouraged when harmful but promoted when beneficial, as these practices tend to have substantially more support and legitimacy than newly-introduced biomedical recommendations (e.g. Steinberg 1996).

Nevertheless, while cultural and religious beliefs and practices have proven to be persistent, they are by no means static. Culture and traditional knowledge evolve continuously in interaction with the changing environment of a society. Hence, belief systems may adapt to new

biomedical information by incorporating biomedical recommendations or adapting existing beliefs and practices so as to make them consistent with newly acquired information. Social norms regarding when, how and what type of health care to seek may also adapt to changing circumstances and new opportunities.

In areas where there is little information about the true cause and proper treatment of illness, individuals may choose to combine traditional and biomedical therapies to maximize the probability of effectiveness (Ellis et al. 2007; LeMay-Boucher, Noret, and Somville 2012). Households often first turn to one type of medicine, and seek help from alternative medicine when first-line treatment fails (WHO 2013).

Women are found to combine traditional medicine with biomedical health services depending on their socio-economic situation, location, the quality and cost of care offered and the perceived need for and risks of different types of care (e.g. Ellis et al. 2007; Glei and Goldman 2000; Lee et al. 2009; Obermeyer 2000; Wiley 2002). Women may prefer to seek help from traditional birth assistants to give birth at home, but choose to go to a hospital when complications arise that are outside of the medical abilities of the birth attendant (e.g. Glei, Goldman, and Rodríguez 2003; Obermeyer 2000).¹⁶ Obermeyer (2000) discusses how Moroccan women combine traditional care with formal biomedical health care during pregnancy and childbirth, selecting certain elements from each system depending on the means at their disposal. The explanatory models of both types of services are made compatible by reinterpreting biomedical information and practices according to traditional cultural beliefs such as hotness and coldness. Wiley (2002) describes how in Ladakh (India) various traditional health care systems are complemented by biomedical care from formal health care institutions. The author suggests that

¹⁶ In Western countries where biomedical medicine is the conventional health care system, people are increasingly turning to alternative traditional therapies when biomedical treatment fails (WHO 2013).

the absence of institutionalized traditional care, together with the high rate of pregnancy loss and infant mortality, may be one of the reasons for the rapid increase in the use of biomedical care during pregnancy and delivery. In addition, biomedical prenatal care and recommendations are consistent with traditional cultural beliefs and practices in this region, which may facilitate the acceptance and adoption of prenatal care and biomedical information. According to the author, another important reason for the rapid uptake of biomedical care is the presence of a female obstetrician who is familiar with the cultural context of pregnancy in Ladakh, accommodates biomedical care with the local belief system – for instance by using ethnophysiological language to explain treatments – and has the status of a well-trained and knowledgeable authority figure.

The Ladakh case study illustrates that not only care receivers have been found to adapt to new information and integrate informal traditional care and biomedical care. Caregivers may similarly integrate elements of traditional and biomedical health care. Obermeyer (2000) reports how traditional birth attendants in Morocco may give vitamin pills, injections or pain relievers in addition to herbal treatments. Medical staff in formal health care institutions such as hospitals and health centres are found to seek the help of traditional health practitioners themselves, and to integrate cultural beliefs and practices into biomedical health care. For instance, the biomedical personnel may follow certain traditional practices when treating patients (e.g. massaging the abdomen with olive oil) or refer to the local ethnophysiology when explaining care decisions and treatments (e.g. the notion of hotness and coldness of the body).

“Biomedical and non-biomedical beliefs about the causes of childhood illness are not necessary mutually exclusive” (Goldman, Pebley, and Gagnolati 2002:1695). Several studies describe how ethnomedicines categorize some diseases as having physical causes (e.g. bodily reactions to food), thus being treatable by biomedical medicine, whereas others are believed to

have supernatural causes (e.g. soul loss, evil spirits) which can only be dealt with by traditional medicine (e.g. Aujoulat et al. 2003; Chapman 2006; Englberger, Marks, and Fitzgerald 2003; Laderman 1987). Comoro et al. (2003) describe how both health workers and rural and urban mothers in Tanzania recognize the symptoms of mild malaria, and most mothers associate this illness with mosquito bites. However, severe cases of malaria that produce convulsions in the child are interpreted by the mothers as signals of an attack by evil spirits that need to be treated by a traditional health practitioner (see also Beiersmann et al. 2007; Nsimba and Kayombo 2008). Chapman (2006) describes how women in Mozambique considered certain illnesses such as malaria and diarrhoea during pregnancy to have natural causes (mosquito bites and contaminated food or water respectively) and mainly sought biomedical treatment for these problems. Severe health problems such as haemorrhaging, miscarriage and complications during childbirth were generally considered the consequence of evil spirits or witchcraft, needing treatment from traditional health practitioners. Gleit and Goldman (2000:5) find that in Guatemala “pregnant women, especially indigenous women, are more likely to seek biomedical care in conjunction with traditional midwifery care rather than to rely solely on the former.”

Several studies find that people integrate new health and nutrition information and health services into the existing cultural belief system, adapting existing beliefs and practices in the process (Adams et al. 2005; Obermeyer 2000; Semega-Janneh et al. 2001; Wiley 2002). Adams et al. (2005) provide an illustrative example: in rural Nepal, most women fear giving birth in a hospital because they fear the presence of evil spirits and spiritual pollution due to the presence of blood and death. However, among nomad women a different view has come up, namely that hospitals are a good place to give birth because the polluted blood is quickly and easily removed and remains far away from the home and family of the mother.

