

Quinoa: From Local Staple to Global Commodity

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From Local Staple to Global Commodity:

Assessing the Impacts of the Growing Global Demand for Quinoa on Bolivian Farmers' Livelihoods with Special Reference to their Food Security

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The choice of quinoa, as the focus of field research, came about as a result of articles appearing in the western media. Many of them reported that the growers of the Bolivian Altiplano were becoming impoverished and malnourished because their traditional staple diet, quinoa, had become an unaffordable commodity to be exported abroad. The research, therefore, sought the opinions of the growers themselves about changes to their situation by means of household surveys, as well as conducting interviews with key informants.

The results indicate quite clearly an improvement in farmers' income, and, tellingly, a reduction in migration away from the quinoa growing area. The boom in quinoa comes at a cost, but not one that has received much media coverage. The cost is environmental degradation. The rush to capitalize on the quinoa boom has led to intensive farming methods that are destroying the soil upon which quinoa depends. These methods put the farmers' new-found food security at risk.

Key Words : Food Security, Sustainable Livelihoods Approach, Commodity, quinoa, Income Generation, Rural Livelihoods, Bolivia

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1. INTRODUCTION TO QUINOA

Quinoa (pronounced 'Queen-Wa') is a grain native to the Andean Region (Bolivia, Peru, Ecuador, Colombia, Chile, Argentina and Brazil). The crop is a pseudo-cereal, as it is a broadleaf plant (non-grasses) which is harvested similarly to seeds and ground into flour which can be used in the same way as cereals.

Quinoa thrives in extreme conditions: at cold temperatures, and in arid areas at high altitude. The crop can be exposed to drought, frost, hail, strong winds and be grown on poor and saline soils, conditions in which most grains would fail. The crop can be grown where there is little level ground; it reaches a height of 0.5 -2 m, braced by roots that penetrate to up to 15 cm (Small, 2013).



There are more than 3,000 eco-types of wild and cultivated quinoa (FAO, 2013). The considerable genetic variation in cultivated quinoa is due to its adaptation to very different growing conditions in the Andean region (Small, 2013). These adaptations, depending on agro-ecological conditions, amount of irrigation/rain, precipitation, altitude, temperature and humidity, and are grouped into 5 categories according to the main production areas, as follows:

- Quinoas of the Saltflats (Salares)
- Altiplano quinoas around Lake Titicaca, the Suni Agro-ecological Zone)
- Dry Valley (Junín) And Humid Valley (Cajamarca) quinoas
- Sea Level quinoas (Chile)
- Quinoas Of The Yunga Agro-ecological Zone And Subtropics (Bolivia) (FAO, 2013)

The research will focus on quinoa from the Altiplano. This eco-type can withstand extreme xerophytic conditions (FAO, 2013). The southern Altiplano has among the harshest conditions, where annual precipitation ranges from 110 to 250 mm and temperatures fall below 0° C for 200-250 days a year (Hellin and Higman, 2005). This type of quinoa, quinoa royal, needs to follow a specific production cycle whereby the soil is left idle for four to eight years after harvesting (FAO, 2013). The high altitude of the Bolivian Altiplano means there are relatively few pests and diseases, making it viable for large scale organic production (Hellin and Higman, 2005).

The crop can also be categorized according to its origin and intended use, for example, improved quinoa that has been selected for specific commercial qualities. Alternatively, there exist native varieties of quinoa which the farmers or indigenous communities have selected themselves. These in turn can be grouped into small white quinoa, sweet quinoas that are low in saponin, and bitter quinoas which are high in saponin (Tapia and

Fries, 2007). The most popular export variety is the quinoa real or quinoa royal characterized by its large-sized grain, which comes from the Altiplano region. However, other varieties are increasingly popular, such as red and black varieties (FAO, 2013).

In their natural state quinoa grains are bitter because of the saponins found in the outer layer of the seed. This has to be removed, which is a labour intensive process and amounts to a loss of 40% of the weight of the grain (FAO, 2013). On a small scale production level, harvesting and post-harvest processing of the grain is labour intensive: the quinoa is washed several times in water, rubbed together to remove the coating of saponins. This process, when poorly completed, in combination with inadequate storage conditions, increases the incidence of mould and insects, and field drying encourages vermin (Hellin and Hignman, 2005).

2. CONTEXT

2.1 FROM PEASANT'S FOOD TO FAD FOOD: THE RISE OF THE GLOBAL 'SUPER GRAIN'

Quinoa is one of the oldest crops in the region, having been grown for 7,000 years, and was domesticated 3,000 to 4,000 years ago (FAO, 2013; Small, 2013). Of great significance to the Andean people, the Incas saw the crop as sacred, referring to it as the 'mother of all grains'. During the Spanish conquest, quinoa was suppressed due to its ceremonial religious status, forcing the Incas to grow wheat instead (Keen and Hayes, 2008). Small (2013) argues that if quinoa had been considered worthy at the time of the Spanish conquests, it would be one of the major crops of today.

Smallholders have traditionally grown it, as part of overall household food production. While it has been a staple for many years, quinoa had low social prestige. It was seen as a food only for Indians and its nickname, 'petty rice', reflected this bias. While traditionally grown for humans, it was also used as animal feed Small (2013).

Quinoa was, until recently, almost unheard of outside of the Andean countries. During the 1990s, alternative (health-food, fair trade) networks started to work with Andean smallholders to re-establish traditional quinoa production for the export market (Jacobson, 2011, Ofstehage, 2011). Hellin and Higman note in their publication in 2005 that, while quinoa is not the most lucrative product, it has become a phenomenon for the alternative market such as health food and fair trade retail outlets. Nowadays, the quinoa market has flourished, and it is no longer only sold in small quantities within the alternative retail sector, but has large scale outlets through major supermarket chains (Jacobson, 2011; Ofstehage, 2011).

The more recent boom of quinoa is due to its new esteemed status as a 'superfood'. This term describes foods with supposed exceptional health benefits, but there is no accepted medical definition of a superfood, and many argue it is solely a marketing term. According to these claims, in terms of health and nutrition, quinoa is comparable or superior to other cereals and animal products, being gluten-free and high in protein. Friedmann-Rudosky, (2012) points out how it accommodates every recent health food craze, ie., 'it is whole grain, gluten free, fair trade and organic'.

The popularity of such foods has now been termed 'food faddism', whereby consumers in the west try to improve their diets by incorporating 'superfood' products such as quinoa. Indeed, Boasi et al (2012) refer to 'first world foodies' (persons with a refined interest in food and beverages, seeking out food experiences as a hobby rather than choosing on grounds of convenience or pleasure) to describe how quinoa is so widely available in many forms, and outlets, from upscale health food shops to the lower end discount.

“When buying quinoa, international consumers fulfil many of today's popularity standards as for food as to warrant a perceived sense of internal satisfaction. They are looking for nutritional benefits, organic quality, and moral satisfaction when they see that quinoa is also a guaranteed a “fair trade item” (Bosai et al, 2012 p. 17).

Therefore, the point needs to be made that a substantial amount of the expansion of the quinoa market has been due to outside marketing efforts, and a health food / foodie culture, rather than investment made by donors and multi-lateral agencies in the growth of quinoa.

2.2 PRODUCTION, EXPORTATION AND MARKET PRICE OF QUINOA

Peru and Bolivia are the source of 92% of the total quinoa produced in the world (Suca Apaza and Suca Apaza, 2008). To a lesser extent Ecuador, Colombia and Chile export it to. Elsewhere, Canada and the United States are estimated to produce quinoa on the largest areas of land outside of the Andes region. Successful cultivation is in its infancy in Europe, Asia, and Northern Africa (FAO, 2014).

In line with the growth in demand for quinoa in the West, there has been a substantial increase in the production and export of quinoa from Bolivia and Andean countries. Within Bolivia, crop production increased from 63,000 ha to 104,000 ha between 2009 and 2013. In 2012, the total production was 20 times that of 2000 (Small, 2013). Below is a figure 1 showing total quinoa production in the Andean region..

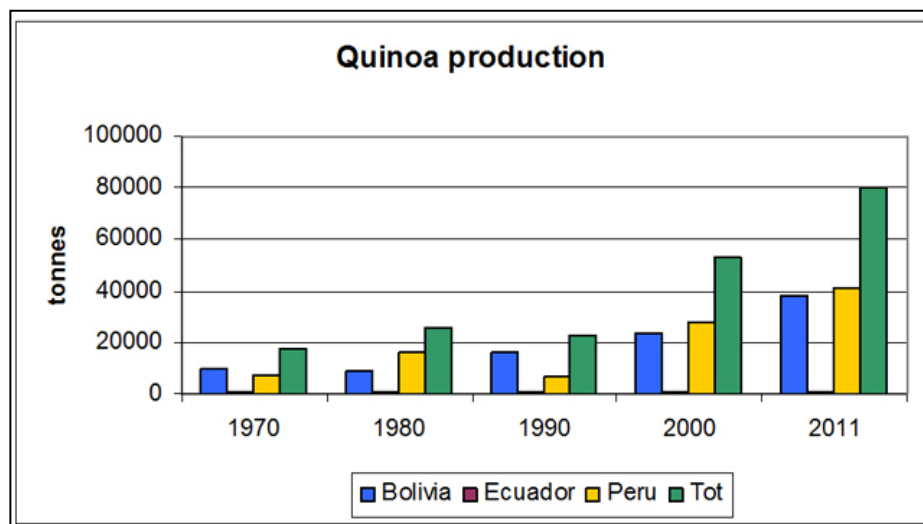


Figure 1: Total quinoa production in the Andean area (FAO 2013)

Over 30 years the area of quinoa cultivation has grown from 36,000 hectares to 83,000 in 2009, as shown on the figure 2 below (FAO, 2013)

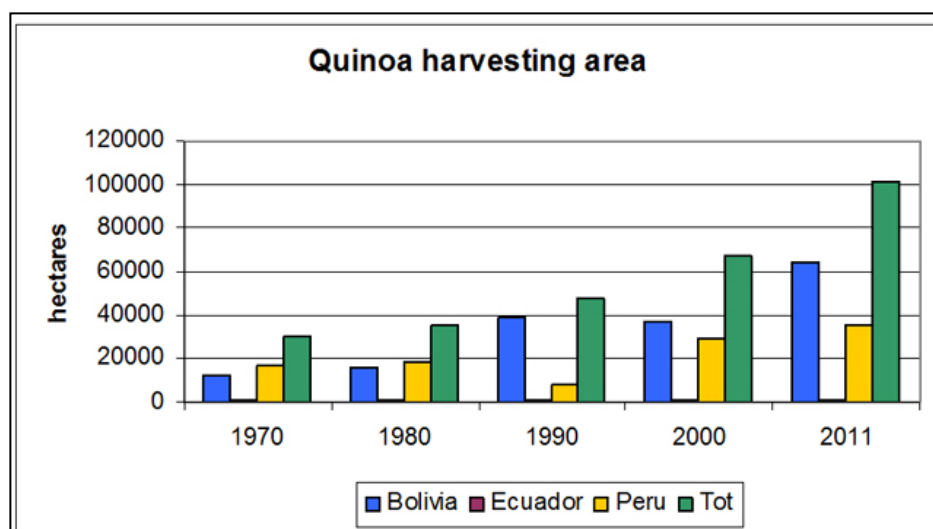


Figure 2: Total Area of Quinoa Harvested in Andean Countries (FAO 2013)

Bolivia, the largest exporter, exported quinoa to the value of US\$43 million in 2009 (Bolivian Institute of Foreign Trade – IBCE, 2010 cited in FAO, 2011). The FAO (2013) estimated that in 2010, Bolivia exported around 15,000 MT of quinoa, while Peru and Ecuador exported only minimal amounts, with far more destined for the local market. It is noteworthy that up to an estimated 50% of Bolivia’s quinoa crop is smuggled to Peru, to be sold on the domestic market or to be exported from Peru (Small, 2013).

The price of quinoa varies according to factors including destination markets (local or international), quality, and whether it is organic or not. Between 2000 and 2008, the international market price increased by 600%. Between 2006 and 2013, the price of exported quinoa tripled (Blythman, 2013, Small, 2013). The current FOB¹ value is between USD 3,000 and 3,500/tonne, with a tendency to keep increasing (FAO, 2013).

Of the non-producing countries, the main importers of Bolivian quinoa are USA, France and Netherlands, accounting for 74% of total Bolivian Exports (FAO, 2013). Of relevance to this study, there was a projected deficit of the crop to meet demands in the coming years (Jacobson, 2011).

¹ FOB stands for freight on board

3. RESEARCH AND PUBLICATIONS ON IMPACTS OF THE BOOM

3.1 ECONOMIC IMPACT AT A LOCAL LEVEL OF RISE IN EXPORTED QUINOA

The Bolivian Andes are characterized by high levels of poverty and a fragile, unfertile ecosystem. The inhabitants are also subject to political and economic marginalization, which limits options to improve their livelihood. Traditionally, quinoa played a minor role in Andean farmers' income generation, but an extremely important role in nutrition, social organisation and environmental sustainability (Jacobson, 2011). Healy (2011, cited in Banks, 2011) argues that the fact that Bolivian farmers had to seek out adequate technologies themselves for quinoa processing in Peru highlights the low public status of quinoa in Bolivia, despite the country's position as the world premier producer. However, Ofsehage, (2011) states that with quinoa achieving higher prices, it is affording farmers' greater economic stability, which, through producer organisations and co-operatives is translating into a degree of political power.

There have, nevertheless, been contradictory reports regarding the economic benefits of quinoa. Small (2013) argues that where weak, or non-existent, farmer organisations and co-operatives exist, the quinoa trade benefits mostly the middlemen. Healy (2011, cited in Banks, 2011) makes the point that were it not for the organization of producer associations in the late seventies and eighties, the benefits of the boom would have been a lot weaker. In contrast to Peru, Bolivian institutions provided relatively little support of the crop in terms of credit, marketing, processing or recognition of the food (ibid).

3.2 NUTRITIONAL IMPACT

There have been a great number of media reports that farmers are no longer eating quinoa and are instead purchasing less nutrition-dense staples such as rice or pasta (Blythman, 2013). This is generally attributed to the greater saleable profitability of quinoa as a result of the recent increase in demand. Additional reports go further to state that producers who used to consume quinoa as part of a meager diet are now facing issues of malnutrition as they are selling their entire crop (Collins, 2013). Such reports moved one consumer in a letter to the New York Times to offer to forgo its benefits in the interests of damage limitation:

'While I appreciate being able to find such a nutritious and satisfying product on the shelves of my local supermarket, I'd gladly give it up to ensure that Bolivians can afford to eat it. Having foods from around the world is a convenient luxury so long as others are not paying a hefty price for it.' (NY Times, 2011)

In response to these claims, there are mixed reports concerning the amount eaten by the farmers. Bolivia contends that quinoa is eaten more by its own citizens despite these rising international prices. However, authors such as Small (2013) contest this assertion. They point out that Bolivian middle class (urban) diets have changed to western processed foods, and in rural areas farmers' improved income is having the same effect. A subsistence issue becomes a nutrition issue too when quinoa is seen as a low status food, so there is an inclination to switch to a high status food, no matter how unhealthy it is (Blythman, 2013). Therefore, it is unclear if the quinoa farmers are indeed better or

worse off economically and nutritionally. It is a matter of concern whether the spike in global demand and higher prices are leading the rural poor who depended on local production of quinoa to suffer.

A second question must be considered as to whether or not the price that is paid in terms of loss of traditional way of life outweighs the economic benefits that quinoa affords. The self-denying Times letter writer might unwittingly deprive someone of an income and will not necessarily alleviate poverty and malnutrition among Andean farmers, who are among the poorest groups in Bolivia.

3.3 GAPS AND ISSUES WITHIN SCIENTIFIC KNOWLEDGE

Firstly, a review of journalism and media outlets found a great deal of speculation in regards to quinoa farmers' income, and the associated changes to their eating habits. Here is an overview of the titles which has been raised:-

Can vegans stomach the unpalatable truth about quinoa?	The Guardian	January 16, 2013
Quinoa: Good for you – bad for Bolivians	The Independent	June 26, 2013
Quinoa's Global Success Creates Quandary at Home	The New York Times	March 19, 2011
Quinoa Boom Puts Stress On Bolivian Economics, Environment	The Huffington Post	February 20, 2012
Quinoa: The Dark Side of an Andean Superfood	Times	April 3, 2012

Claims made by the English-speaking media regarding the recent growth in the global quinoa market and specifically changes to the farmers' food security are difficult to substantiate due to the paucity of empirical research and a lack of academic studies. Therefore, this research first aims to gain a better understanding of the current situation and contribute to these knowledge gaps on the situation of quinoa farmers, and then make assertions based on empirical evidence.

Secondly, there is a lack of verifiable production and export data. For example the Bolivian government, the FAO and quinoa producers' association all produce different statistics regarding quinoa. The smuggling of quinoa into Peru, the existence of an informal market and the lack of documentation all impedes the tracking of the amounts of the crop retained within the household (and eaten domestically) versus that which is exported overseas (Banks, 2012). In addition, there are methodological issues when assessing changes in eating habits and food security. Previous household nutrition research has relied on comparing food weights, for example, Laguna, 2003, and weight is no longer considered the best means of comparison of starches (Winkel et al., 2013). The research will contribute to an understanding of domestic consumption and the interchange of starches in Andean diets.