Biomedical information and recommendations may play an important role in changing the perception of specific practices as being beneficial or harmful. For instance, some studies report a shift in the practice of discarding the colostrum, finding that the large majority of women has started to feed the newborn colostrum (e.g. Barennes et al. 2007). Martínez Pérez and Pascual García (2013) report that all 17 interviewed women of the Fulla ethnicity in The Gambia reported to feed newborns colostrum. The authors hypothesize that this may be a consequence of health and nutrition education interventions, as the respondents indicated that these interventions increased their nutrition knowledge. Semega-Janneh et al. (2001) surveyed 324 women from rural communities in The Gambia and complemented this information with focus group discussions. The respondents indicated that the colostrum was believed to be bad for the child and would cause diarrhoea and stomach pain, with some mothers mentioning the similarity between the colostrum and pus (the yellowish colour). Although many women still adhered to this belief, 89 % of the women reported to feed the newborn colostrum. The main reasons for feeding colostrum were (health) benefits for the child and protection against infections (36%), following the advice of health workers (including traditional birth assistants) and family members (27 %) and the colostrum being the only food to give (23 %). Some mothers appeared to integrate the new information about the benefits of feeding the colostrum into existing cultural practices. They explained the feeding of the colostrum as adherence to the traditional practice of the mother being the first to give her breast to the infant to promote mother-child bonding – even though this practice traditionally did not involve actually breastfeeding the infant. The authors point out that local knowledge can also be used to accommodate new information and practices into traditional practices. For instance, although the traditional belief maintains that exclusive breastfeeding is bad and infants need water as well, some participants objected that newborn animals also survive on

milk exclusively. The traditional practice of keeping the mother and infant together, which has been somewhat abandoned as mothers spend the entire day working on the farm, could also be promoted again to facilitate exclusive breastfeeding by reintroducing the building of traditional shelters where breastfeeding can take place. King (2000) discusses how common traditional prevention measures for STD's and AIDS in Sub-Sahara Africa are consistent with the supernatural aspect of their ethnophysiology (wearing protective amulets or tattoos), but also consistent with biomedical knowledge regarding causation and transmission (limiting the number of sexual partners or wearing a condom to prevent 'pollution'). According to King (2000), many traditional health practitioners now promote the use of condoms even though this goes against pre-existing cultural beliefs about the importance of semen for the health of the mother and infant during pregnancy. Bessong (2008) analyses the compatibility of traditional and biomedical explanatory frameworks of illness in Sub-Sahara Africa, and finds that biomedical views on the causation of illness can be readily integrated in traditional explanatory frameworks. However, the author also finds that traditional views on the prevention of illnesses such as AIDS conflict with biomedical views and points out that this might pose considerable health risks. Cosminsky (1975) discusses how a Guatemalese community incorporated biomedical information regarding nutrition and health in their ethnophysiology through the creation of new concepts (e.g. *alimento* or nutritious food) that combine traditional and biomedical views of the causation and treatment of illness.

5. Traditional medicine

Traditional medicine plays an important and underestimated part in public health, often being the primary source of health care and possibly the only accessible, affordable and culturally acceptable source of care (WHO 2013). Africa for instance counts roughly one traditional health

practitioner per 500 individuals and one biomedical doctor per 40 000 individuals, and an estimated 70 to 80 % of the population uses traditional health care (Mills et al. 2006; WHO 2002a; WHO 2013). Similar numbers are found for Asian countries. In the Lao People's Democratic Republic traditional health practitioners are major suppliers of health care for 80 % of the population living in rural areas, with each village counting one or two traditional health practitioners (WHO 2013). In Far West Nepal there is at least one traditional health practitioner per 100 people, compared to one health worker per 600 people (Kunwar et al. 2012). In countries where the supply of formal biomedical health services is relatively extensive, people may still frequently rely on traditional medicine, as is the case for 76 % of the population of Singapore and 86 % of the population in South Korea (WHO 2013). Finally, in countries where the formal biomedical health sector is well developed there is a steadily growing demand for traditional medicinal techniques as complementary or alternative therapy (WHO 2002a; WHO 2013). Hence, traditional medicinal techniques that have been proven safe and effective can contribute significantly to public health (WHO 2013).

Traditional health practitioners (traditional healers, midwives, birth attendants) are often highly respected, trusted community members and opinion leaders who play a pivotal role in the provision of primary health care and health-related information and advice (King 2000; Stoop, Verpoorten, and Deconinck mimeo; WHO 2002a). Aside from medical treatments, traditional health practitioners are often found to provide social and psychological support as well (e.g. Goldman, Pebley, and Gragnolati 2002; Kale 1995).

Although the importance of traditional health care is largest in rural areas where access to biomedical health services is lower, it is not the case that traditional medicine loses its importance for health care provision in urban areas. Obuekwe and Obuekwe (2004) for instance report how in

an urban community in Nigeria (Benin City) women continue to rely on traditional medicine to treat diarrhoea. The authors explain the persistence of traditional health care in urban centres where biomedical health care is readily available by the fact that the beliefs underlying traditional medicine are fundamentally entwined with the community's cultural belief system and world view, and strongly integrated in daily life. Various other studies show that urban communities continue to rely on traditional health care (e.g. Comoro et al. 2003; Liamputtong et al. 2005; Peltzer and Mngqundaniso 2008; Sein 2013).

5.1. Safety and effectiveness

The safety and effectiveness of traditional medicine depends mainly on (1) the safety and effectiveness of the therapies used and (2) the clinical skills of traditional health practitioners¹⁷.

The medicinal use of plants and animals is the mainstay of nearly all ethnomedicines (Alves and Rosa 2005; Mukherjee 2001). In the last decades a vast number of studies has investigated the pharmacological properties of traditional medicinal plants.¹⁸ A large number of studies finds that traditional medicinal plants and foods have antioxidant, antifungal, antibacterial or antiviral properties.¹⁹ Ahmad and Beg (2001) for instance find that 40 of 45 tested Indian medicinal plants show an antimicrobial activity against one or more multi-drug resistant bacteria, and discuss the potential of traditional medicinal plants in particular for the development of new drugs against bacteria that have become resistant to existing drugs, as resistance to antibiotics is an important and increasing concern in health care in both developed and developing

¹⁷ E.g. the capability to provide a correct diagnosis and prescribe an appropriate treatment.