Thirdly, this research aims to have a greater understanding of food security by introducing a multidimensional approach. The production of quinoa needs to be understood in terms of global food security and specific local contexts (Banks, 2011). In order to determine food security, rather than a one-sided observation on either income or self-supporting food production, the research will analyse both economic effects through a sustainable livelihoods approach and food production and, most importantly, the interaction of these.

3.4 RELEVANCE FOR INTERNATIONAL DEVELOPMENT

Bolivian food production combines the role of food and economic security. Studying the quinoa trade provides a greater understanding of market based methods of poverty alleviation. In addition, there is little research concerning the effects of once obscure foods that become popular in the western markets (other examples would be chia seeds, amaranth etc.), rather than trying to green commodity supply chains such as tea, coffee or cotton that have existed for a long time.

4. BOLIVIA: CONTEXTUAL BACKGROUND

The Plurinational State of Bolivia is a landlocked country located in South America, bordered by Brazil, Paraguay, Argentina, Chile and Peru. The country is divided into three geographic zones: the semi-tropical Yungas and the valleys to the eastern slopes of the Andes, the tropical lowlands, and the Andes region, wherein lies the Altiplano, upon which the research is focused. The country is divided into 9 departments: La Paz, Pando, Potosí, Oruro, Chuquisaca, Cochabamba, Tarija, Santa Cruz and Beni. The greatest concentration of Aymara people, and to a lesser extent the Quechua, are found in the rural areas of the high plateau departments of La Paz, Potosí and Oruro.

4.1 BOLIVIAN ALTIPLANO AND BOLIVIAN FARMING METHODS

The Peruvian-Bolivian Altiplano is a high altitude basin between the Cordilleras Occidental and Central, two Andean mountain ranges 1100 km long by 120-160 km wide, of an average altitude of 4000 m. The area is covered in the sediment of extinct lakes and residues of large salty lakes. The humidity decreases from north to south, while salinity increases in the same direction (Quiroga, 1992).

The Bolivian section of the Altiplano is 800km long and includes the departments of La Paz, Oruro and Potosí, covering only 12% of the total land area of Bolivia (Quiroga, 1992). It is one of the highest agricultural areas in the world with an average altitude of 3900m above sea level. The environmental conditions are characterised by extreme low temperatures, irregular rainfall, low levels of precipitation, evapotranspiration and low levels of soil fertility (Cusicanqui et al, 2013).

The Altiplano region is characterized by semi-arid Puna grasslands and shrubs of low nutritional value. The soil tends to be low in nitrates and potassium. The erratic rainfall ranges between 300-600 mm per year, and is supplemented by scarce irrigation when water is available (FAO, 2006).

Sheep and camelids such as llamas, alpacas and vicuñas are kept in the Altiplano for meat, and provide also clothing and wool, thus traditionally constituting an important source of income. They were traditionally used to graze crop stubble in an attempt to maintain soil fertility. As the pastures have a low nutritional value, they are best suited to the native camelids, whereas animals such as cattle and sheep need supplementary animal feeds (FAO, 2006). Moreover, raising camelids is an essential component of Andean culture and tradition. The producers have traditionally combined communal and private lands, most of which is grazed to some extent by livestock (FAO, 2006).

4.2 BOLIVIA'S ECONOMY

Bolivia is the one of the poorest and most underdeveloped countries within Latin America. However, Bolivia's economy has grown at a higher rate than the Latin American average, averaging 4.9% a year since 2004. This was due to high commodity prices and a prudent macro economy policy. This has also meant that overall public debt has declined from 94% of the GDP in 2003 to less than 40% in 2013 (World Bank, 2014).

Bolivia's economy relies heavily on the export of raw commodities: natural gas, soy beans, crude petroleum, zinc ore and tin with the agricultural sector only accounts for 4% of total exports (CIA, 2010). This reliance means economic growth is vulnerable to changes in the global commodity prices (World Bank, 2014). However, as world commodity prices have risen, this has fuelled large trade surpluses. (CIA, 2010).

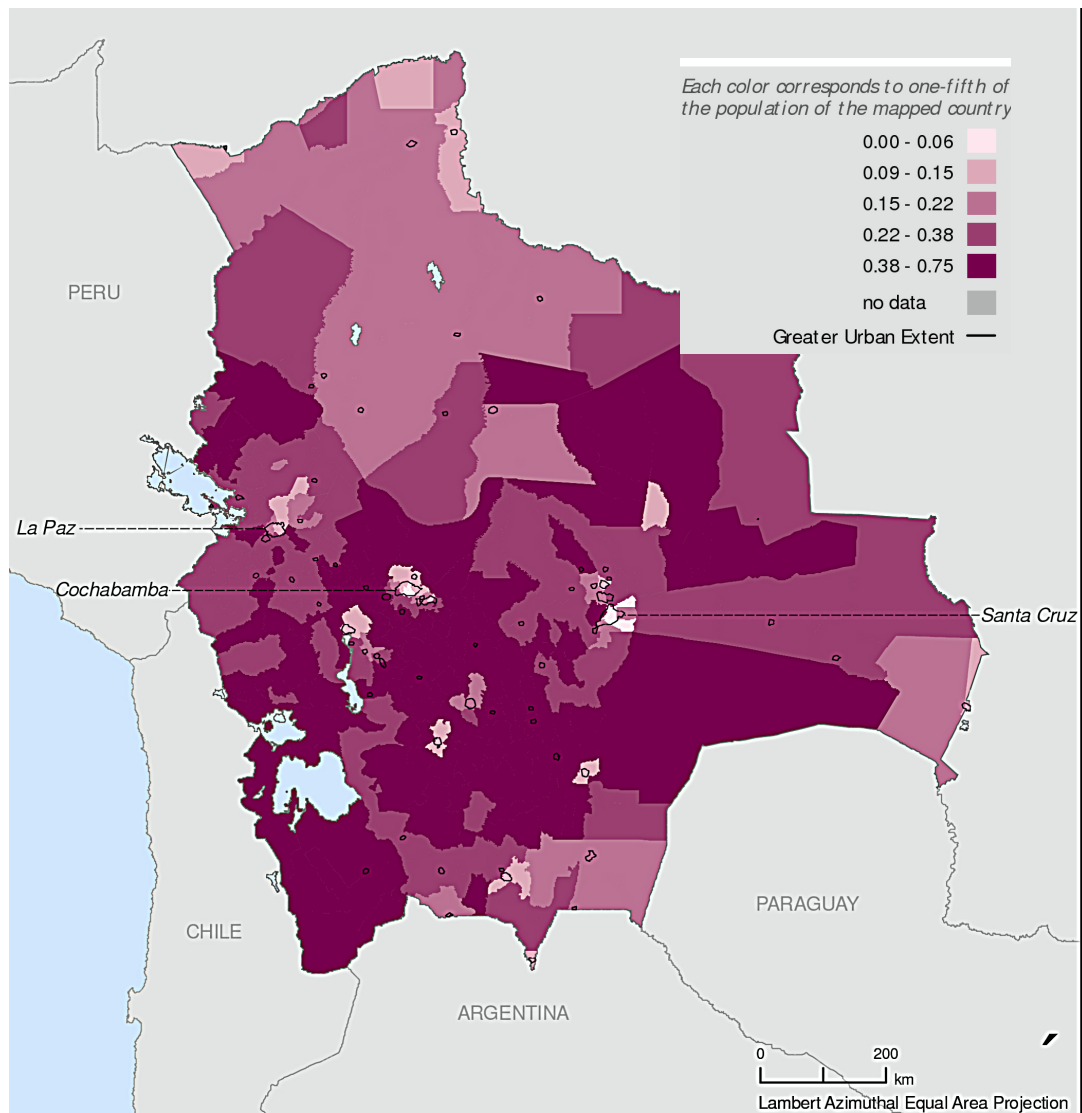
The level of poverty has been reduced under the Morales government. In 2005, poverty was at 63% and in 2011 reduced to 45.0%. Extreme poverty also reduced by 43% from 36.7% to 20.9% during the same period (FAO, 2012). Bolivia's improved economic situation is being seen through a real increase in household income alongside a range of social programs. The rapidly increased minimum wage, which in the period 2005 to 2014 increased by 87.7%, has benefited the poorest 40% of the population (Instituto de Estadística de Bolivia, 2014 cited in World Bank, 2014;).

4.3 AGRICULTURE

With its great agro-ecological diversity and differences in production, Bolivian agriculture is a very spatially heterogeneous sector (Cuesta, 2011). Intensive agricultural production and agribusiness, with a mix of large and small producers, characterize the eastern lowlands, with a focus on the export market. In the western valleys and highlands, the focus is on small units of food production for the domestic market, and the sector's contribution to departmental economies in this region ranges between 4% and 9% of GDP (Cuesta, 2011).

For the Bolivian economy, agriculture accounts for 13% of the GDP or 27% if agribusiness is included (Cuesta, 2011). However it employs 32% of the total population, with a large number of subsistence farmers (World Bank, 2010a).

The agricultural sector represents \$6.18 billion of the total Bolivian GDP of \$51.46 billion, but while agriculture only contributes roughly 15% to gross national product, it employs 90% of the economically active rural population, of which the large majority live in extreme poverty (Cuesta (2011; Jacobsen, 2011). Furthermore, this high percentage is despite the aforementioned decline in the rural population (World Bank, 2010).



Map 1: illustrates the differences in poverty in Bolivia by using the Poverty Gap Index, expressed in ratio of the poverty line (Center for International Earth Science Information Network (CIESIN), 2015).

Compared to other Latin American countries, Bolivia's agricultural production is low, and more vulnerable to adverse climate phenomena such as El Niño and La Niña, and there is a lack of adequate mechanisms to respond to such events. Historically, government spending on agriculture and rural development has been low. Resources have been focused on productive infrastructure such as roads, irrigation and rural electrification and less on agricultural innovation. Policies focusing on agriculture are now the main part of the government poverty reduction strategy in rural areas. There has been an increased amount of public spending, however this has not been uniform in all regional departments. Though government transfers are almost the sole income for departments, there is a discretionary element to the spending at lower levels (Cuesta, 2011).

4.4 RURAL POPULATION

The rural Bolivian population is concentrated in the valleys and the Altiplano Region, which include the quinoa producing departments of La Paz, Oruro, Potosi and

Chuquisaca. Bolivia has one of the highest proportions among Latin American countries of persons living in rural areas. More than 60% of the rural population lives below the poverty line poor and more than 45% are living in extreme poverty (INE, 2011). The average rural income is approximately US\$0.60 per day; this is 30% of the median urban income. Accordingly, the living conditions of the rural poor are worse than their urban counterparts. The rural population suffer a lack of access to basic infrastructure, such as water management systems, road connections or social services such as health care or education (INE, 2011). Extreme poverty is exacerbated by lack of steady employment, of access to safe water, of sanitation and of adequate nutrition (Morgan, 2011).

A report by Oxfam, notes that poverty in the Bolivian rural regions stems from a lack of secure and well paid jobs (Oxfam, 2009). Low productivity and inadequate opportunities to improve human capital (due to poor education) has led to a nation which suffers from persistent poverty and high levels of income inequality (World Bank, 2010a). Low productivity, stemming from small-scale and uneconomic techniques, is combined with high transport costs, little opportunity of outside work, and the low prices that farm products fetch on the market place. Accordingly, the rural-to-urban migration of people seeking to improve their situation has also increased. Figure 4 shows the increase in urban population compared to decrease in rural regions.

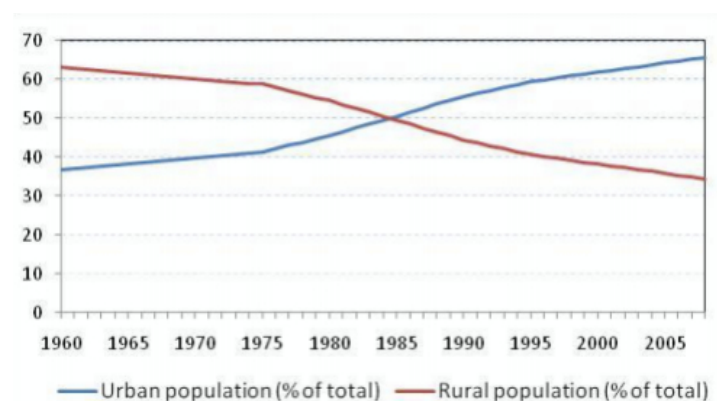


Figure 3: Comparison of Percentage of Total Urban and Rural Population (World Bank 2010 cited in Morgan, 2011)

It is important to note that under the Morales government there has been a reverse in the anti-rural bias and a strengthening of civil rights. The constitutional amendment of 2008 dramatically increased the resources and responsibilities of local government in areas such as the promotion of rural development, creation and maintenance of infrastructure. There has also been an increased recognition of indigenous culture and the aspirations of the indigenous communities, and an effort to involve civil society in local planning and decision making, and include marginalised groups (World Bank, 2014).

4.5 FOOD INSECURITY AND MALNUTRITION

Food security in Bolivia hinges upon being able to produce or purchase food. 40% nationally, and 59% in rural areas are unable to meet their requirements. 63% of persons in rural areas are unable to meet their daily calorific intake (FAO, 2013).

Extremely high levels of malnutrition in rural areas are detailed in data by World Food Programme, (2014) which estimates stunted growth in children under 5 has remained at 27% nationally, but exceeded 37% in rural areas and exceeding 40% in some areas.

Malnutrition stems from several causes: lack of food or income poverty is often combined with poor diet, persistent bouts of disease, lack of access to safe water and inappropriate nutritional behaviours such as insufficient breastfeeding (Morgan, 2011). The rural and indigenous population who depend on subsistence agriculture often find it an irregular and unreliable source of income and are prone to food deficits and natural disasters.

5. RESEARCH OBJECTIVES AND RESEARCH QUESTIONS

The research objective is to gain a greater understanding of how the recent boom in demand for quinoa has impacted the livelihoods of farmers, and whether this has led to improved and sustainable livelihoods and food security. More specifically the research will investigate how the changes from production of quinoa for household use to production for the export market have affected the farmers and the surrounding communities' livelihoods and food security.

Reflecting the objectives of the research, the main research questions are

To what extent has increased demand for quinoa for the export market led to improved livelihoods for Bolivian quinoa farmers? If so, how have these changes impacted their food security?

The questions require, firstly, an analysis of the overall well-being and economic livelihoods of farmers; and, secondly, whether the change from subsistence crop to export crop has impacted positively or negatively on their food security. The rationale for including the two elements is that Bolivian quinoa production is integrally linked to both food security and economic security for the smallholders whose livelihoods depend on it. In order to comprehend the multi-faceted sustainable livelihoods and food security issues, it is important to consider both. The following are the sub questions guiding the research:

- **How the increase in demand of quinoa for the export market impacts on quinoa farmers' livelihoods?**
- **What possible changes to Quinoa producer's household food consumption patterns and dietary choices since the growth in the export market?**
- **How farmers' food security has been impacted since the increase in quinoa for the export market?**
- **To what extent to has increased demand for quinoa is linked to farmers' increased income and their food security?**

6. THEORETICAL FRAMEWORK

The following will first outline the sustainable livelihood approach then the notion of food security. It will do so by clarifying the definitions, concepts, interlinking concepts and indicators, and the intended scope of the research.

6.1 SUSTAINABLE LIVELIHOOD APPROACH

The research was conducted according to the sustainable livelihood approach, which is a broad and systematic framework of how rural actors support themselves and their households. The approach considers that there is not one single monetary income cause of poverty, but that it also has political, cultural, social and ecological causes (Kaag et al. 2004, cited in Zoomers, 2008).

This approach aims to understand various sources of capital, one of the many factors in poverty, which persons utilize to sustain their livelihoods (FAO, 2013). These types of capital or assets are the following:

Capital	Examples
Human Capital	Skills, education, labour (includes good health and physical capacity)
Social Capital	Networks, social claims, social relations, affiliations and associations
Financial Capital	Capital base, money, savings, debts. And other economic access
Natural Capital	Natural resource stocks (soil, water, land, minerals). Environmental Services
Physical Capital	Houses, livestock, machinery, technologies Infrastructure – buildings and roads

(adapted from Scoones 1998, Bebbington, 1999)

These assets or capital (and subsequent livelihoods) are vulnerable to adverse events and changes, usually outside the actors' control, and are categorized in the below.

Vulnerability	Context and Examples
Trends	Economic, political or technological such as population, resources and economic indicators
Shocks	Changes in human or animal health, natural disasters, conflict or sudden economic changes
Seasonality	Prices, agricultural production, employment opportunities, resource availability

(source IFAD, n.b.)

These are usually negative events but they also can provide positive opportunities. Furthermore, perceived vulnerability and actual vulnerability are both important, as actors are subjective in the decisions they make regarding their livelihoods (Adato & Meinzen-Dick, 2002). It is to be noted that the approach sees people as active agents in the shaping of their future, focusing not on what poor people lack, but rather on what they have and on their capabilities (Chambers and Conway 1991; Zoomers 2008).

The framework acknowledges how policies, institutions and processes affect how people use their assets in pursuit of their livelihood. This can occur at multiple levels: micro, intermediate and macro levels (IFAD, n.b.), using formal or informal institutions, different levels of government, civil society and the private sector (Adato & Meinzen-Dick, 2002).

The figure below is DFID (2001) model of the sustainable livelihoods approach, to show how quinoa is researched within this framework.