¹⁸ One objective of this research is to uncover the potential use of traditional medicinal plants and knowledge in the development of new (synthetic) drugs (see for instance Fabricant and Farnsworth 2001; Rates 2001; Rotblatt and Ziment 2002).

¹⁹ E.g. Ahmad and Beg 2001; Gürbüz et al. 2005; Hossan et al. 2010; Kudi and Myint 1999; Lopez, Hudson, and Towers 2001; Li et al. 2004; Mukhtar et al. 2008; Navarro et al. 1996; Ríos and Recio 2005 ; Santos et al. 2010; Taylor, Manandhar, and Towers 1995; Taylor et al. 1996; Valsaraj et al. 1997; Yesilada and Küpeli 2007).

countries. Santos et al. (2010) similarly argue that medicinal plants used in the north-eastern region of Brazil can provide a readily available and affordable alternative to synthetic drugs. Huffman (2001) reports how certain plants are widely used by botanical medicine across Africa, the Americas and Asia to treat gastro-intestinal ailments such as parasite infections, and how these plants have been proven to be effective. Fabricant and Farnsworth (2001) analyse the ethnomedical use of 122 plant components (derived from 94 plant species) that are globally used as drugs. The authors find that 80 % of the substances studied are used in traditional medicine in a way that is identical or similar to the current use of the active ingredients of the plants in synthetic drugs. Sherman and Billing (1999) discuss how many spices traditionally used in food preparation have potent antimicrobial properties, and the antimicrobial effect is stronger when certain spices are combined. The authors also mention that many plants from which spices are extracted are often used in traditional medicine to treat bacterial infections or worms. Tapsell et al. (2006) summarize existing scientific evidence for alleged health benefits of the consumption of herbs and spices traditionally used in many cultures for pharmacological and culinary purposes. For certain products (e.g. garlic) there is convincing evidence for health benefits of regular consumption (e.g. lower cholesterol and blood pressure).

However, ineffectiveness and toxicity are also reported (Bessong 2008; Chan 2003; Duarte et al. 2005; Halberstein 2005; Rates 2001; Saad et al. 2006; Sofowora 1982; Veale, Furman, and Oliver 1992). Duarte et al. (2005) find that Brazilian medicinal plants show antifungal activity when processed into oils, but not in ethanol extracts from the same plants, indicating that the processing technique matters for effectiveness. Rates (2001) points out that traditional medicine in Brazil involves the use of potentially toxic plants and information and awareness regarding this risk is lacking. Veale, Furman, and Oliver (1992) find that several plants used by black South

African women as antenatal medication or to induce labour are toxic. In developing countries herbal remedies are widely used to treat symptoms of AIDS, and although some herbal therapies have been found to have beneficial effects, other plant preparations were found to have no effect or to produce substantial side effects (Bessong 2008). Fandohan et al. (2005) report that traditional maize-based medicinal beverages in Benin carry the risk of mycotoxin contamination if the raw maize has not been properly processed. Saad et al. (2006) stress that the concentration of active ingredients depends on a variety of factors, including which part of the plant is used and when the plant was harvested, and that many medicinal plants (as well as pharmaceutical drugs) are curative in certain doses, but toxic in others. Knowledge of appropriate preparation, use and dosages is therefore an important requirement for a safe and effective use of medicinal plants and animals (Obuekwe and Obuekwe 2004; Saad et al. 2006).

There has been less research on the safety and effectiveness of non-botanical traditional medicine, but the literature has identified effective, ineffective and harmful therapies (Kale 1995; Stoop, Verpoorten, and Deconinck mimeo). Acupuncture has proven to be an effective treatment against a wide variety of illnesses and health problems (WHO 2002b). Case studies have documented examples of ineffective or harmful practices such as wearing amulets and drinking herbal teas to prevent malaria (Maslove et al. 2009), or treating convulsions due to severe malaria with fumigation of the child (Comoro et al. 2003). Graham et al. (2000) discuss how persistent fever and diarrhoea are sometimes treated by removing gum and teeth, which may lead to dental malformation. Christian religious leaders may claim charismatic healing powers and offer 'faith healing' services to their followers by prayer, by touch or using holy water (Fourn et al. 2009; Kale 1995). Ineffective therapies pose serious health hazards for the patient when effective treatment is

delayed or not received at all (e.g. Barker et al. 2006; Maslove et al. 2009; Mull and Mull 1988; Nsimba and Kayombo 2008).

A second major determinant of the effectiveness of traditional medicine is the clinical skill set of traditional health practitioners. Traditional health practitioners may possess an extensive body of culturally evolved medicinal knowledge, but when there is no assessment or control mechanism, the skill level is not guaranteed. China has aimed to resolve this issue by creating an extensive regulatory framework to assess and certify the skill level of officially recognized traditional health practitioners, which involves amongst others the requirement to take a national exam. In rural areas local health authorities are responsible for certifying traditional health practitioners, but Qi, Liming, and van Lerberghe (2011) report that the clinical skills of rural practitioners remains a concern to date. To uncover the potential use of traditional medicine for the improvement of public health and food and nutrition security, there is a need for further research to determine the safety, effectiveness and optimal use (as primary or supplementary treatment for instance) of traditional medicinal techniques and treatments (Halberstein 2005; Obuekwe and Obuekwe 2004).

5.2. Integration

In some cases the persistence of cultural beliefs and practices in the areas of food and health, and the continued popularity of traditional medicine and traditional health practitioners presents an important obstacle to the improvement of food and nutrition security. It is often argued that for instance reliance on traditional medicine delays effective treatment, with potentially fatal consequences in the case of serious illness (e.g. malaria). Although Nsimba and Kayombo (2008) support this notion in the case of malaria in Tanzania, the authors point out that another reason for delayed treatment is the lack of access to well-functioning and effective biomedical health care.