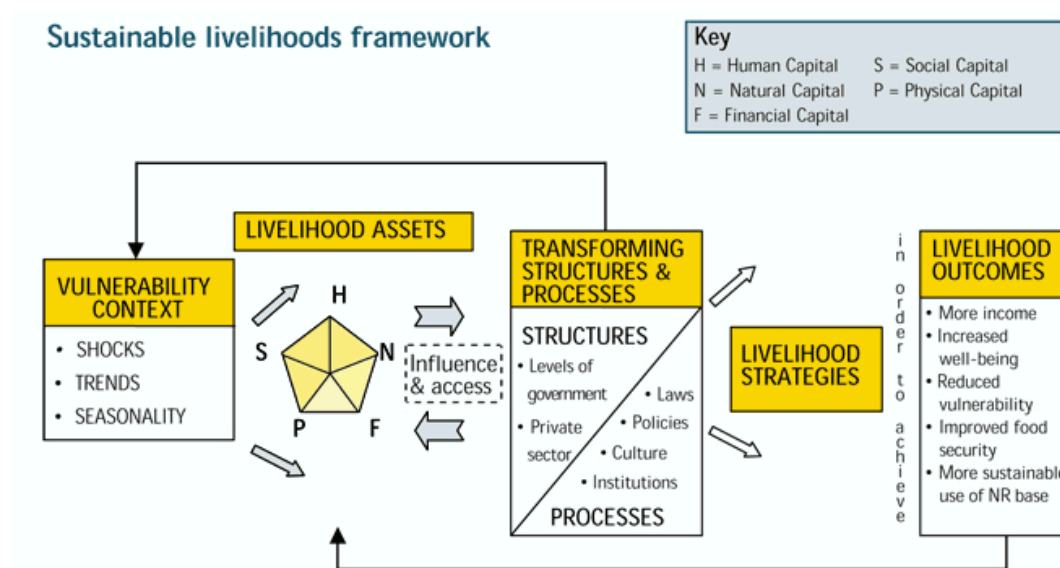


Figure 4: Model of the sustainable livelihood approach (DFID 2001, cited in practicalaction.org, 2015)

6.2 DEFINITION OF A SUSTAINABLE LIVELIHOOD

According to Chambers and Conway (1991), p.6 :

‘livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for means of living’.

A sustainable livelihood is where:

‘[it] can cope and recover from stress and shocks, maintain or enhance capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels in the short and long term’ (Chambers and Conway, 1991. p.6).

A livelihood is composed of the livelihood capabilities, activities, and intangible and tangible assets. A tangible asset is a resource such as land and domestic equipment or stores such as food stocks, cash savings and resources. Intangible assets are claims and access: claims constitute the demands and appeals which can be made for material, moral or practical support, whereas access is the opportunity to use a resource, store or service

to obtain information. It is out of these tangible and intangible assets, actors construct a living (Chambers and Conway, 1991). This concept with its interconnections and components is illustrated below in figure 6.

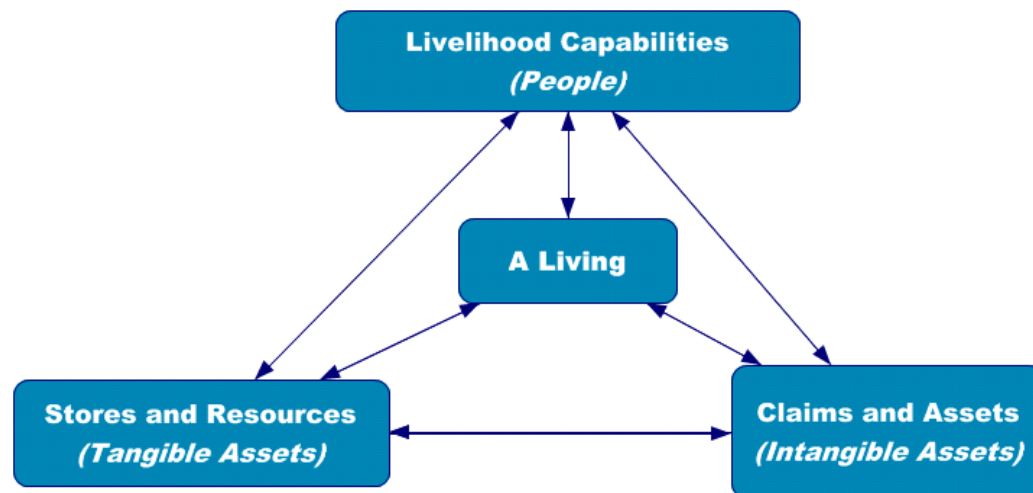


Figure 5: Figure to show how livelihoods are constructed (Chambers and Conway, 1991)

6.3 LIVELIHOOD STRATEGIES: PORTFOLIOS

Rural livelihoods frequently comprise of more than one source of income. Chambers and Conway (1991) identify three differing livelihood strategies:

- *Agricultural intensification/extensification*: Improving livelihood generation from agriculture, such as livestock rearing, aquaculture and forestry, through a process of intensification in order to create a greater output per unit area. This is achieved through capital investment or increased labour input or extensification, in which more land is put under cultivation.
- *Livelihood Diversification*: This is the process of adopting a range of off-farm income activities. This can be by means of investment in diversification in order to accumulate and reinvest, or to cope with adversity, or may be a permanent move when the on-farm activities cannot provide a livelihood. Diversification may involve a wide income earning portfolio to cover all types of stresses or may focus on developing responses to handle a particular type of common shock or stress.
- *Migration*: This is where a member or members of the household move away from the rural home in search of income generating activities. There is a great deal of differences within migration, and the effects and the moment patterns.

6.4 SUSTAINABLE LIVELIHOOD APPROACH AS A RESEARCH TOOL

The sustainable livelihood approach is not intended to be an exact model of reality and a strict tool for research. Instead, it presents a manageable way of understanding realities and differing and sometimes conflicting issues faced by producers when constructing their livelihoods. Therefore, while it is not the most direct way of examining economic impacts experienced by producers, it more importantly allows an understanding of the

intervening factors on multiple levels; and allows for other outcomes such as food security, providing feedback on vulnerability status and asset base. This approach is in keeping with the theme of the main research question, as it analyses the links and it also provides a structure for looking at conflicts of interest. A clear example of this is the expansion of economic assets by producing more to sell, while putting the natural resource base at risk.

6.5 OPERATIONALISATION AND SUSTAINABLE LIVELIHOOD INDICATORS

The research will look at the various outputs in order to examine, if the boom in the quinoa trade has indeed enhanced the producers livelihoods. The analysis takes, as its point of departure, the livelihood strategies that have been pursued in response to a combination of differing types of capital and resources, and the outcomes of those strategies. It also assesses whether institutional processes have enhanced or reduced the achievement of sustainable outcomes, such as food security.

The research will use the Scoones (1998) framework of livelihood outputs in order to understand the positive or negative impact of externalities to the quinoa trade upon the farmers' livelihoods. The outputs can be subdivided into 5 sub-components. These are:

- *Creation of working days*: This is the ability to combine various livelihood strategies to create gainful employment for certain portions of the year – whether it be subsistence production or wage labour.
- *Poverty Reduction*: The research will avoid measuring factors of income, but will assess the combination of poverty indicators, in line with sustainable livelihoods thinking.
- *Well-Being and Capabilities*: This refers to the human ability to do things, and includes conventionally measured concerns education as well as other factors such as self-esteem, happiness, stress, power and exclusion.
- *Livelihood Adaptation*: Resilience is the ability of the household to withstand, cope with or adapt to economic, social, political or ecological shocks and stresses. It is important to note that different types of stress require different mechanisms, including avoidance, repartitioning, resistance or tolerance (Payne and Lipton, 1994).
- *Natural Resource Base Sustainability*: Most rural households are reliant on natural resources to some extent. According to Conway (1985) this notion refers to the ability of a system to remain productive when subject to disruptive forces, stress or shock. Therefore, it is important to avoid depleting stocks of natural resources to a level, which results in a permanent decrease of the rate at which the natural resource base yields products or sources for households. As measuring the natural resource base is difficult, it is important to link the indicators of resource depletion or accumulation, with temporal dynamics of system resilience and livelihood needs (Scoones, 1998).

The first three focus on work and employment, and poverty reduction in relation to broader issues of adequacy, security, well being and capability. The last two elements focus on the sustainability aspect of livelihoods and the natural resource base. These 5

indicators are different in scope and therefore require a combination of techniques from qualitative and quantitative research methods.

To conclude, the framework will be applied to different levels, from quinoa farmer, household, and community, to region and nation. The reason being, it is important to show the different levels of interactions and their outcomes (Scoones, 1998) and this will be reflected within the research. The following shows the conceptual framework from macro and micro and also includes details concerning operationalization of food security.

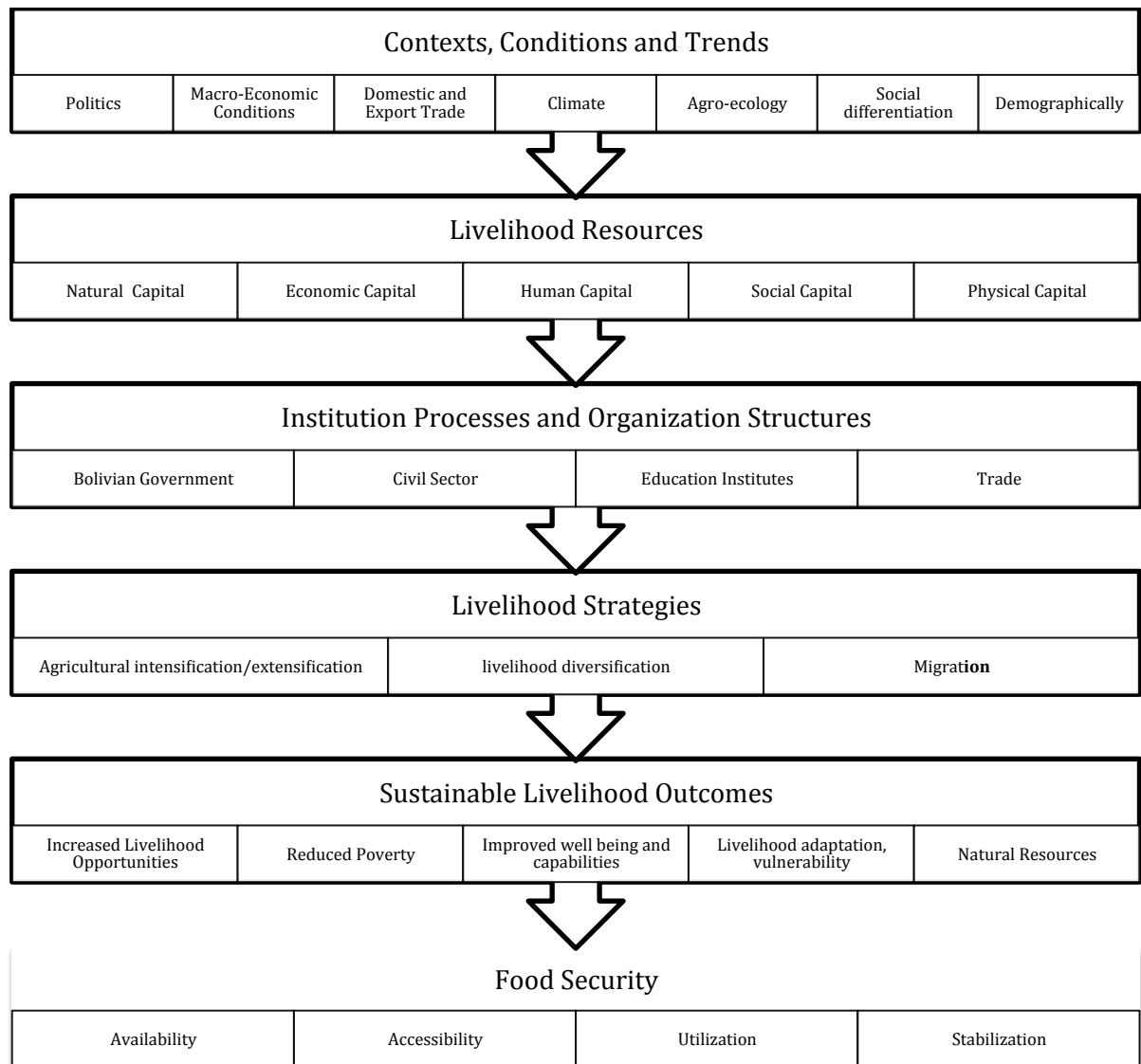


Figure 6: Figure showing the levels of differing levels of interactions and their outcomes within the sustainable livelihood framework and food security (adapted from Scoones, 1998)

7. THEORY OF FOOD SECURITY

7.1 DEFINITION OF FOOD SECURITY

Food security is defined thus:

‘people are considered food secure when they have all-time access to sufficient, safe, nutritious food to maintain a healthy and active life’. (FAO, 2006).

Conversely, food insecurity occurs when an individual household or nation is unable to meet its requirements through production, import or use of stocks and reserves. (WHO, n.b.).

The notion of food security goes beyond the mere absence or low prevalence of hunger (Palmer Keenan et al., 2001). Food insecurity in the most basic sense is when the households’/individuals’ resources are inadequate to simply obtain enough food to meet their basic needs. Hunger ‘the painful or uneasy sensation caused by lack of food’ presents a more severe form by which the condition is experienced but is not a necessary consequence of food insecurity (Anderson, 1990). Food security concerns issues of food production, labour, access to food, food safety and what is nutritious.

7.2 DEVELOPMENT OF FOOD SECURITY NOTION: FROM NATIONAL TO LOCAL

Food security is presently defined by the aforementioned focus on factors affecting individuals’ and households’ access to safe and nutritious foods. But this notion of food security has shifted in focus from the national to the household level.

Food security in its narrowest definition means enough food available from a global to local scale, and was simply measured by a country’s ability to access enough food to meet dietary energy requirements of its population (Pinstrup-Andersen, 2009). National food security has also been taken to mean self-sufficiency. Pinstrup-Andersen (2009) argues that national food sovereignty on the other hand is used to mean the extent to which a country has the means to make available the food needed, whether or not the food is domestically produced or traded. But issues arise about what is enough - to meet economic demand or nutritional requirements.

The global level of food availability depends on production and existing stocks. The national level of food security similarly relies upon a country’s natural resources, its abilities to produce food and its importation capability, which is greatly affected by its national income, the availability of foreign exchange, conditions and price markets. Food aid is also an external addition (Carletto et al, 2013). The household income together with national food availability affect the household (and individual access to food) either by direct access to production of food or market purchase of food. The intra-household allocation of food determines the quality and quantity that the individual ultimately has. Within this framework, it is important to note that there is a distinction between food security of a household and national security, in that the former has other needs that must be met out of the household’s budget and resources. This affects the individual’s nutritional access (Carletto et al., 2013).

7.3 OPERATIONALISED DETERMINANTS OF FOOD SECURITY

There are 4 central components to any operational definition of food security: Firstly, physical needs, ie., nutritional requirements and energy expenditure of individuals have to be balanced. Secondly, complementarities and trade offs between food and other basic necessities such as shelter, education, health care and household productive assets have to be taken into account. Thirdly, any operational definition needs to consider the time/space changes of actors' perceptions and responses. Finally, it needs to capture risk and uncertainty and, as important, actors' perceptions of risk and any responses (Maxwell et al, 1999).

The WHO organization states that there are 3 determinants of food security: food availability, access and food utilization (WHO, n.b.). The FAO adds a fourth pillar: the stability of food security over time (FAO, 2006).

- *Availability*: This is the availability of sufficient quantities of food or appropriate quality supplied by domestic production or imports, including food aid (Carletto et al, 2013). In relation to the household, food availability is the supply of food through production, distribution and exchange. The determining factors for food production include landownership, agricultural choices (crop selection, breeding and harvesting), environmental changes such as rainfall and temperature, unsustainable agricultural practices and the effects of these, including desertification, salinization and soil erosion (Godfray et al, 2010). Economic access to food items requires the existence of cash, bartering or exchanging systems. This necessitates the presence of an effective trading system of market institutions. Social exclusion and civil war hinder delivery of food items. Food distribution is a key factor as poor transport networks obstruct access to food.

- *Accessibility*: This refers to the actors' ability to access adequate resources or entitlements to acquire appropriate foods for a nutritious diet (Carletto et al, 2013). Accessibility concerns the affordability and allocation of food and the preferences of households (Godfray et al, 2010). Similar to issues of availability, it concerns the ability to purchase and/or have sufficient means to grow the households' own food. Factors affecting economic access include lack of money or goods/services to exchange, poverty making the individual or household vulnerable to rises in food price. The number and type of family members employed is another factor, as there may not be enough land to grow sufficient food. Entitlements are defined as a set of all commodity bundles, which a person can command, given the legal, political, economical and social arrangements of the community. This includes traditional rights such as access to common resources (Carletto et al, 2013).

- *Utilization*: This pillar of food security refers to the quality and quantity of food once it reaches the members of the household. Food utilization is adequate diet, sanitation, and health care to reach a state of nutritional well being which meets the physiological needs. This highlights the non-food inputs in food security, such as health, which is affected by

inadequate sanitation (Carletto et al., 2013). Areas of food quality and safety include food processing, conservation and hygiene, and nutritional values of the determined food choice. (Godfray et al. 2010). Also access to medical care, sanitation and education play a role in the prevention of contamination. Education has a great impact upon utilization of food and nutrition (Palmer Keenan et al, 2001).