This argument is echoed by other authors (e.g. Goldman, Pebley, and Gragnolati 2002; Gleit, Goldman, and Rodríguez 2003; Yahya 2007). Women in urban Nigeria for instance report to prefer traditional medicine over biomedical medicine to treat diarrhoea of their children because of the effectiveness, low cost and speed of relief or action offered by traditional medicine (Obuekwe and Obuekwe 2004).

One of the reasons why women resort to traditional health practitioners during pregnancy, childbirth and the postpartum period is that alternative biomedical health care services are perceived to be of a lower quality than traditional health care. In remote, resource-poor areas, formal health care facilities may be understaffed or unskilled and the necessary material may be lacking to offer qualitative health care (Goldman, Pebley, and Gragnolati 2002; Kyomuhendo 2003; Wiley 2002). The care received in formal health care facilities may also be of a low quality from a socio-psychological point of view. In rural Uganda for instance, women report that abuse, neglect, the failure to explain treatments and procedures and the fact that they were treated as ignorant by the health personnel in part explained their unwillingness to use formal health care facilities, even when complications arose (Kyomuhendo 2003). Other studies similarly document that women were unwilling to use formal health services because of impersonal treatment, lack of social support, poor communication and attitude of the personnel (e.g. scolding), the personnel's lack of knowledge of their cultural context and their lack of comprehension of and involvement in decisions regarding treatment (Berry 2006; Maslove et al. 2009; Obermeyer (2000). Hossain et al. (2010) report that rural Bangladeshi women do not use biomedical health services for sexually transmitted diseases and urinary tract infections partly because they were reluctant to speak about this sensitive topic with an unknown doctor.

Hence, the environment of biomedical health services may stand in stark contrast with the care that women would likely receive from traditional health services, where traditional health practitioners tend to be community members who they know and trust, where they may receive social support from family members, where health services are compatible with their cultural belief system and traditions and where they understand the framework used to explain and treat health problems. The cultural gap in beliefs regarding illness and health between patients and professional care givers can thus lead to miscommunication, fear or mistrust of professional health practitioners and institutions and the disregard of their information and recommendations. In some cases mistrust or fear of biomedical health services is an important reason for not using this type of health care (Adams e.a. 2005; de Sousa et al. 2012; Lori and Boyle 2011; Maslove et al. 2009; Yahya 2007). Maslove et al. (2009) for instance document the belief that injections or visits to hospitals would kill children experiencing convulsions due to malaria.

The view that the persistent use of traditional health care services limits the use of formal biomedical health care can thus be turned around: traditional health care may persist in part because biomedical health care fails to provide well-functioning, effective and qualitative health care from the patient's perspective. Yahya (2007:203) makes a similar argument in the context of polio eradication in Nigeria: "The cultural definition of polio as a supernatural affliction, which remains alive in the realities of a significant number of Hausa people, has acquired greater significance in the absence of a well-functioning and effective primary health care system."

This observation does not imply that beliefs and practices cannot represent substantial barriers to the use of formal biomedical health services. The preference to observe cultural practices and to seek health care that is consistent with the local ethnophysiology and broader knowledge and belief system characterizes patients in both developing and developed countries.

Health services that do not take this preference into account might lead to the patient's unwillingness or inability to use these health services, e.g. because of marital or intergenerational conflicts. During pregnancy and labour for instance, the decision-making power about seeking public health care may lie with husbands or elders, who may give more importance to respecting cultural practices and tradition (e.g. Lori and Boyle 2011). Another consequence described in the literature is a rejection of biomedical health care in favour of traditional health care. When illness is believed to be the result of supernatural forces, such as spirits or witchcraft, people may look for treatments directed at the supernatural nature of the illness. Biomedical medicine may be viewed as incompetent to deal with supernatural causes of illness in an appropriate manner (Chapman 2006). People may then turn to traditional health practitioners instead, with potentially grave consequences when traditional medicine fails to effectively treat or deal with the illness (Stoop, Verpoorten, and Deconinck mimeo).

To make biomedical health care more accessible and increase the uptake, many scholars argue that biomedical health services need to be made more culturally appropriate (e.g. Adams e.a. 2005; Barennes et al. 2007; Berry 2006; Chapman 2006; Goodburn, Gazi, and Chowdhury 1995; Kim-Godwin 2003; Steinberg 1996; Wireko and Béland 2013). This can be achieved by integrating beneficial cultural practices into biomedical health care and providing cultural training to health care personnel (de Bessa 2006; Chowdhury, Helman, and Greenhalgh 2000; Gleit, Goldman, and Rodríguez 2003; Kyomuhendo 2003; Lee et al. 2009; Semega-Janneh et al. 2001; WHO 2013).

Another way of achieving cultural congruence is through a closer collaboration of traditional and biomedical medicine, with an important role for traditional and biomedical health practitioners (Bessong 2008; Comoro et al. 2003; Courtright 1995; Ellis et al. 2007; Homby et al.

2004; King 2000; Mills et al. 2006; Okeke, Okafor, and Uzochukwu 2006; Puckree et al. 2002). King (2000) reviews the arguments in favour of and against such an integration. Arguments in favour of integration maintain that traditional health practitioners provide “client-centred, personalized health care that is culturally appropriate, holistic and tailored to meet the needs and expectations of the patient. Traditional healers are culturally close to clients, which facilitates communication about disease and related social issues.” (King 2000:10). This characteristic may be of particular importance for culturally significant and symbolically loaded events such as pregnancy and childbirth. A closer collaboration of traditional and biomedical health services may improve the ability of formal public health services to provide culturally appropriate health care, which may substantially improve access to and use of formal public health services (e.g. Berry 2006; Kyomuhendo 2003; Maslove et al. 2009; Obermeyer 2000). “Current efforts directed toward the training and integration of midwives into the formal health system are likely to be much more effective at improving pregnancy-related care than the replacement of midwives with biomedical providers.” (Glei and Goldman 2000:5). Households are more likely to take up preventive health care practices when these practices are consistent with their ethnophysiology and cultural belief system (Stoop, Verpoorten, and Deconinck mimeo).