- *Food stability*: Food stability is the ability to obtain and have stable access to adequate food at all times, independent of economic, social, political shocks or cyclical practices. Instability is either transitional or chronic, i.e. whether the food problem is persistent or short-term (FAO, 2006). Importantly, chronic and transitional instability are linked, as the reoccurrence of transitional food instability makes a household more vulnerable to food insecurity. This also includes issues of seasonal food insecurity such periods before harvest times. (Carletto et al, 2013).

This definition stresses the individual level and acknowledges the role of food quality and cultural preferences. It is noteworthy that there is a clear hierarchy evident within this framework; availability is necessary, but not necessary to secure access, but both these are insufficient to secure proper utilisation of food (Barrett, 2010, cited in Carletto et al, 2013). The notion of stability cuts across availability and accessibility (Carletto et al., 2013).

7.4 MARKET ACCESS AND HOUSEHOLD PRODUCTION

Economic access and/or household production levels determine food security. The former concerns the ability of the household to acquire food on the (informal) market by means of monetary payment or exchange. The latter concerns whether income meets the cost of food and/or there is sufficient viable land to grow the household's own food. It is important to note that self-sufficiency or crop production is not the same as food security. Food security can be achieved through both methods (household production or food purchasing) and a combination of both (FAO, 2006). The inter-linkages between production exchange and consumption are displayed below.

7.5 FOOD SECURITY ON THE NATIONAL AND INTERNATIONAL SCALE

The advantages of the commonly used framework are that it focuses on the active participation of actors, and it also shows how multi-dimensional food security is. However, it does not adequately describe food insecurity on a broader macro level, nor does it provide explanation and connection as to how economic, social and environmental processes affect actors, communities or countries. This is especially important as this research seeks to assess livelihood and its vulnerability to processes and institutions.

7.6 LINKING FOOD SECURITY AND ECONOMIC DEVELOPMENT

Food security and economic development are intricately linked. It is nearly impossible to succeed with one without making progress with the other. There is a correlation between high agricultural growth rates and falling rural poverty and increased food security. Strong agricultural growth leads firstly to lower food prices for urban and rural food buyers and secondly increased income generates opportunities for rural households

(Ravallion & Datt, 1996). Therefore, this research will look for links between agricultural developments in the quinoa trade and the economic development of the rural poor.

The above definition considers availability, access and utilization as core elements of food security and links them to the households' assets, livelihood strategies as well as political, social, institutions and economic environment.

7.7 SUSTAINABLE LIVELIHOODS AND FOOD SECURITY

The research assesses the move from a home-produced household staple to an economic crop, so it is important to understand food security within the livelihood framework. For greater food security to be the outcome, several sectors are required to be functioning at a beneficial level including agriculture, rural development, infrastructure, health, education and social protection, with a combination of short-term periods of migration, and long-term strategic investments (Cuesta, 2013). Therefore, it is important to see food security as an outcome of a sustainable livelihood but not as a single indicator on a specific level of analysis (individual/household/national or global). Under this framework, the research will study food security in the following ways:-

On an actor level, the research will focus on the household and the household perception of food security, using the commonplace definition, as well as the operationalized components accessibility, availability, stabilization and utilization.

On a second level, the research will focus on the trends and processes that have a direct impact on communities. Food security vulnerability will be analysed by considering the environmental, social and economical threats, in line with threats to sustainable livelihoods.

7.8 CONCEPTUAL FRAMEWORK

The focus will be on how developments or changes in agriculture and the increased global demand of quinoa have impacted diet and food security. The following conceptual framework highlights the main components of food security; the drivers, the levels of analysis and the interrelationship between the export quinoa trade in Bolivia from macro level to the household level. This clarifies the research process in order to answer the main research question:

To what extent has increased demand for quinoa for the export market led to improved livelihoods for Bolivian quinoa farmers? If so, how have these changes impacted their food security?

At a household level of the model, food security comprises accessibility, availability, stability and utilization. The framework highlights these links

The two determinants for achieving food security are food production and economic assets. Economic assets can be achieved by selling or exchanging goods or services (such as waged labour on the labour market) or selling the households' own produce for an economic return. Food production (and self-sustainability) is the other means to food security.

The determinants at the micro level of the model are social factors such as institutions, which include co-operatives, government and policies, and economic factors such as market demand. In the economic section of the flowchart, the profit from quinoa is affected by its market and trends of increased consumer interest at an (inter)national level. This has been linked to institutions, structural conditions and processes, for clarity of the model.

At macro level the conceptual model highlights globalization, how the global food chain reflects consumer demands in the west, and also environmental conditions, which can affect farming. It is also important to note that structural processes and conditions also affect the agro-environment. For example, poor farming methods such as monocropping and deforestation can be caused by a variety of factors such as lack of knowledge concerning best practices, increased pressure on the land for higher yields.

Finally, the link between economic prosperity and food security, the thrust of the research, is presented in green.

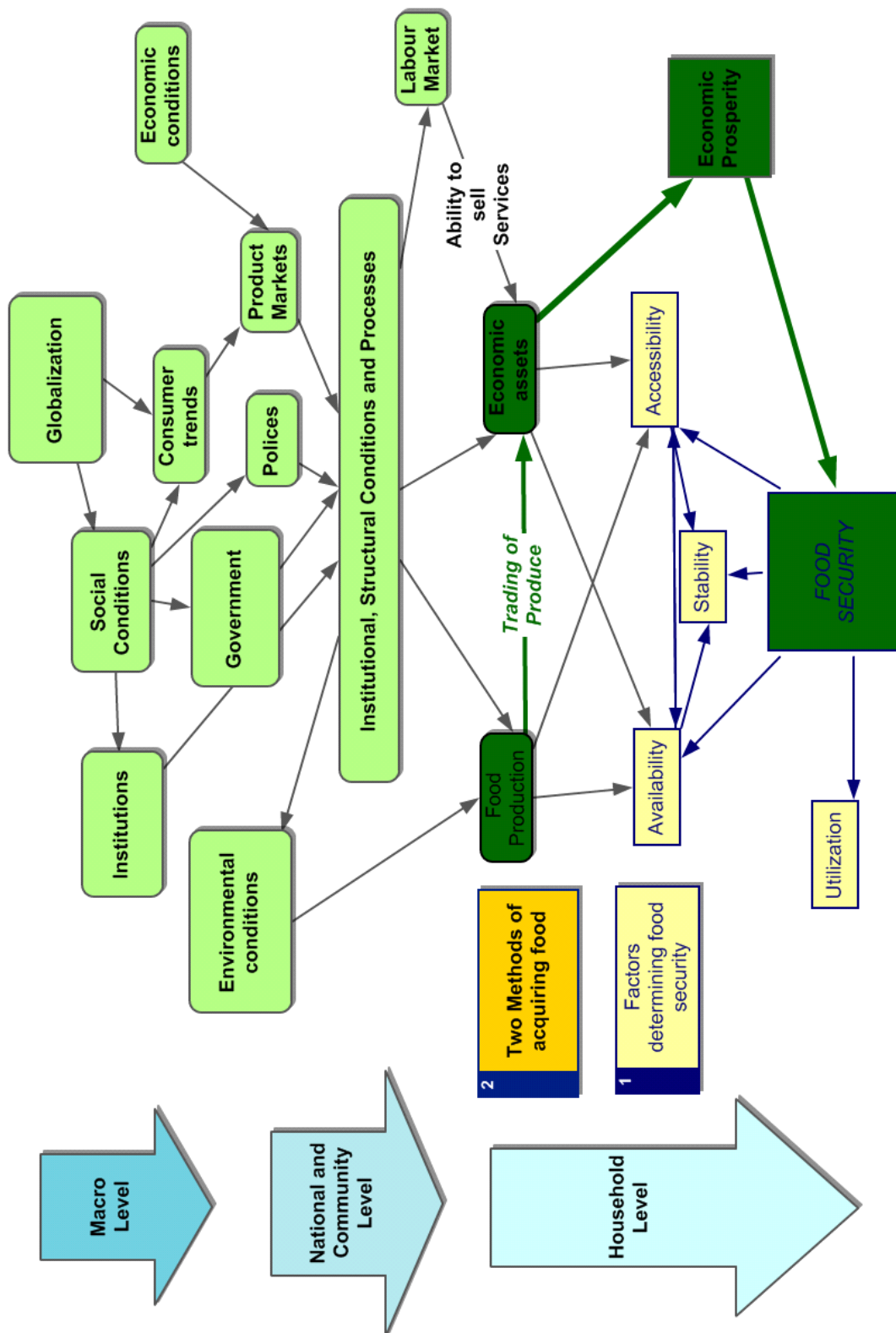


Figure 8: Conceptual Framework of Research

7.9 INDICATORS

There is no general agreement on how to measure the variables accessibility and stability directly nor how to achieve accurate measurements of safety, dietary quality or availability, therefore a proxy indicator will be used. The following highlights the indicators, measurements used and the assessment from previous research of the strengths of the tools.

7.9.1 INDICATORS AT HOUSEHOLD LEVEL

In order to assess availability, the research used the indicator of dietary diversity (the range of foods available to a person). This is because it highlights the accessibility of food stuffs, calorie energy availability and intake of micro-nutrients. This is considered to be the bench mark of food security as it can be compared cross-culturally. Using these criteria, research for US national data found that concern about food security was significantly lower among adults who reported lower intake of fruits and vegetables (Palmer Keenan et al, 2001). One method of assessment is to make individual nutritional assessments of food intake. However, for this to be accurate it requires a great deal of assessment of household compositions, age and sex of individuals, activity levels and physical state. In addition, there are no scientifically agreed correct amounts and proportions of nutrients gained from food sources. To overcome this, research will include open ended question to ask if there have been any changes to the source of participants' proteins, carbohydrates, fats, vegetables and fruits, as well as processed high sugar and high fat foods. The dietary diversity only captures the physiological aspect of food security (Maxwell et al, 1999).

A second indicator of food availability is an adaptation of the household food security scales, in order to understand the participant's anxiety and uncertainty about the household food supply. This looks at behaviours and coping strategies, which are indicative of an actor's perception of food insecurity (Coates et al, 1997). Coping strategies are the activities to which people resort to obtain food, income or services, when the normal means of a livelihood have been disrupted (Maxwell et al, 1999). The coping methods that are considered in the research are dietary change strategies, whereby less expensive food is adopted. Rationing strategies are considered long term changes, as are changes to the household structure, by decreasing the number of persons needing to be fed, therefore the research will also consider changes in the family structure.

The research will use retrospective food sufficiency questions concerning the previous 10 years, in addition to questions about their present experience and any current anxieties or uncertainty about their food supply. It is important to note that questions about food preferences aim to ascertain socially acceptable foods consistent with religious and ethical values rather than high end, luxury food. A low cost diet may meet energy requirements by ignoring household preferences and variations in expense to meet their needs (Pinstrup-Andersen, 2008).

7.9.2 INDICATORS AT MACRO LEVEL

Food security is a dynamic and forward thinking concept, which incorporates exposure to risks and capacity to react to them. The risk of becoming food insecure is determined by the frequency and severity of natural disasters and by their socioeconomic and geographical scope (Cuesta, 2013). Vulnerability to food insecurity – the heightened susceptibility of a household - is a function of how a household's livelihood would be affected by a specific hazard and how it would manage to cope with this impact.

This framework applies not just to individuals and households but communities, often dictated to by local, regional and national governments (Cuesta, 2013). The research argues that to isolate the household would be too narrow a focus, especially as the research is looking at the effects on a household of the increased global demand. The method of analysis specifically measures food insecurity and vulnerability by using a risk analysis framework that takes into account negative impacts, whatever their causes, and the resilience of households.

8. METHODOLOGY

8.1 INTRODUCTION

Both qualitative and quantitative research methods were used to assess the positive and negative impacts of the expansion of the quinoa trade on local livelihoods, food security and food consumption patterns. The field research was conducted between April and July 2014. The research was undertaken independently with no association to a company or non-profit organisation, and under the supervision of Utrecht University.



8.2 RESEARCH SITE

While quinoa is produced in many Andean countries, namely Peru, Ecuador and to a smaller extent Colombia and Chile, the research focused on Bolivia. Bolivia is the largest producer and exporter of quinoa among the native quinoa producing countries (FAO, 2014) and also one of the poorest countries in Latin America (CIA, 2014). This meant that any changes in household income and food production were more likely to have a significant and researchable impact. It is also the country in which the quinoa boom has been met with the most enthusiasm: the Bolivian president was the spokesperson of the FAO 2013 Year of Quinoa, the aim of which was to promote quinoa on the international business arena.

The high value, export-oriented crop, Quinoa Royal, comes exclusively from the Altiplano region, and the majority is sold on the export markets. This region is also traditionally the poorest, the inhabitants of which are often socially excluded and face a narrow choice of income generating activities.

The region is indicated on the map below.



Map 2: Research site in the Salinas, Altiplano Region of Bolivia (Source: <http://www.weather-forecast.com/locations/Challapata>)

The research took place mainly in the areas of Salinas, and the settlements of Challapata and L. Caberera.

The area surrounding Sucre was also chosen as it produces quinoa for domestic purposes, alongside other crops. The sample population was drawn from the Sucre region. This area was chosen in order to provide data that could be compared with that of the quinoa producers from the Altiplano. The Sucre producers would provide a contrast in the results because, firstly, they are able to grow non-royal varieties of quinoa which they mainly use for domestic consumption. They are also physically less isolated communities, and have differing and a greater number of livelihood generation activities.

8.3 DATA COLLECTION METHODS

To be able to fulfill the research objectives and achieve the differing levels of analysis, the data was gathered from field and desk research. The desk research included reviewing relevant literature and secondary data included research, discussion papers and statistics from educational, government and non-government organizations and profit-making entities. Field research included in-depth interviews with key informants and household surveys with the quinoa producers. These interviews were recorded, transcribed and later qualitatively analysed by key themes and connections. All respondents are quoted simply as key informants, as a number of them wanted anonymity.

The survey included 28 quinoa producers, and in depth interviews with 8 farmers. The key informants had a professional background and experience in the quinoa trade, food security and agricultural section; they included professionals in the private, non-profit and government sectors. Furthermore, ethnographic field observations were made during the research.

8.4 HOUSEHOLD SURVEY

The household survey consisted of 28 quinoa producers of the Altiplano and a comparable sample group of 28 rural agricultural producers in the Sucre region.

The definition of a household used within the research was a group of persons, usually related, living in the same accommodation, providing themselves with food and other essentials for living, with a pooling of their resources to a greater or lesser extent (OECD, 2005). The criteria for participating in the survey were that the person answering the questionnaire on behalf of the household could be of either sex but had to be over the age of 18 to be able to give consent to participate in the survey. The household had to produce quinoa as part or sole source of its income or household food production. They also had to be permanent residents (not migrant labour,) and reside in the Altiplano area.

The survey was used to gain a greater understanding of the changes in the sale of quinoa, economic changes, farming methods and dietary changes. A proportion of questions used in the survey were based on questions previously applied in research. The reason for appropriating these questions is that they have already been employed in the field and verified for any issues such as language problems, which this research did not have the capacity to undertake. The remaining questions were based on a literature review. The questionnaire consisted of both closed and open questions. The open ended questions were later grouped into categories.

The role of the questionnaire was to obtain aggregate responses to questions concerning agriculture, and reflections on changes, thoughts and links between quinoa production and food security. The first section of the questionnaire consisted of social economic questions. The second section consisted of an inventory of the agricultural crops and horticultural livestock, which farmers presently have, compared with 10 years previously. The next section consisted of questions concerning agricultural methods, changes relating to farming methods, inputs and outputs, as well as environmental changes.

The second half of the household questionnaire concerned food security. Firstly, whether there was sufficient food, and if not, did this result in reducing the size of portions, purchasing different items and/or missing meals, again using the baseline of 10 years previously. The latter part of the questionnaire elicited whether the respondent was eating greater, smaller or equal amounts of the common food groups. The groups were quinoa, simple starches (bread, pasta and rice), fruit and vegetables, animal proteins, foods of a high sugar content, and foods of a high fat content, and open ended questions about the reasons for the choices.

This section concerning dietary diversity was completed as such due to uncertainty over the accuracy of participants' recall of weight measurements or times. In addition, following the criticism of Winkel et al (2013), which is that the use of weight as a measurement for comparing starches etc does not provide an accurate reflection of how well hunger has been satisfied, because not all starches are equally filling and therefore not likely to be eaten in equal weights, making a weight comparison of consumption

misleading. The latter part of the questionnaire asked about preferences in food consumption and if respondents felt that health, food security and accessibility have improved. Questions of this nature were felt to be helpful because of the difficulty of being precise or specific about eating habits a decade previously, and of giving an account of volumes or weights consumed then. Therefore, the question Do you eat more or less of specific food groups? was asked. Questions were worded in such a manner that they were not culturally biased, value-loaded or implied that a western diet was the ideal.

When the questionnaire was finalised, a pilot survey was undertaken. The results of this highlighted any issues arising from the wording of the questions, such as appropriacy, clarity/vagueness, repetition or terminology, which could then be addressed. In addition, the pilot demonstrated that it was more appropriate to use a 10 year mark rather than a 5 year mark. The research tried to cover some issues associated with previous measurements of dietary patterns such as weights of starches not being fully comparable.

The questionnaire was an opportunistic sample, asking village households who were available during the day. This was significant, as a common trend is to have two homes, one in a more urban settlement and one in the countryside, and as the research was done out of season, there was no guarantee that the people would be working in their fields. Due participants' distrust of an outsider, a gatekeeper was employed. Therefore, research sites were chosen where a gatekeeper was available to introduce the researcher to the communities. The logistics of transport from key points was another factor in the choice of sites.

8.5 SEMI-STRUCTURED INTERVIEWS

An interview schedule was employed to guide the discussions and avoid excessive deviation from the research questions. However, the research was very flexible in that it allowed participants to elaborate on areas that they felt important. With the participants' permission, the interviews were recorded on a digital dictaphone, and brief notes were taken while conducting the interview.

Once recorded, interviews were later transcribed, keeping as close to the natural speech as possible. The transcript acknowledges the different speakers present such as researcher, participant, research assistant or translator, to understand the social context. If a Quechua or Aymara translator was needed during the interview, an English translation was recorded at the time of the interview. At times the recordings became inaudible, so these were marked as '[unclear]' on the transcript and the remaining parts of the speech were noted.

8.6 ANALYSIS OF THE DATA

The qualitative data was analysed by the patterns, themes and connections between phenomena. These were organised into themes in accordance to the research data/or theoretical framework.

The questionnaire survey was analysed using statistical software, SPSS. Not all the results are presented in the final report due to a variety of reasons, including: insignificant results; unreliable results; questioning seen as inadequate in hindsight. As the sample was convenient, the researcher cannot be confident that it is representative of the population as a whole, and the statistics should be seen as descriptive, highlighting correlations between the relationships in the case study. Any bias will be overtly stated in the research. For an example of the questionnaire see appendix 2.

By combining two different paradigms and the associated research methods, the aim was to facilitate better understanding of the processes involved with more accurate, valid, reliable and richer results (Bryman, 2004; Hulme, 2007). This research strategy combines the advantages of both methods such as the use of questionnaires to help to highlight trends, which were aggregated and comparable across groups. This could be later explored by the qualitative research.

8.7 ETHICS

The research was completed in a professional and ethical manner, fully respecting the participants' wishes, opinions and beliefs. A high level of integrity was maintained in relation to the welfare of the participants. In order to use information provided by participants, co-researchers or translators, informed consent was necessary. Informed consent covered the purpose of the research, the methods used, potential risk and benefits and alternatives, so that the individual was able to make an informed decision to be enrolled and continue in the study (Bryman 2004). Informed consent was obtained by explaining to the participants fully the nature and aims of the research, the researcher, Utrecht University and any positive and negative consequences. At no point in the research was deception used.

The participants were informed that they were able to ask questions concerning the research throughout the period and also able to leave at any time without giving a reason. Furthermore, participants were able to refuse to answer certain questions but continue with the research. It was ensured that any research assistants or translators were aware of this protocol and adhered to it. This was understood by participants, and a small number declined to participate or exited early from the survey. In addition, 4 participants refused to answer the most sensitive question concerning money received for quinoa. The participants were able to decide if the interviews could be electronically recorded, or if photographs could be taken and published. The direct benefits for the participants involved were limited, and that was explained to them.

Anonymity and confidentiality are very important elements in the research and will be protected. The research maintained confidentiality of the individuals involved. All notes and transcripts were kept confidential and made no mention of any participants' names. These will be destroyed after the final submission of the thesis. In addition, one key informant requested to be anonymous, therefore all key informants are only referred to by their area of expertise.

The no harm rule to participants included any negative physical, mental, social or economic effects (Bryman, 2004). The nature of the research meant that it avoided many sensitive issues. However, a foreseen issue was rural households being absent from their place of work, with a negative impact on their economic livelihoods. In order to cause no harm in this regard, an agreed timeframe of 40 minutes was adhered to and the interview was scheduled at a time and location of their convenience. Local translators and research assistant were paid for their time according to local wages and transport costs were covered by the researcher.

While this research did not use participatory research methods and the theoretical and ethic consideration of the co-creation of knowledge which it entails. In spite of this, there was a strong sense of empowerment among the persons studied, and often they wanted to participate so their voices would be heard, for example, many farmers wanted to give additional answers, explanations, etc, or entered into a discussion of additional details a non-Bolivian would know about the global quinoa trade. These details were discussed freely with participants who wished to do so.

9. SUSTAINABLE LIVELIHOOD RESULTS

9.1 INTRODUCTION

The following section investigates, within the sustainable livelihoods framework, how the demand for quinoa has impacted the livelihoods of the quinoa producers. It was based on the sub research question:

How does the increase in demand for quinoa for the export market impact on quinoa farmers' livelihoods?

As aforementioned, the sustainable livelihoods framework is a broad approach, so analysis uses the indicators deemed the most suited to the scope of the research. These were the creation of working days, reduction in poverty, improved wellbeing and capacities and finally improved livelihood adaptation. The first four report on significant changes in factors contributing to a sustainable livelihood, whereas the fifth, livelihood adaptation, is an analysis of the threats to and vulnerability of quinoa farmer livelihoods. Before this, the research will present an overview of the sample groups.



9.2 BACKGROUND TO THE GROUPS

The first group, referred to as the quinoa farmers or producers, live in the Altiplano region, and the comparable control group live in the rural region surrounding Sucre. The important difference between the groups is that the control group produce quinoa solely for domestic consumption. The different ecological conditions mean that this group have a greater ability to produce a variety of crops, and they are also less isolated and suffer less extreme cases of poverty (Morgan, 2011).

The main languages spoken by the quinoa farmers is Aymara and Spanish whereas in the control group it is Spanish and Quechua as shown in figure 8 and 9.

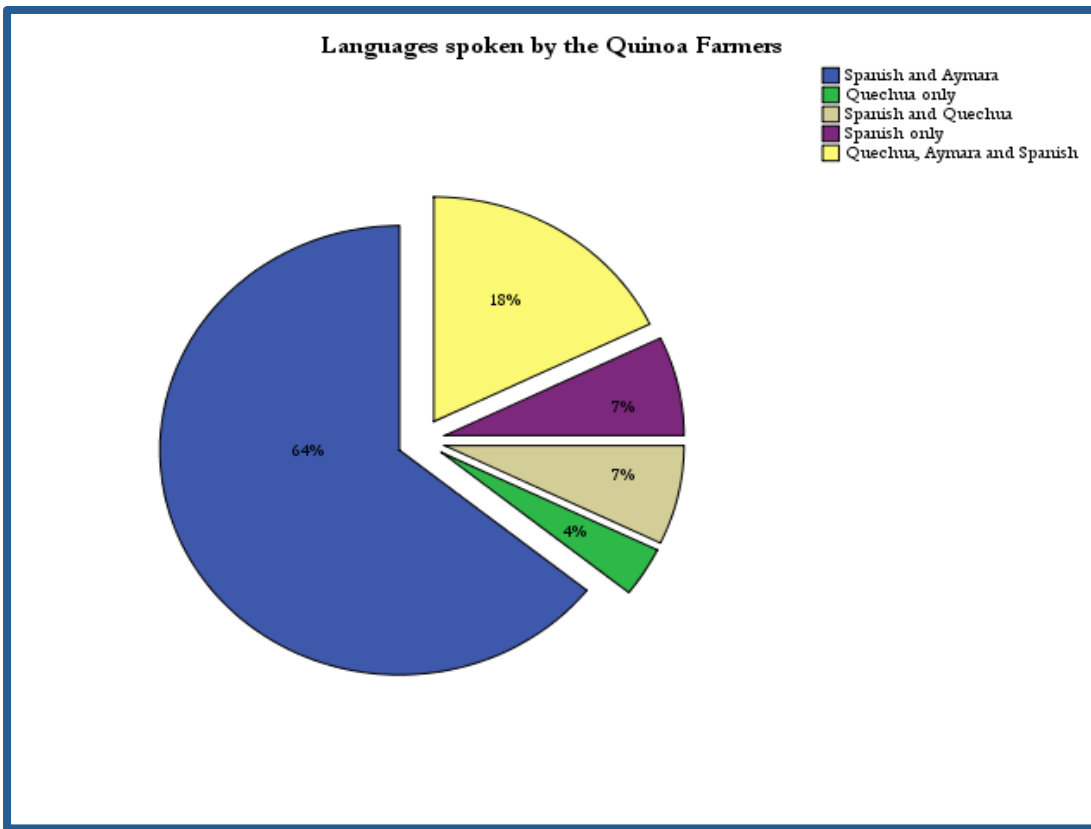


Figure 8: Pie Chart showing the languages spoken by the quinoa farmers

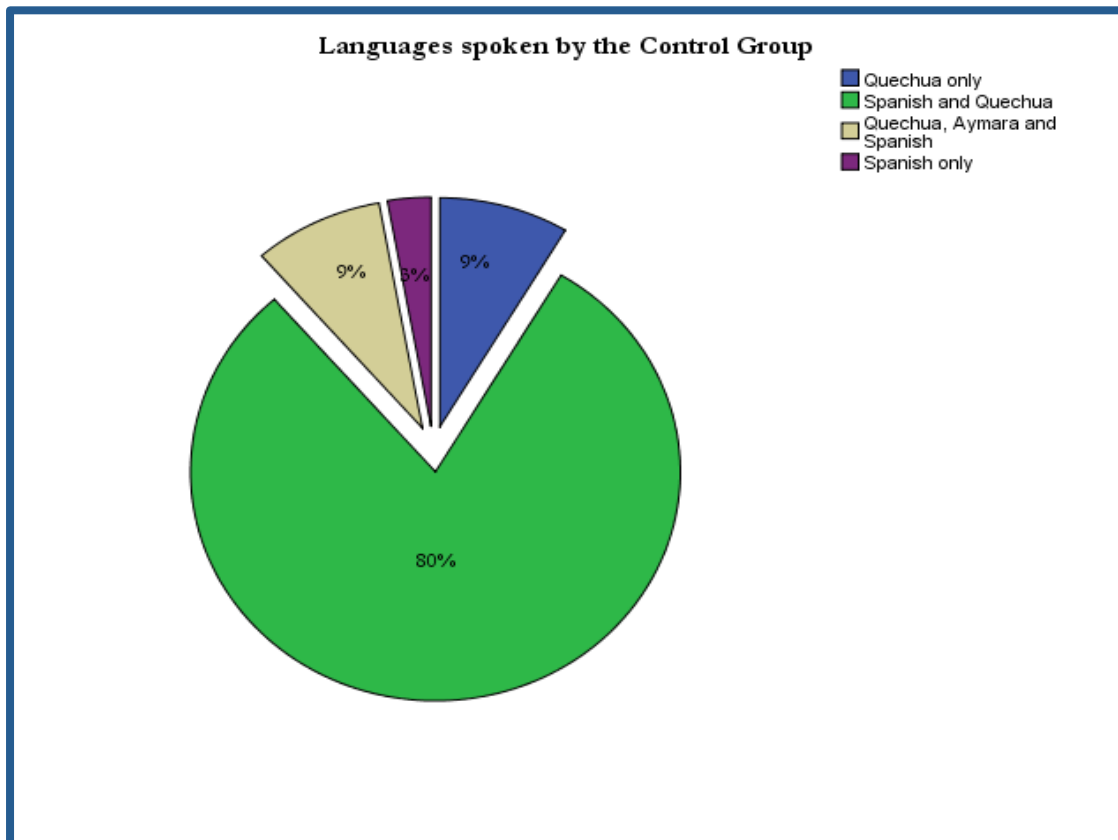


Figure 9: Pie Chart showing the languages the control group speak

The following graphs (graph 1 and 2) highlight the differences in principle household occupation between the two groups. As the graphs illustrate, the control group based in the Sucre region have a wider range of income generating activities, including waged labour such as mining, self-employed occupations such as artisans, and agricultural work that includes livestock. This contrasted with the quinoa farmers who depend on agriculture that excludes livestock, and have a smaller number of income generating activities, which did not fit into the pre-designed categories.