Another argument in favour is that health information provided by traditional health practitioners tends to be perceived as more credible and trustworthy by the community than information provided by the government or external health practitioners, in particular in countries where there is a generalized mistrust in the government or public health care system (e.g. Liberia) (King 2000; Lori and Boyle 2011; Yahya 2007). Hence, involving traditional health practitioners in health interventions and public health programs may reduce opposition towards the intervention and improve awareness and the quality of information provided to communities.

Traditional health practitioners and religious leaders may also oppose biomedical health care services themselves for several reasons. One reason may be a deep mistrust of public health services, the government and foreign institutions.²⁰ Another reason may be a fear that formal health care institutions will undermine or replace their position as health care providers. Fourn et al. (2009) for instance find that some pastors in urban areas in Benin who offer faith healing services perceive health centres as their competitors and advise their faithful against vaccination, using primarily religious arguments to convince them and sometimes even pronouncing vaccination to be taboo. The authors report the opposition by religious leaders to be a real barrier to vaccination. When a more integrative approach is used it may be that traditional health practitioners or religious leaders would more readily accept the presence of an alternative biomedical health system.

A closer collaboration between traditional health practitioners and biomedical health care may also improve the rate and speed of referral to biomedical health services (King 2000). Finally, a large number of studies report that traditional health practitioners are interested in a closer collaboration with biomedical health services (e.g. Courtright 1995; Homsy et al. 2004; Kayombo et al. 2007; Mills et al. 2006). Arguments against integration involve amongst others the difficulty of monitoring activities of traditional health practitioners and evaluating and controlling the quality of care provided; the possibility of reducing the use of biomedical health care and the risk of promoting untested medicinal techniques (King 2000; see also Kale 1995).

King (2000) analyses several cases of collaboration in Sub-Saharan African countries in the context of HIV/AIDS, and concludes that collaboration is possible and creates important public health benefits (see also Courtright 1995; Wreford 2005). Other studies (Kayombo et al. 2007; Mills et al. 2006; Robertson 2006) point to some important challenges that need to be met (e.g.

²⁰ See for instance Yahya (2007) for the case of resistance to polio vaccination campaigns in northern Nigeria.

distrust due to the persecution of traditional healers during the colonial period) to come to sustainable and meaningful cooperation. In China traditional and Western biomedical medicine have coexisted since the introduction of the latter in the 19th century, and it is one of few countries where traditional medicine has been fully integrated into public health services (Qi, Liming, and van Lerberghe 2011). Hospitals provide both traditional and biomedical health services with 22 % of hospitals specializing in traditional medicine, universities provide academic training in traditional medicine, health insurance covers traditional medicinal diagnoses and therapies and national legislation requires a second diagnosis from biomedical medicine for each diagnosis within traditional Chinese medicine, resulting in regular collaboration between traditional and biomedical health practitioners (Qi, Liming, and van Lerberghe 2011). According to Wireko and Béland (2013), Sub-Saharan African countries could draw lessons from the Chinese experience on how to integrate traditional medicine into public health services to improve access to qualitative public health care. India is another example of profound integration of traditional medicine into the public health care system (Mukherjee 2001).

6. Traditional food systems

6.1. Potential for food and nutrition security

Recently, there has been a growing interest in the nutritional and anti-nutritional value of traditional food systems, and their potential for improving food and nutrition security and public health. A traditional food system concerns the types of food included in traditional diets, but also how societies traditionally obtain food, combine different food items, process and prepare food.

Individual food items and combinations of foods consumed in traditional food systems are often found to have a high nutritional value and important health benefits (e.g. Andarwulan et al.

2010; Kuhnlein 2004; Odhav et al. 2007; Milburn 2004; Tapsell et al. 2006). Milburn (2004) gives the example of the combination of grains and legumes found in many traditional food systems around the world (e.g. the corn-bean combination among American cultures), where the protein quality of the combination is dramatically higher compared to the individual food items due to protein complementarity. Tapsell et al. (2006) summarize scientific evidence for the health benefits of the consumption of herbs and spices, key elements of nearly all traditional food systems. The authors conclude that various herbs and spices have a high nutrient content themselves and positively affect the absorption and bioavailability of nutrients when consumed in combination with other foods. Kuhnlein (2004) finds that three local food items commonly included in traditional food systems (karat banana, pulque²¹ and gac fruit) are valuable dietary sources of micronutrients. Gac fruit for instance has the ability to provide vitamin A and E and essential fatty acids throughout the year. The author suggests that local traditional foods can play an important role in the fight against malnutrition and chronic non-communicable diseases by providing nutrient-rich, available, affordable and culturally accepted foods.

A large number of studies analyses the nutritional and anti-nutritional value of traditionally consumed local food plants, in particular wild edible plants.²² Several local traditionally consumed food plants are found to have high nutrition contents, with wild plants in some cases exceeding the nutritional value of conventional cultivated foods (Flyman and Afolayan 2006; Gupta et al. 2005; Kawashima and Valente Soares 2003; Legwaila et al. 2011; Odhav et al. 2007; Uusiku et al. 2010). Other benefits cited in the literature are the higher resilience of wild food plants and lower care needs compared to conventional cultivated foods (Flyman and Afolayan 2006; Legwaila et al.

²¹ An alcoholic beverage prepared from Agave plants.

²² See van Wyk (2005) for a global review of food plants and Uusiku et al. (2010) for a review of African leafy vegetables.

2011) and the potential use as an additional source of income (Legwaila et al. 2011; Sundriyal and Sundriyal 2004). Many scholars argue that local food plants present an underutilized, high-potential resource for achieving food and nutrition security, in particular for vulnerable communities (Flyman and Afolayan 2006; Grivetti, Ogle, and others 2000; Gupta et al. 2005; Kuhnlein and Receveur 1996; Kunwar et al. 2012; Legwaila et al. 2011; Ogoye-Ndegwa 2003; Molla et al. 2011; Uusiku et al. 2010; van Jaarsveld et al. 2014).