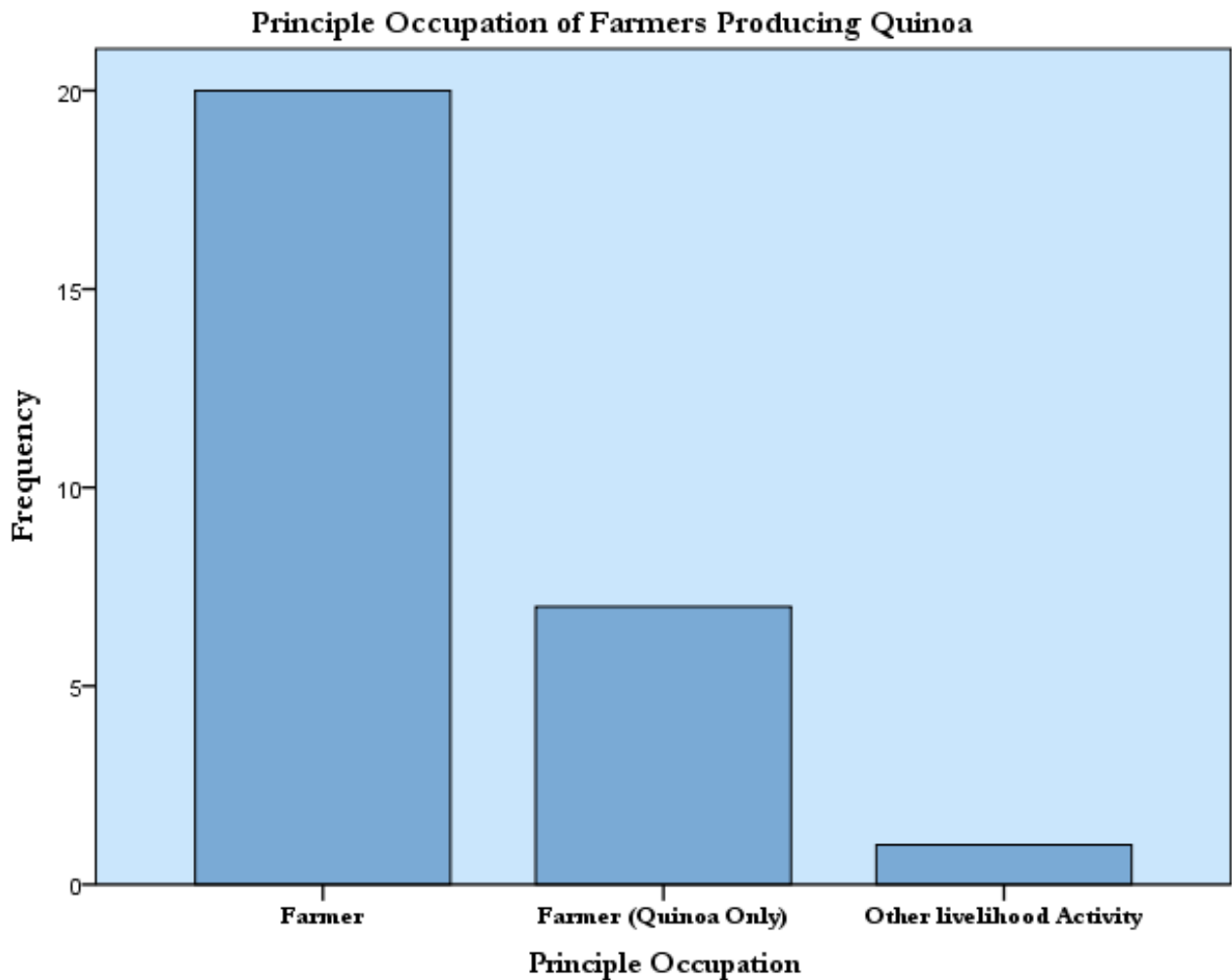


Figure 10: Chart showing the Principal Occupation of Quinoa Farmers

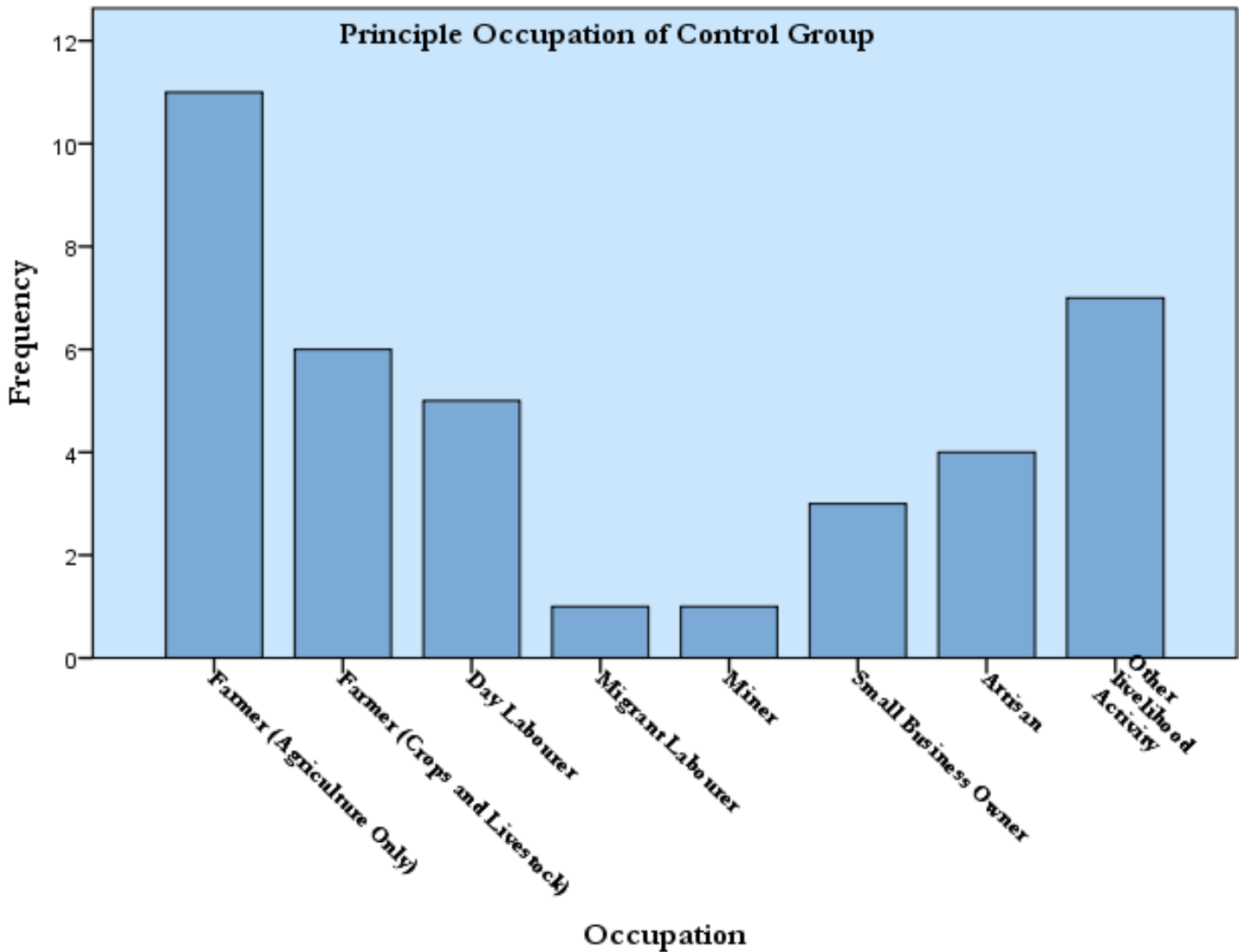


Figure 11: Chart showing the principal occupation of the control group

The amount of land owned by farmers ranged greatly from 0.5 to 100 hectares, with the average being 19.5 hectares. The amount designated to quinoa production was 73.4% of the land, with an average of 12.3 hectares per farmer. Previous research by Callao Perez (2004) notes that 50% of farmers hold between 0.1 and 20 hectares. It is noteworthy that the quinoa farmers with less land tended to allocate a higher proportion of it to quinoa production. As there was a high rate of refusal by respondents from the sample group not the quinoa farmers group ? to answer the question concerning amount of land owned the low number of cases made it necessary to dismiss the question.

Among the Altiplano farmers, 89% stated that they owned the land on which they produced quinoa, and the remaining cases stated that the land they used was community land. In regards to land rights among the sample group, 75% stated that they owned their land, 2% rented their land and 8% used community lands. The remaining responses were 'did not know' or 'prefer not to say'.

No respondent from either group reported receiving any remittances, however the research believes that the wording was at fault, causing miscommunication. Similarly, the data collected to compare education levels had to be dismissed on grounds of miscommunication because it indicated that the quinoa group had an extremely high level of education (95% higher level or degree level) and this would have invalidated the results or a comparison between groups.

9.3 SUSTAINABLE LIVELIHOOD INDICATORS

The results presented below are based upon the sustainable livelihoods framework, as detailed in the theoretical concept section. The results are grouped as follows: changes in the livelihood development; the creation of working days; reduction in poverty; improved wellbeing and capacities and livelihood adaptation. Changes in the producer's assets and capabilities, different types of capital (human, physical, financial, social and environmental) and the impacts of processes, institutions and policies will be commented upon within these indicators.

9.4 POVERTY REDUCTION

While poverty is an issue with a multitude of factors, poverty reduction within the context of this research relates to the ability to lift oneself out of poverty, and concerns financial capital (economic growth, capital base, savings and other economic access) and physical capita (improved living standards, housing, transport and basic amenities). Poverty will be assessed relative to the past, because this research is about changes to farmers' economic situation since the rise in demand for quinoa.

Firstly, the research confirmed that the production of quinoa has moved from being a subsistence activity to a viable income generating opportunity for inhabitants of the Altiplano. The research asked how much a farmer was paid for a kilo of quinoa currently and 10 years previously. From the 23 responses, the minimum a farmer receives is \$2.70 per kilo, the maximum \$5.40, and the mean average \$4.76 per kilo. 10 years previously the lowest was \$0.15 per kilo, the maximum was \$1.75, making an average of \$0.74. Therefore on average the farmers have had a 543% increase in the gate price they receive for quinoa. It is important to note, that the above figures only represent price per kilo, and do not indicate the amount the farmer earns in total: to ask a direct question about total income was deemed too intrusive. Furthermore, we also know that quinoa farmers have maintained or increased the area of land on which they produce quinoa (as no participant stated that they had reduced it) then overall income has increased. This finding is further confirmed by the response of the quinoa producers who, when asked if they had noticed a significant increase in their income, responded 88.5% in the affirmative.

The participants were asked if they noticed an improvement in their standard of living in the last 10 years, and the results are presented in the chart below.

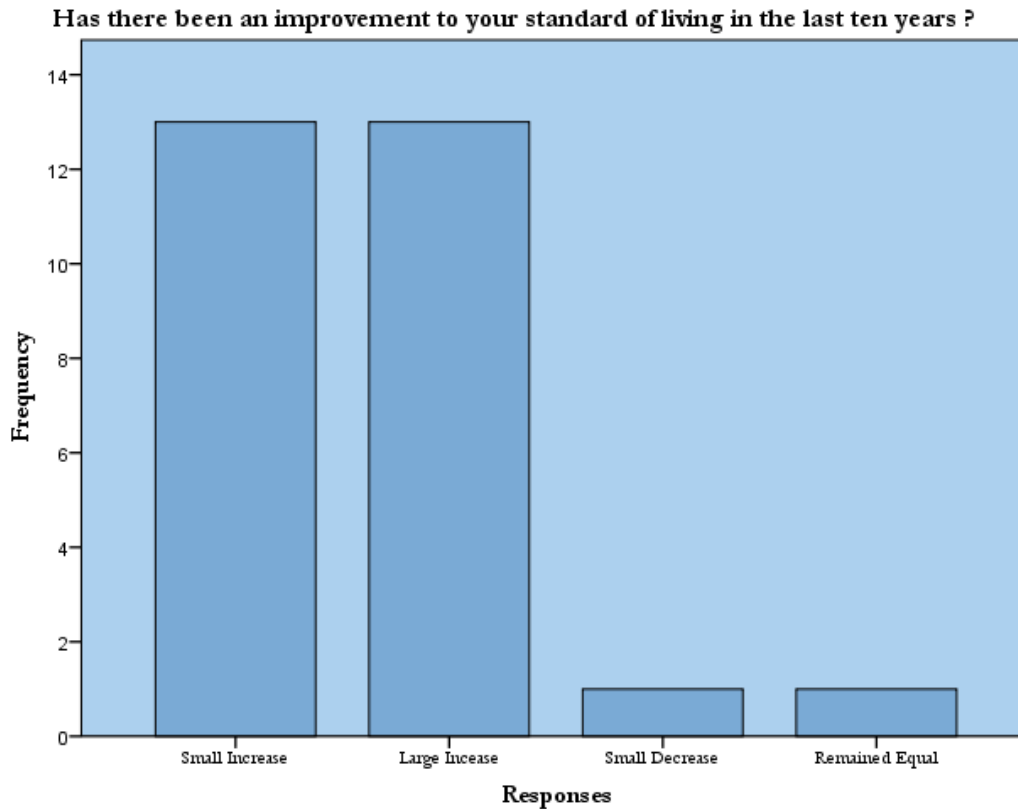


Figure 12: Chart showing frequency of responses to the question regarding an improvement of their standard of living.

The chart shows that the 26 respondents out of 28 cited a small or large increase in their standard of living.

The increased income brought tangible benefits, as evidenced by what the respondents could now afford to buy. The figure below shows to what use they put the extra income, and the frequency of these responses.

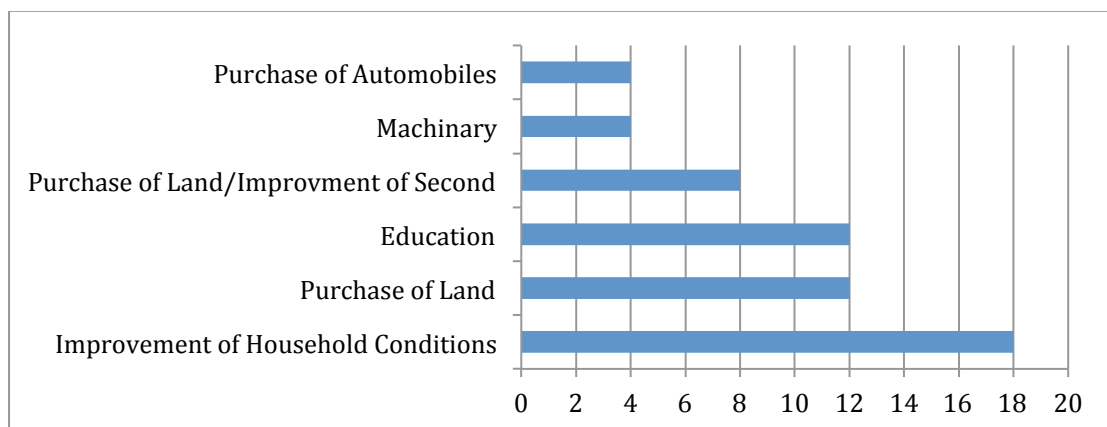


Figure 13: Frequency of responses to what benefits the additional income has been used for

The research found the benefits cited by the participants mainly focused on investment in property and houses. On a household level, these included the buying of lands and

construction of a house or home improvements. The majority of those surveyed had at least two residences, in the rural area near their agricultural land and/or in a nearby settlement such as Challapata, Oruro, La Paz or El Alto. There was a preference for living in urban settlements, because of their accessibility to a greater number of services such as health care and higher education establishments.

Nevertheless, the dramatic increase in income from quinoa may not necessarily translate into long-term poverty reduction in the area. One issue is management of household resources: capital is spent on high cost items rather than invested in assets which would enhance long term livelihoods and reduce vulnerability. One example is the purchase of new and expensive automobiles; as one quinoa farmer noted: everyone has a hammer now. A key informant, a leader of a local quinoa community group expressed the opinion that the new owners of upmarket vehicles were unaware of the rate of depreciation of their purchase.

A second important point is that the investments made in housing are not necessarily in the quinoa producing areas. Money is put into assets outside the region, often when farmers buy second houses and invest physical capital in urban areas such as Potosí, Oruro, La Paz and El Alto. This reflects a divide in attitude, whereby some farmers use the income for long-term business investment, whereas others farmers think in terms of short term cash generation enabling them to move away. This causes a fracture at a community level: the little investment in housing or other amenities in the region causing resentment to long-term inhabitants.

9.5 WELL-BEING AND CAPACITIES

This section focuses on improvement to social capital such as skills and education, and human capital such social claims and social relations; and also factors such as self-esteem, happiness, political power and exclusion.

The greater wealth has allowed access to health care and educational opportunities. The only non-material benefit cited in the survey was education; the increased income has allowed more children in the family to be sent to school and for longer in order to gain higher education. On a community level, a market now exists with quality and quantity requirements and this has now transcended into opportunities for skilled technicians. The key informants from the non-profit sector spoke of new projects being developed to meet this gap by training persons from this area.

A component of poverty and inequality is social exclusion and discrimination. This applied particularly to the Altiplano communities. Previously, quinoa was deemed food for the indigenous and even used as animal feed. Recognition of the benefits of the indigenous grain and its new status as a “super food” has increased self-esteem and a pride among the communities, and created a greater respect for indigenous culture.



For many communities, this has translated to political power which was previously commented by the work of Ofstehage, 2011). But it is important to note also that this has happened at the same time as the Evo Morales government reforms and national support of indigenous culture. From the qualitative interviews, many of the older generation of farmers stated that

they no longer felt excluded in local politics and felt that through their community groups they had new channels to be more politically involved.

With quinoa production now a viable income opportunity, there is less necessity for persons of working age to leave the altiplano area to find employment. This has meant that family units are able to stay together, whereas previously it was mostly the older and younger generations who resided in the Altiplano area. Within the qualitative discussions, many persons talked about how this brought a greater sense of community and family life.

However, with the return of migrants, who differ in the actions and outlook from the traditional way of life in the altiplano region. This causes social tensions to arise, often due to land disputes. Community social relations are strained when ownership is under threat from another person laying claim to land. Disputes can be between family members and returning migrants who have been away for a substantial time. During a qualitative interview, the respondents noted that these issues are being resolved within communities, however it is unclear how effective this is.

9.6 CREATION OF WORKING DAYS



The difference between the creation of working days and poverty reduction is that the latter focuses on the opportunity of income generation rather than solely upon the amount of earnings.

The first indicator of an improved livelihood is the creation of a greater number of working days and of a greater output from a days' work. This relates to the following proxy indicators:-

- Reduction in migration, that is, persons needing to move away to find income

generation activities

- A change and/or greater opportunities in livelihood generation activities

A reduction was found in the number of persons of working age (deemed 15-49) migrating from Altiplano to find work. The results from the questionnaire found that 8 households of the quinoa group reported at least one family member returning to the Altiplano region, but the number of migrants range from 1-4 per family. 27 cases had someone working from age s living in the Altiplano and 32% had been living in the Altiplano for less than 10 years. This indicates that there is a less of a need for migration, as the work from quinoa is able to provide a livelihood activity.

The household survey also found a great number of changes to livelihood activities since the profitability of quinoa. The research asked if the principle source of income of the participant had changed in the last 10 years and the results are displayed in the chart below.

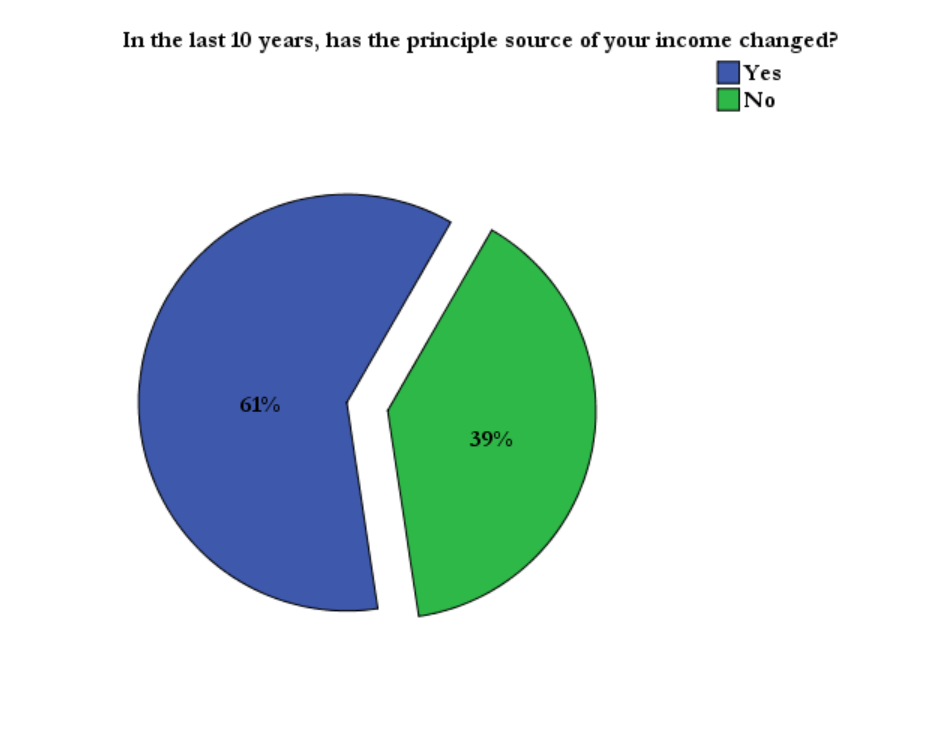


Figure 14: Pie Chart showing the number of respondents whom stated either 'yes' or 'no' as to if their livelihood had changed.

All of the 61% of respondents who answered yes cited the profitability and viability of quinoa as the reason for them to change their principle source of income. Additional comments made in response to this open ended question included 3 cases citing greater transport links as the reason for quinoa's greater viability; in one case that opportunities working with/for community groups had developed and in 5 cases the main income had moved from the sectors of mining or transport.

Returning migrants had greater entrepreneurial skills and would return with capital saved and more skills and knowledge. They set about increasing the profitability of quinoa – by means of farming methods to increase production or by increasing area of land, which will be discussed in the later sections. Or they would often seek out additional income generation activities, such as starting a small business such as shops, restaurants or leasing out farming machinery. This could sometimes cause friction as it challenged the traditional norms of the community.

9.7 NATURAL RESOURCE BASE STABILISATION

As the production of quinoa is reliant on the natural environment, the research focused in detail on ascertaining how this has impacted natural capital of the agricultural base. The research showed that farmers were adopting methods of cultivation associated with environmental stress and the undermining of the natural resource base, having a direct negative effect on the natural capital and resource stocks, thereby increasing the vulnerability of the farmers.

Quinoa is normally grown after a long fallow period and the application of manure, and the harvesting, threshing and cleaning all completed manually. However, these methods are being abandoned to increase the volume of quinoa. For a greater income, a farmer simply needs to produce a greater volume to sell. This has led farmers to change from the traditional methods to more intensive ones that involve the abandonment of livestock, shortening the quinoa cycle period to 12 months (by shorter or no fallow periods, shorter harvesting periods, and elimination of crop rotation) . Or they can increase the area of land used.

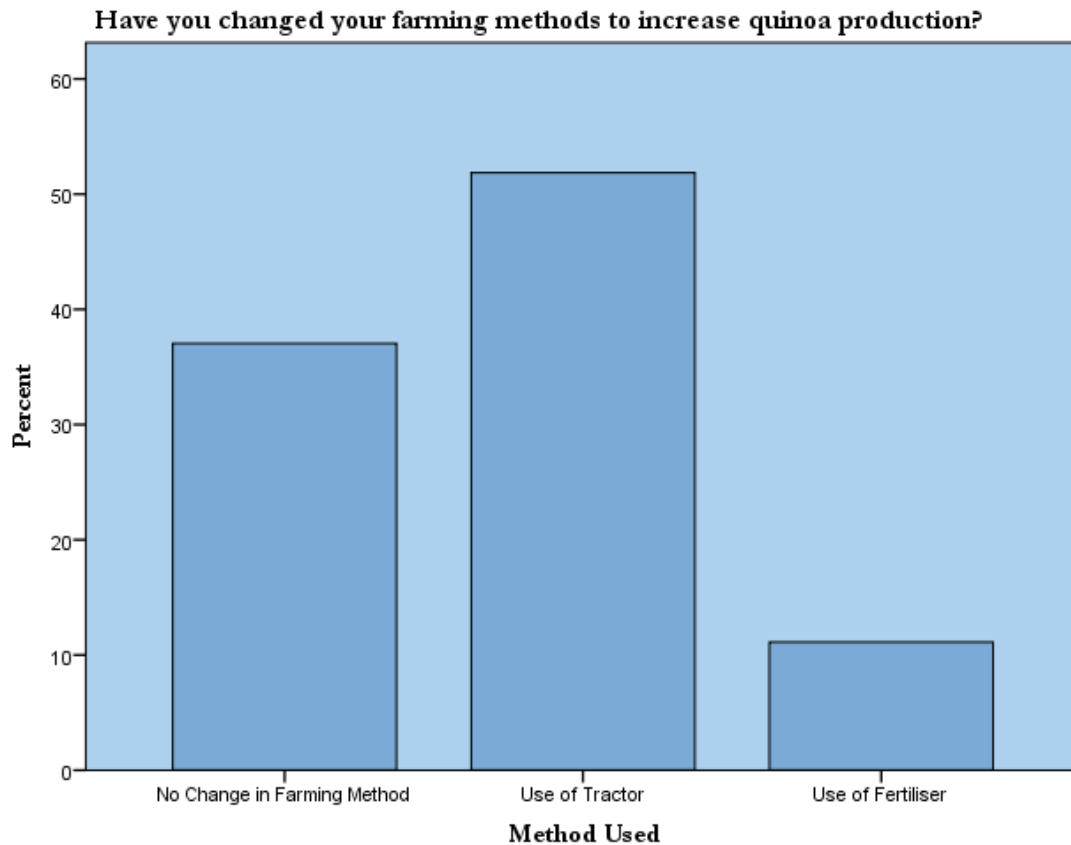


Figure 15: Bar chart to shows the percentages of methods used to increase the volume of quinoa

Mechanisation of farming methods means that a farmer can produce more quinoa than a counterpart can by hand. Indeed, without the availability of tractors, it is highly unlikely that farmers could take on a greater area of land. However, mechanisation means it is easier to extend onto virgin lands, which reduces the natural vegetation that is feed for the livestock (Félix and Villca, 2009). In addition, the disc plough and sowing machine degrades soil fertility (PIEB, 2009, cited in Jacobsen, 2011).



A second change to farming methods is the substantial reduction in traditional livestock in combination with cultivation, diminishing the supply of manure. The central issue is that the number of llamas kept has been reduced in order to convert land to more profitable quinoa production, despite the necessity for manure. Consequently farmers are

using less animal manure from their own livestock or buying it, or using chemical or organic fertiliser or using none. The following chart 5 shows the different types of manure used.

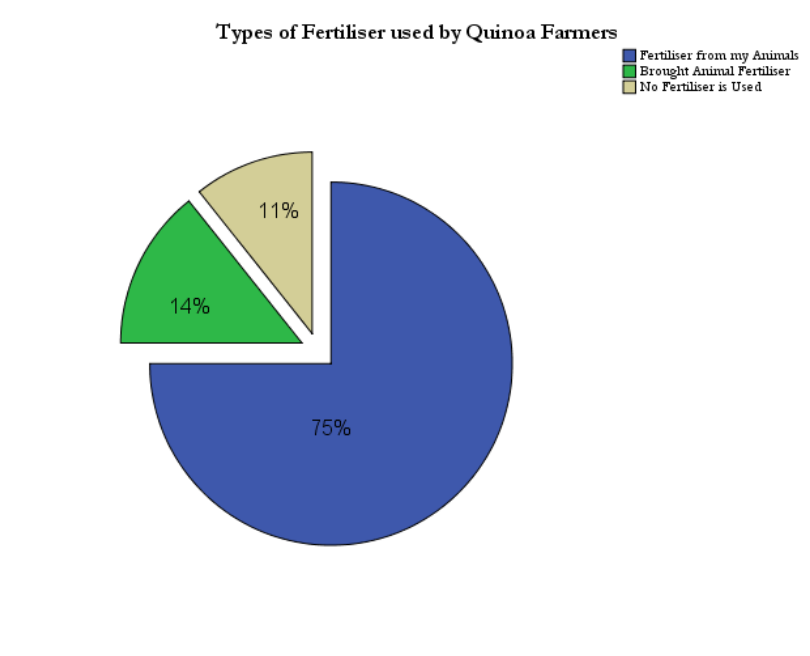


Figure 16: Pie Chart showing the type of fertiliser which is applied to the quinoa fields

A smaller amount of manure is not substantial enough to fertilise the land. This trend is confirmed by Jacobson's study (2011) in which he observes llamas are being removed from their natural pasture. The author notes, further, that even where llamas have been retained, lack of knowledge about producing good manure means that fresh manure, containing weed seeds and disease spores detrimental to the crop, is being used instead of applying decomposed manure.

A second change to the traditional farming methods, which came to light in the qualitative research but did not arise in the questionnaire, was the reduction in the traditionally long fallow period, which is necessary for the soil to store moisture as there is insufficient annual precipitation, and also reduces pests and diseases and restores fertility. At high altitude these biological processes require a minimum of 10 years (Joffre and Acho, 2008, cited in Jacobsen, 2011).

Félix, in 2008, noted that the reduction of the fallow period from 2-6 years to 1-2 years, has resulted in a progressive reduction in the yield of quinoa over the last 20 years (cited in Jacobsen, 2011).

Jacobsen, S.E., (2011) argues the biodiversity of the species is being reduced as farmers are only planting the types of quinoa that sell. The research found that this was not the case, as none of the quinoa farmers reported a reduction in the eco-types of quinoa

planted. However, it is important to note that the farmers of this research are from a relatively small area which is known for specific ecotypes of quinoa that are particular to its ecosystems.

The final way in which farmers are increasing the volume of quinoa produced is to expand the total area of lands designated for quinoa production. As previously mentioned this reallocation of land is having social impacts, as well as negative environmental impacts.

The research asked the farmers about the extent of land they use, and the proportion given over to quinoa production and how these amounts have changed in 10 years. The research found that of the quinoa farmers 28.6% had expanded their land, increasing quinoa production in the same proportion; 32% increased their quinoa production, but their overall size of land had not changed, and the remaining farmers had not increased their land or the amount designated for quinoa production. The research then went to on examine what type of land was expanded upon and what it had been used for in the past. (shown on chart 6 and 7)

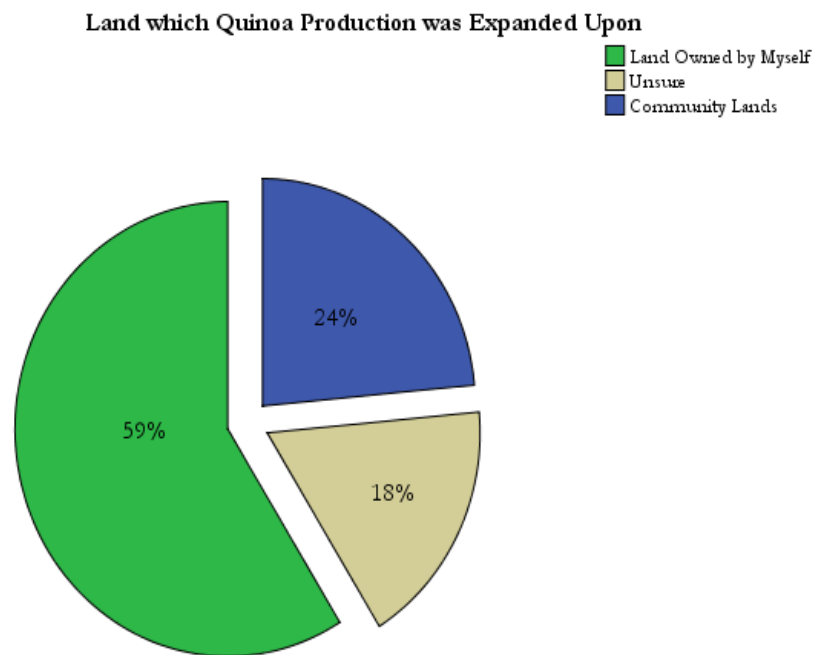


Figure 16: Chart showing what land was expanded upon.

Farmers are using lands on which quinoa was not traditionally grown, such as virgin land, mountainsides, community lands or land which was previously used for other crops or livestock. Jacobson (2011) notes principally the loss of virgin lands. However this research found that 63% of converted land was previously used for livestock, as

demonstrated by the chart 6 below. However, sensitivity when talking of community issues may mean that some respondents were reluctant to give the full picture

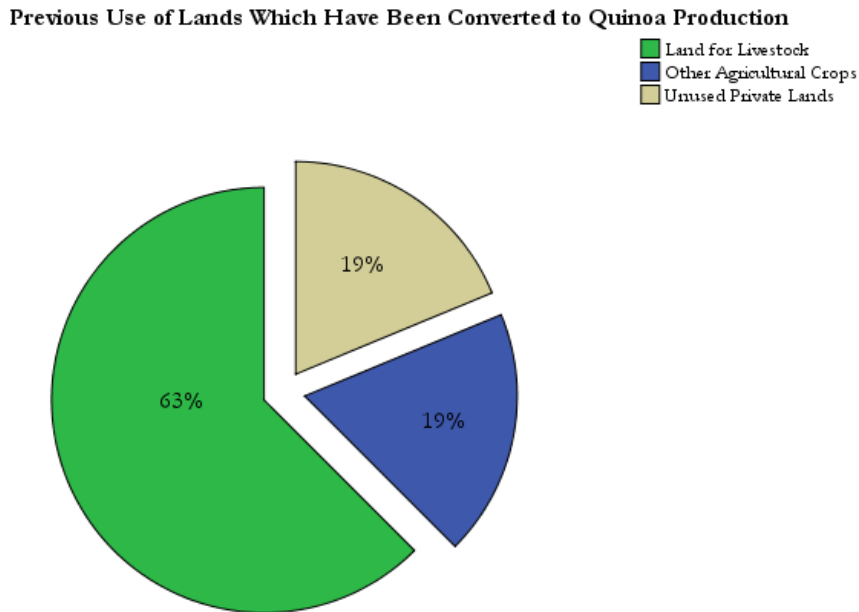


Figure 17: Chart showing the previous use of lands now designated to quinoa production

9.7.1 EFFECTS OF THE CHANGES IN FARMING METHODS

The changes in farming methods and increase of land dedicated to quinoa are placing pressure on the carrying capacity of the lands. Loss of natural vegetation, which acts as wind breaks, is causing severe land erosion, removing the upper soil layers. This is becoming such a serious problem that it is causing significant changes to the landscape. As one key informant notes:

This year, the salt lakes are no longer white – they’re brown, as all the top soil has blown onto the salt lakes.

This confirms the work from Jacobsen (2011) who notes that the lands are vulnerable to salinization, desertification and loss of biodiversity. The flat areas surrounding the salt desert, which were a source of natural vegetation for livestock, is being sown with quinoa, which leads to loss of fertility and eventually desertification.

9.8 LIVELIHOOD ADAPTATION

Resilience is the ability of the household to withstand, cope with or adapt to economic, social, political or ecological shocks and stresses. It is important to note that different types of stress elicit different response mechanisms, including avoidance, resistance or tolerance (Payne and Lipton, 1994). This section focuses upon the potential of livelihood adaptation to withstand stress. The areas of stress discussed will be: ecological vulnerability, particularly the stress of unsustainable farming methods and climate change, vulnerability to market boom and bust cycles, competition from Peru and the lack of institutional support, namely from the government and the quinoa associations. The research will evaluate how these macro processes affect quinoa farmers' livelihoods and their ability to withstand these shocks and stresses.

9.8.1 ECOLOGICAL VULNERABILITY

The following chart shows farmers' responses to how they would rate the quality of the land in the last 10 years.

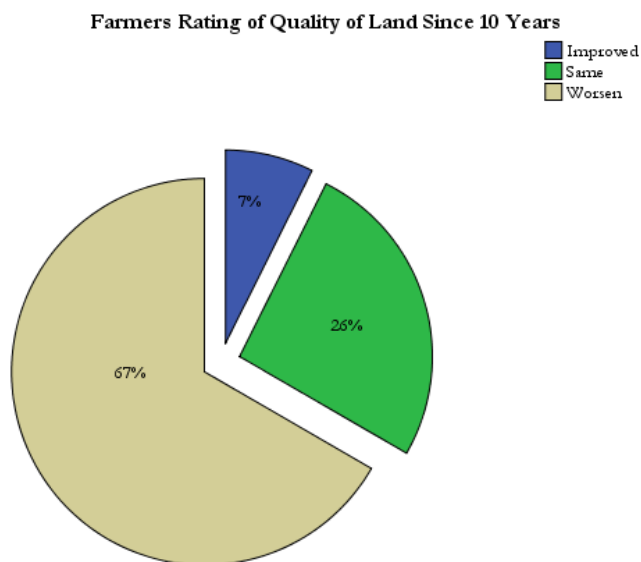


Figure 18: Pie chart showing number of responses of the quality of land in the last 10 years.

67% of respondents stated that the quality of their lands has diminished. Estimates from key informants suggested the lifespan of quinoa production at the current unsustainable rate would be 3-5 years. In confirmation of this, Jacobson (2011) argues that while there has been an increase in overall gross production, there has been a reduction in productivity per hectare, which is displayed in the results below of data by the Food and Agriculture Organization.

Decade	Mean Annual Harvest	Mean Annual Area (ha)
1982-1991	31,336	57,001
1992-2001	41,929	61,294
2002-2011	62,869	79,474

Table 1: Mean world cultivation and harvest tonnage according to data by FAOSTAT (cited in Jacobson, 2011)

As quinoa producers rely on the productivity of their land for their most substantial (or only) source of income, this can only have a devastating effect.

9.8.2.1 Climate Change

A second environmental threat to quinoa farmers' livelihoods is climate change. The table below shows the frequency of statements made by respondents after they were asked what, if any, changes they had noticed in climate. 75% of the quinoa producers answered that they had noticed changes in the climate, compared to only 47% of the control group. The results show how many times a particular change was described. Most of these can be summed up as more extreme weather : more or stronger wind, colder, warmer and more disturbed weather patterns than previously, affecting harvest time and rainy seasons.

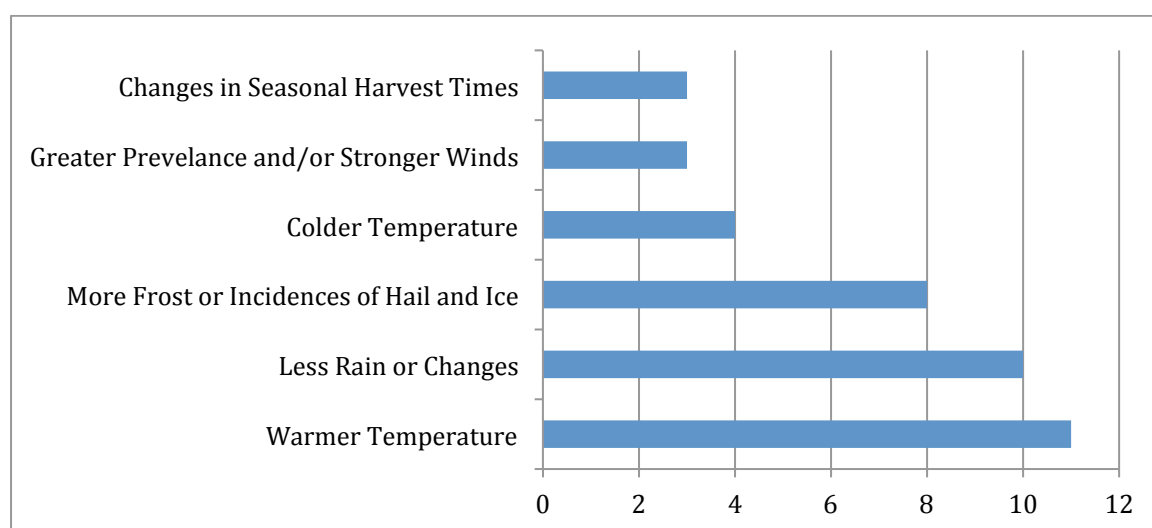


Figure 19: Number of responses to changes in climate change

It has been estimated that Bolivia will lose 7% of its GDP as a result of climate change (Dideriksen, 2008). It will also affect the highlands and the indigenous population more severely (Viceministro de Tierras, 2009). However, the research argues that because of the delicate nature of the ecology of the Altiplano, strong intervention is needed to ensure that the farmers are able to adapt to these changes. There is also a need for quinoa ecotypes that withstand greater variations in temperature.