Cerda et al. (2001) describe the results of a food and nutrition security program promoting the production and consumption of the palm worm (*alerito*), a traditionally consumed food by Native American communities living in Amazonas, Venezuela. The palm worm has high nutritional value (protein, vitamins A and E and minerals) and was originally gathered from palm stems and eaten raw or toasted. The program developed a low-technology, small-scale palm worm production system using wild and traditionally cultivated plants. The first findings of the program suggest that palm worms can be successfully bred using the proposed production system. Given the nutritional value of the palm worm, the modest land and technology requirements of the production system and the acceptability of the product to tourists, palm worm breeding is promising both as a source of nutrition and as a livelihood strategy to support incomes. In particular in regions such as the Amazons, which are unsuited for conventional livestock activities based on large mammals, the breeding and commercialization of small protein-rich animals can present a sustainable livelihood and food and nutrition security strategy. One potential risk is the overexploitation of plants used in the breeding process, but according to the authors the risk is limited as a large variety of local plants is found to be suitable for palm worm production.

6.2. Food safety

If the promotion of traditional and local foods is included in food and nutrition security policies, several factors regarding food quality and food safety need to be taken in to account: possible toxicity of foods through organic or inorganic contamination and the impact of processing and preparation techniques on the nutritional and toxic value of foods.

Several studies have reported that the traditional diet of arctic indigenous peoples is generally more diverse and nutritious than imported market foods, but local traditionally consumed foods face a growing problem of contamination (e.g. mercury, heavy metals) through water pollution (e.g. Deutch et al. 2007; Chan and Receveur 2000; Peixoto Boischio and Henshel 2000). As a reduction of the consumption of local foods may lead to increased rates of non-communicable diseases (e.g. diabetes) and other health problems, research is needed to determine the optimal balance between local foods and imported market foods from a nutrition and health perspective (Deutch et al. 2007).

Another health risk may arise from wild or cultivated plants absorbing soil contamination in urban and peri-urban settings created by soil, water and air pollution. Nabulo, Young, and Black (2010) find that contamination levels of tropical vegetables grown in farmer gardens in and near Kampala City varied considerably between and within farmer gardens and between different types of vegetables. The authors conclude that most gardens allow safe cultivation if certain conditions are met, such as the selection of suitable vegetables based on their capacity to limitedly absorb contaminants. Rattan et al. (2005) similarly report that certain vegetables cultivated on sites irrigated with sewage water in an urban area in India are safe for human consumption because of their ability to limit contamination build-up. However, other studies find hazardous concentrations of heavy metals in most types of vegetables tested (e.g. Nabulo et al. 2012). Strategies promoting

consumption of wild edible plants and local foods in urban and peri-urban settings should therefore take possible health risks from environmental contamination into account. The ability of certain food plants to limit the build-up of contamination levels may be used as a guiding principle for deciding which food plants to promote.

Another important – and often underestimated – health risk for both rural and urban populations is contamination by organic toxins such as mycotoxins²³ and cyanide (Murphy et al. 2006; Wild and Gong 2010). Global supplies of foods such as maize, cereals and groundnuts are frequently contaminated by mycotoxins, and communities that consume these foods as staples may be chronically exposed to high toxin levels, especially when relying on subsistence farming or unregulated food markets where food safety checks may be lacking (Wild and Gong 2010). Mycotoxin poisoning may be fatal, and chronic high-level exposure can lead to birth defects, liver cancer, neurotoxicity and immunosuppression (Gong et al. 2002; Murphy et al. 2006), which in turn can exacerbate infectious diseases such as malaria (Shephard 2008; Wagacha and Muthomi 2008; Wild and Gong 2010).

Cyanide, a powerful neurotoxin, appears naturally in cassava in modest quantities. Consumption of large amounts of cassava and derived products, however, may cause cyanide poisoning, leading to symptoms such as vomiting and diarrhoea and possibly death (Cardoso et al. 2005). Chronic dietary exposure to cyanide has been associated with diseases such as konzo and Tropical Ataxic Neuropathy (TAN) in African countries (Cardoso et al. 2005).²⁴

²³ Toxins produced by fungus.

²⁴ “Konzo is an irreversible paralysis of the legs of sudden onset, which occurs particularly in children and women of child bearing age (Ministry of Health Mozambique, 1984; Howlett et al., 1990; Cliff et al., 1997). Tropical ataxic neuropathy (TAN) is a chronic condition of gradual onset that occurs in older people who consume a monotonous cassava diet. It causes loss of vision, ataxia of gait, deafness and weakness (Osuntokun, 1994; Howlett, 1994; Onabolu et al., 2001).” Cardoso et al. (2005:452).

6.3. Food preparation and processing techniques

Food processing and preparation techniques may positively or negatively affect the nutritious and toxic value of foods. For instance, the practice of washing foods before cooking can substantially reduce heavy metal contamination (e.g. Nabulo, Young, and Black 2010; Keikotlhaile, Spanoghe, and Steurbaut 2010). Therefore, traditional techniques for processing and preparing food may have important implications for food and nutrition security, in particular food safety.

Katz, Hediger, and Valleroy (1974) (cited in Henrich and Henrich 2010) document how maize-dependent Native American populations avoided micronutrient deficiencies by using alkali (lye, ash or lime) in the preparation of maize. Hotz and Gibson (2007) discuss how traditional food processing and preparation techniques such as soaking and fermenting have the potential to enhance the bioavailability of micronutrients in plant-based diets in Malawi (see also Makokha et al. 2002; Uusiku et al. 2010).

Liu, Han, and Zhou (2011) discuss how the fermentation of food (dairy, meat, vegetables and soy) is a long-established and culturally embedded culinary tradition in China, still practiced widely today. The authors review the different functions of food fermentation and conclude that fermentation is a cost-effective and energy-efficient way of improving the safety, nutritional value and palatability of food. Other studies have shown that fermentation and malting of food are practiced in various cultures around the world and offer important health benefits by increasing the level and bioavailability of micronutrients and decreasing anti-nutrient content (Thailand: Klayraung et al. 2008; Kenya: Makokha et al. 2002). Traditional food processing and preparation methods also have the potential to reduce the toxicity of food. Hwang and Lee (2006) find that washing and heating methods used in traditional Korean food preparation substantially reduce

mycotoxin concentrations. In Nepal fermentation of maize was found to reduce one type of mycotoxin, but to have no effect on another type (Desjardins et al. 2000).²⁵ Fandohan et al. (2005) report that sorting, winnowing, washing, crushing and de-hulling of maize grains in Benin effectively removed a substantial percentage of mycotoxin concentrations, but fermentation and cooking of maize had little impact.

Cardoso et al. (2005) report how different processing techniques for cassava produce substantially varying results in reducing cyanide concentrations. Processing techniques used to produce *farinha* (flour) in Brazil and *garri* (mash) in western Africa leads to a reduction in cyanide contents eight to sixteen times larger compared to common processing techniques in central, eastern and southern Africa. Kalenga Saka and Nyirenda (2012) study traditional processing techniques of cassava roots in two different communities and find that one community peeled cassava roots before soaking, which resulted in safe cyanide content post-processing, whereas the second community soaked unpeeled roots, which yielded a cyanide content twenty times higher post-processing. The authors conclude that the soaking of peeled roots is a much more effective method of reducing cyanide content and should be promoted in other communities.

It is clear that traditional and local foods may possess varying nutritional, anti-nutritional and toxic content. Traditional food processing and preparation techniques can potentially reduce or eliminate anti-nutrient and toxic concentrations and may present a tool for improving the safety and bioavailability of traditional and local foods. If anything, research shows that the nutritional, anti-nutritional and toxic content of traditional and local foods needs to be carefully assessed, taking into account the impact of (in)organic contamination and food processing and preparation techniques (Flyman and Afolayan 2006).

²⁵ The authors note that women were able to remove most mycotoxins by handsorting maize grains.

Recently, a new method for cassava processing (the wetting/spreading method) has been developed and tested in the field (Bradbury 2006; Bradbury and Denton 2010; Cumbana et al. 2007). The wetting/spreading method involves thinly spreading out wet cassava flour and leaving it in the shade or sun for a number of hours. This simple processing method has been readily accepted by rural women in pilot studies and was found to reduce the cyanide content of cassava flour below the safety threshold, in addition to improving taste and storage possibility of flour preparations (Banea et al. 2012; Banea et al. 2013). In one trial in DRC no new cases of konzo were reported in the village where the wetting/spreading processing was taught to all women (Banea et al. 2012).

6.4. The impact of dietary change

In the last decades, many communities have experienced substantial dietary changes. The globalization of food systems and the resulting spread of packaged market food, supermarkets and fast food chains often results in a move away from traditional food systems towards imported market foods (Bhattarai, Chaudhary, and Taylor 2009; Kuhnlein and Receveur 1996; McCann 2013). Deaton and Drèze (2009) suggest that the significant shifts in food habits in India in the last decades may have important and underestimated consequences for food and nutrition security. The authors cite the example of the declining consumption of traditionally consumed micronutrient-rich coarse grains (at all food expenditure levels) and the rising demand for micronutrient-poor fast food, both in urban and rural areas. Kuhnlein and Receveur (1996) document several cases where dietary diversity and food and nutrition security worsened when communities shifted away from traditional food systems (see also Deutch et al. 2007; Englberger, Marks, and Fitzgerald 2003; Receveur, Boulay, and Kuhnlein 1997), but also describe cases where the diversity and stability of the food supply increased and food and nutrition security improved. Kuhnlein and

Receveur (1996) conclude that rural populations in resource-poor settings who face a supply of low-variety, low-quality market foods are most vulnerable to a deterioration of food and nutrition security due to dietary change. This risk can be mitigated by supporting incomes, ensuring the availability of a variety of nutritious foods and providing nutrition information and education regarding alternative foods.

Another possible strategy that has proven successful in some cases is the reintroduction and promotion of traditionally consumed and culturally significant foods (Kuhnlein and Receveur 1996). However, Englberger, Marks, and Fitzgerald (2003) describe how this strategy has failed so far in the Federated States of Micronesia, where imported foods such as white flour, rice, sugar and fatty meats increasingly replaced nutrition-dense local foods. Although education interventions appear to have been successful in informing communities that local foods are generally more nutritious than low-quality market foods, rice, wheat flour and sugar foods continue to be commonly included in diets “because of convenience, affordability, availability, taste and prestige.” (Englberger, Marks, and Fitzgerald 2003:9). The authors argue that the consumption of nutrition-poor imported foods continues to negatively affect nutrition security in this area, in particular amongst children, and further research is needed to devise strategies that can effectively promote the consumption of local nutritious foods.

7. Conclusion

The definition of food and nutrition security used in the FOODSECURE project identifies two key dimensions: (1) the food and nutrition status and (2) the stability of this food and nutrition status (Pieters, Guariso, and Vandeplass 2013:4). The food and nutrition security status is determined by food availability, food access and food utilization, while the stability of the food status depends on vulnerability and resilience. Culture, religion and traditional knowledge may affect all these dimensions of food and nutrition security.

In terms of the food and nutrition security **status**, food availability, access and utilization are all influenced by culture and religion. The **availability** of nutrient-rich foods may be affected (positively or negatively) when a community shifts away from the traditional diet towards imported market foods (Kuhnlein and Receveur 1996). Cultural practices regarding the gender division of labour and work restrictions for women during reproduction may affect food availability at the household level (e.g. Piperata 2008). Food taboos that serve to protect natural resources from overexploitation may contribute to ensuring the availability of food in the long run (e.g. Colding and Folke 2001). The identification of safe and nutritious wild edible plants and traditionally consumed local food plants may contribute substantially to the local availability of nutrient-rich foods (e.g. Uusiku et al. 2010).

Food taboos and other dietary rules may also affect **access** to food and nutrients. Groups that are particularly vulnerable to malnutrition, such as pregnant women and young children, may face a large number of food prescriptions or proscriptions that determine their diet. Dietary rules may also take the form of social norms regarding the intra-household distribution of food, where certain household members may be favoured or disfavoured in terms of the quantity of quality of food (e.g. Gittelsohn, Thapa, and Landman 1997).

Food **utilization** is affected by culture, religion and traditional knowledge in various ways. First, food taboos may protect communities from eating toxic foods (e.g. Henrich and Henrich 2010). Culturally evolved knowledge embedded in traditional food systems may dictate how to process and prepare foods so as to increase the nutritional value and decrease the anti-nutritional or toxic value (e.g. Liu, Han, and Zhou 2011). Traditional food systems may also involve implicit or explicit knowledge regarding which combinations of foods increase the nutritional content and bioavailability of nutrients (e.g. Tapsell et al. 2006).

Another crucial determinant of food utilization is health. Illness and health problems can have severe implications for food and nutrition security by limiting the absorption of micro-nutrients. Traditional cultural or religious beliefs and practices related to pregnancy, childbirth and the postpartum period may significantly affect health seeking behaviour and access to public health services (e.g. Adams et al. 2005). Traditional medicine continues to be prevalent and may present the only available, affordable and culturally acceptable form of health care for poor and food and nutrition insecure groups. Recent research has shown that the traditional knowledge embedded in traditional medicine may prove highly useful in the development of new drugs and alternative affordable therapies (e.g. Fabricant and Farnsworth 2001). However, the use of traditional medicine also presents risks, such as harmful therapies and delay of effective treatment (e.g. Maslove et al. 2009).

Culture, religion and traditional knowledge may improve the **stability** of the food and nutrition security status. Local, traditionally consumed (wild) food plants may prove more resilient to local environmental shocks than introduced varieties (Flyman and Afolayan 2006). The health status of an individual and the types of health services available again have important implications for the **vulnerability** to malnutrition and the **resilience** in recovering from illness.

To take full advantage of the potential benefits of traditional medicine, a large number of scholars has called for an integration of traditional and biomedical medicine and health care (e.g. King 2000). A closer integration may improve the quality, safety and effectiveness of traditional health services and may simultaneously improve the body of knowledge, quality and cultural congruence of biomedical health care services.

Each culture-specific set of interwoven beliefs and practices may affect food and nutrition security and health in multiple ways. This complexity implies that culture-specific sets of beliefs and practices needs to be carefully evaluated in a holistic framework. A frequent recommendation in the literature is that policy should aim to encourage beneficial beliefs and practices while discouraging harmful ones.

Various authors therefore argue for efforts to document and analyse cultural and religious beliefs and practices regarding food and health, and take these determinants into account when designing and implementing food and nutrition security policies (e.g. Steinberg 1996). Promoting foods that are culturally accepted by the targeted population will be more effective than promoting foods that are proscribed. Increasing the cultural compatibility of biomedical health care services will likely improve access to and utilization of these services. Cultural training of biomedical personnel will increase their ability to encourage beneficial practices and discourage harmful practices at the local level while avoiding conflicts and psychological stress for the patient. Traditional food knowledge and local biodiversity can be a useful instrument to promote food and nutrition security at the community level, and scholars are increasingly advocating to preserve and integrate traditional knowledge and local biodiversity into current policies (e.g. Burlingame, Charrondiere, and Mouille 2009; Johns and Eyzaguirre 2006).

Even though culture, religion and traditional knowledge may affect food and nutrition security in important ways, they should be put into perspective. Several studies identify poverty as a major determinant of dietary and health choices, in some cases of equal or higher importance than cultural and religious considerations. For instance, pregnant women may choose to abandon cultural food restrictions if the proscribed foods were to become available and affordable to them. Beneficial food prescriptions may not be observed because of availability and income constraints (e.g. Christian et al. 2006). Some studies report that geographical inaccessibility and income constraints restrict access to and use of public health care services more than adherence to cultural or religious beliefs and practices or preferences for traditional medicine (e.g. Goldman, Pebley, and Gragnolati 2002). Hence, the role of culture, religion and traditional knowledge as drivers of food and nutrition security should not be viewed in isolation, but evaluated within the context of other drivers of food and nutrition security.

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The FOODSECURE project in a nutshell

Title	FOODSECURE – Exploring the future of global food and nutrition security
Funding scheme	7th framework program, theme Socioeconomic sciences and the humanities
Type of project	Large-scale collaborative research project
Project Coordinator	Hans van Meijl (LEI Wageningen UR)
Scientific Coordinator	Joachim von Braun (ZEF, Center for Development Research, University of Bonn)
Duration	2012 - 2017 (60 months)

Short description

In the future, excessively high food prices may frequently reoccur, with severe impact on the poor and vulnerable. Given the long lead time of the social and technological solutions for a more stable food system, a long-term policy framework on global food and nutrition security is urgently needed.

The general objective of the FOODSECURE project is to design effective and sustainable strategies for assessing and addressing the challenges of food and nutrition security.

FOODSECURE provides a set of analytical instruments to experiment, analyse, and coordinate the effects of short and long term policies related to achieving food security.

FOODSECURE impact lies in the knowledge base to support EU policy makers and other stakeholders in the design of consistent, coherent, long-term policy strategies for improving food and nutrition security.

EU Contribution	€8 million
Research team	19 partners from 13 countries

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