9.8.3 ECONOMIC VULNERABILITY

9.8.3.1 Quinoa as a global commodity

Bolivia has a competitive advantage on the global quinoa market. Firstly, it is able to produce a large amount of organic quinoa. The lands are isolated, have not been exposed to artificial chemical fertiliser or pesticides in the past, and traditional farming methods are in keeping with the organic guidelines. It is noteworthy that organic production was cited by farmers as an important part of their beliefs because of its link to Pachamama. Pachamama, in short, is the goddess of the indigenous people of the Andes, seen as nature itself, so people are wary of taking too much from nature as it takes too much from Pachamama. 90% of companies in the Bolivian Chamber of Quinoa Royal and Organic Products Exporters are certified organic, and more than 60% of quinoa exports are certified organic. This means that Bolivians are able to benefit from the more profitable niche products. While there is an opportunity for a 'Bolivian Brand', as will be mentioned later, there are very few policies to encourage it.

Quinoa is on a global platform where it is traded as a commodity, which makes the small-holder farmers very vulnerable to any boom and bust cycle. A shortage of enough quinoa to meet the global demand was reported in 2012 (FAO, 2013) and proved advantageous to producers as it increased prices. However, the research feels this will only increase the chances of a boom and bust cycle. Firstly, the market will not expand indefinitely. Just as quinoa was marketed and boomed very quickly as a 'super food', there is also a risk of its sudden downfall if western consumer tastes change. As a key informant remarked:

If a newspaper makes a story that quinoa gives you cancer, then that's it – the market's gone.

Secondly, extremely high and/or unstable prices are off-putting to many buyers, as profit margins risk being too small to make it viable. Thirdly, the rise in demand has now opened up a gap in the market that will attract entrepreneurs from outside Bolivia. This includes other non-Andean countries such as India, China and some in Europe who have started to produce quinoa and whose initial results have been successful. In addition, they have skills and resources and would be able to flood the market with lower prices than Bolivia could compete with.

The research argues that this situation could prove similar to the coffee crash after 1992 when global coffee prices dropped, triggered by Vietnam and Brazil flooding the market with cheaper coffee at a time when the growth in demand had slowed. This led to a fall in prices and a low price elasticity of demand meant falls in price became severe. There was a consequent drop in income for those households dependant on the coffee trade (Hallam, 2003). In comparison to coffee growers whose lands are more fertile and suited to other crops, quinoa farmers, can be seen to be more vulnerable. A reduction in demand followed by a global price drop would be devastating to those households who have intensified and narrowed their source of income to quinoa production, and for whom there are no viable alternative agricultural products.

9.8.3.2 Peru's Competitive Advantage

Peru has a competitive advantage over Bolivia in the export market, in addition to which there is a large flow of black market quinoa smuggled into Peru from Bolivia, all of which affects Bolivia.

Peru is a strong agricultural country, and has greater technical knowledge, business skills, experience and research than Bolivia. While it doesn't have Bolivia's advantage of a greater organic potential or the ability to grow quinoa royal, it has a better business environment with cheaper transport networks which make it a more appealing country with which to do business. Indeed, in the World Bank's Ranking of Economies in the Latin America and Caribbean Region, Peru is ranked 2nd while Bolivia is 29th out of the 31 countries listed for ease of doing business and having a regulatory environment that is conducive to the starting and running of a company. (DoingBusiness.org, 2015). For export companies, Peru is more attractive for long term investment, despite Bolivia having the natural advantage of the better product.

Secondly, it is estimated about 40-50% of the Bolivian crop is smuggled to Peru and resold as Peruvian quinoa. The use of Peruvian intermediaries does benefit the poorer, more isolated farmers. They are able to provide cash immediately, pay higher prices and purchase and collect the quinoa directly from the farm which many co-operatives are unable to do.

9.8.4 INSTITUTIONAL VULNERABILITY

9.8.4.1 Lack of regulation and governmental support

While overregulation can restrict a business environment, a lack of government support can put the market itself and the farmers at risk. In regards to the global marketing of quinoa, many felt that the events and campaigns, such as the FAO Year of the Quinoa, 2013, was:

All smoke, and no help for us to be prepared for it. (Key informant)

The opinion was expressed that the government promoted quinoa on a global scale, but did not offer support to the Bolivian-owned enterprises and organisations. Many of the institutions dealing with private companies felt they were not sufficiently prepared to take advantage of the event.

Many stakeholders from both civil society and the private sector in the quinoa trade felt it important to have a stamp of origin, to start differentiating Bolivia's quinoa as superior quality to other quinoa on the market. There is no government policy regarding this. By not playing a big enough part in the creation of a favourable long term business environment, the Bolivian government risks a loss of interest from export companies. This impacts on farmers; as a key informant stated:

Need to make sure Bolivia is as competitive as other countries. They are going to eat us. The market is going to get bored because of the prices, simple as that.

An additional factor is that there are no environmental regulations or policies to encourage more sustainable farming methods or develop commercial links with exporters. Instead, the focus is on increasing production and trying to add value by enabling organisations and associations to have access to processing plants. These government investments especially processing plants were described as ‘white elephants’, that is, redundant; as the commercial enterprises use their own processing plants or other privately owned ones to ensure an export quality of quinoa.

A third factor is the lack of land titles. As land is now sought after, clearer land titles need to be established. Such matters are presently being dealt with in the community but a clear regulatory framework is needed.

9.8.4.2 Issues with Trade Associations

The research found there was a growing issue surrounding the role of the associations especially the two largest. A conflict of interest has arisen through the attempt to combine social goals and business goals. Currently, there is a push to sell quinoa at the highest price, or playing bold games, but they are not unique in selling quinoa, as it was expressed by a representative, rather than working on long term sustainability of the new market. There is a quick turnover of association membership which means there is a lack of long term vision. While many farmers may be members, many of them still sell to businesses. Therefore their membership list does not necessarily reflect those that work with them. The research believes that these associations would be more beneficial to the farmers if they focussed on an advocacy role, ensuring protection for the small holders.

10. FOOD SECURITY RESULTS

10.1 INTRODUCTION

The previous chapter has established that the increased market price of quinoa has provided an increase in income. But given the facts that quinoa itself was a fundamental part of household food for the subsistence farmers, and that very limited crops could be grown in this region, the question arises of what impact there has been on diet and food security. Consequently, this section will review the dietary changes and food security by answering the following sub-questions:

What, if any, changes have taken place in Bolivian household food consumption patterns and dietary choices since the growth in the export market?

How has farmers' food security have been impacted since the increase in quinoa for the export market?

Firstly, this will be done by assessing any changes to household food production, and any changes to household diet and consumption habits of quinoa producers over the 10 year period. And secondly, by assessing food security according to the indicators accessibility, availability, utilisation and stabilisation.

10.2 CHANGES IN HOUSEHOLD FOOD PRODUCTION

Traditionally, quinoa farmers were subsistence farmers, whereby through self-sufficiency, they grew food to feed their household. Therefore, the research firstly wanted to establish: to establish what is grown as a staple food and the diversity of these foods.

The following tables show the different types of food grown by a sample group, the percentages for domestic or commercial purposes, or both, and those of 10 years previously, in order to make the comparison. Only crops grown by one or more respondents have been included.

	Total number from sample		Domestic		Commercial		Combined Domestic and Commercial	
	No.	%	No.	%	No.	%	No.	%
Potato	20	71.4	18	90	0	0	2	10
Quinoa	28	100	1	1.4	2	7.1	25	93.3
Broad Beans	10	10	9		-	-	1	-
Onions	8	8	8	100	-	-	-	-

Table 3 showing the Type and Purpose of the Crop 10 years previously								
	Total number from sample		Domestic		Commercial		Combined Domestic and Commercial	
	No.	%	No.	%	No.	%	No.	%
Potato	19		17		-	-	2	
Quinoa	24		3		1	-	20	
Broad Beans	7		6		-	-	1	
Onions	8		6		-	-	2	

The results highlight that aside from quinoa, the crops of potato, broad beans and onions are mainly produced for domestic consumption. The current choice of crops is consistent with that of 10 years ago.

The amount of quinoa that is presently produced for domestic consumption ranges from 5% to 50% with the average being 24% of the total production. Ten years previously, the amount ranged from 40% to 90% with the average being 63% for domestic consumption of the overall yield.

It is important to note that these results do not look at the overall amount of quinoa produced, so it is possible that over the 10 years, a lower percentage of domestic consumption could be counteracted by an increase in production, resulting in the volume of domestic consumption remaining the same. However, it is important to note that the farmers are consuming a portion of the quinoa produced.

The following shows the type of livestock and the purpose of these livestock.

Table 4 showing the Type and Purpose of the Livestock								
	Total number from sample		% domestic		Commercial		Combined Domestic and Commercial	
	No.	%	No.	%	No.	%	No.	%
Pigs	5	17.9	3	60	-	-	2	40
Chicken	12	42.9	12	100	-	-	-	-
Llamas	11	39.3	7	63.6	-	-	4	14.3
Sheep	8	28.6	6	75	-	-	2	25

Table 5 showing the Type and Purpose of the Livestock 10 years previously

	Total number from sample		% domestic		Commercial		Combined Domestic and Commercial	
	No.	%	No.	%	No.	%	No.	%
Pigs	4	14.2	1	25	1	25	2	50
Chicken	15	53.6	14	93.3	-	-	1	6.7
Llamas	16	57.1	5	31.2	-	-	11	68.8
Sheep	18	64.3	4	22.2	-	-	12	66.7

A comparison of the figures shows there has been a reduction in livestock ownership. 10 years previously, the majority of farmers owned a combination of chicken, llamas and sheep. Despite a reduction of the number of farmers keeping llama, there has been an increase in farmers using them for commercial purposes. When farmers were asked the reason for the reduction in livestock, the most commonly cited reason is that they want the lands to be dedicated to growing quinoa.

10.3 CHANGES IN CONSUMPTION AND DIETARY HABITS

This section will outline any changes in dietary habits among quinoa farmers and the control group by asking if they were eating more, less or equal amounts of the major food groupings: quinoa, starchy carbohydrates, fruit, vegetables, animal proteins and foods containing high fat and high sugar. The frequencies of answers are shown as well as reasons why. Aside from quinoa, and to an extent the animal products, all of these food groupings cannot be produced locally, and have to be imported and purchased.

10.3.1 QUINOA

Farmers stated that they were still consuming quinoa, with 68% eating it twice a week, and 25% about 1-2 times a week. Compared to 10 years previously, 50% of farmers stated they were consuming equal amounts, 28.8% more than before, and only 21.2% stated that there were eating less than ten years ago. 51.6% of the control group answered that they eat equal amounts of quinoa, and 35.5% eat less.

When asked the reasons why they were eating more, farmers cited personal preferences, the greater amount of quinoa available and its health benefits. The participants who were asked why they were eating less quinoa, explained that it was more profitable to sell it and that preparing quinoa is time consuming compared to starches such as rice, pasta and bread. However, because it was a traditional aspect of their culture, 79% of the participants stated that they would like to eat more quinoa and 21% stated that they are satisfied with the amounts they are eating.

10.3.2 STARCHES

In terms of rice, pasta and bread, the 85% of participants reported eating more rice, pasta (fideo) or bread than 10 years previously. The reasons given were that it was cheaper, more available to purchase and easier to cook. There were only two households who were eating equal amount of starches and two cases eating less. The control group had a

much broader distribution, with 45.6% stating they were eating more starches and 40.2% stating the same amount as previously.

10.3.3 FRUIT AND VEGETABLES

86% of survey participants reported that their intake of fruit and vegetables had increased in the 10-year period. This is the food group showing the biggest change in consumption levels. This change is due to more people with the means to purchase the foods, more retail outlets and better transport and trade links, making it viable to deliver fresh foods without them spoiling. The control group response was that 46.4% were eating more fruit and vegetables, 39.3% equal amounts, and 14.3% were eating less.

10.3.4 ANIMAL PROTEINS

64.3% of the households stated that they had increased their consumption of animal proteins such as red meats, native meats, poultry and fish. 48 % of the control group stated that they were eating more meat, 36% eating equal and 26% eating less. The reason given for eating more meat was that it was more affordable now to farmers, relative to their income and the retail price of meat which had decreased in the area. There was a noticeable preference among quinoa farmers, 18 cases out of 28, to eat llama meat rather than chicken, beef, lamb or pork. The control group also indicated an increase in eating meat, with 48% eating more, 36% eating the same amount and 26% eating less.

10.3.5 HIGH FAT ITEMS

53.6% of farmers stated that they ate more foods with a high fat content such as fried potatoes and fried chicken while 32.1% said that they ate less. The increase was due to the advent of restaurants, making such food available, and a preference for the taste of it, especially among children and teenagers. The reasons given by those farmers who ate less high fat items were that they were unhealthy and posed health risks. In comparison, the control group gave more equally balanced responses with 35.2% citing more, 32.5% citing equal amounts and 32.3% citing less than 10 years previously.

10.3.6 HIGH SUGAR ITEMS

This section the results were the most dispersed, of responses with 39.3% of altiplano producers stating that they were eating more foods with a high sugar content, 39.3% indicating equal amounts and 21.4% stating that they are eating less. There was a noticeable percentage of producers reducing their sugar intake, citing health benefits. Of the control group, 32.1% consumed more, 53.6% the same and 14.3% eating less food items with a high sugar content.

10.4 CONCLUDING COMMENTS

The findings in the following table compare the changes in all areas of diet of the farmers and the control group.

	Altiplano Producers (%)			Control Group (%)		
	More	Equal	Less	More	Equal	Less
Quinoa	28.8	50	21.20	12.5	51.6	35.5
Starches	31.4	50	17.9	45.6	40.2	14.2
Fruits and Vegetables	86	7	7	46.4	39.3	14.3
Animal Proteins	64.3	25	10.7	48	36	26
High Fat Foods	53.6	14.3	32.1	35.2	32.5	32.3
High Sugar Foods	39.3	39.3	21.4	32.1	53.6	14.3

It is noteworthy, that 12 cases out of 28 answered that they ate more in 4 or more food groups. The research argues that this indicates how their overall food consumption has increased, rather than just the proportion of where the calories come from in their diet. It was commented that hunger was a common phenomenon 10 years ago. A farmer stated:

Because of quinoa, I can eat; before I used to chew coca all day, so as not to feel hungry.

The increase in the consumption of fruit and vegetables was the biggest dietary change for the participants. When asked, *Have there been significant changes in the diet of your family?*, 68% responded that they had a healthier lifestyle due to the availability of fruit and vegetables, and also the addition of food stuffs such as dry food and those foods made possible because of their preservative content.

10.5 FOOD SECURITY ASSESSMENT

This section will assess food security of households in terms of accessibility, availability and to a lesser extent utilisation and stabilisation. A combination of qualitative and quantitative research was used to make an assessment of food security on a household level.

10.5.1 ACCESSIBILITY

Accessibility is the notion that restrictions (such as lack of income or lack of resources for self sufficiency) leave persons unable to acquire the foods necessary to sustain themselves in reasonable health. Coping strategies, such as reducing portions, cutting out meals or certain types of food, have to be resorted to. The proxy indicators of accessibility within the research were firstly the opportunity and ability to acquire foodstuff through income or domestic production. A second indicator was increased diet diversity and the ability to choose preferred foodstuffs.

10.5.1.1 Reduction in Food Inaccessibility

The quinoa producers and the control group were asked, “In the past four weeks, did you worry that your household would not have enough food?” and 10 years ago, in a 4 week period, did you worry that your household would not have enough food?” The results are presented on table 7.

Table 7: (10 Years Ago) In the past four weeks, did you worry that your household would not have enough food?

	Presently (in %)		10 Years Previously (in %)	
	Yes	No	Yes	No
Quinoa Producers	17.8	82.2	50	50
Sample Farmers	50	50	68	32

Out of 28 cases, the Quinoa Farmers answered with a yes response rate of 17.8%. Out of the sample group, 50% answered a yes. When asked the same question about their situation 10 years previously, both groups recalled being worried about having enough food: 50% of the quinoa farmers and 68% of the control group. This shows a significant lessening in the feelings of anxiety about inadequate food supplies. Of the cases of farmers being worried about not receiving enough food, 31.1% of those farmers who had been worried 10 years ago, were now no longer worried.

To establish if the coping strategy of reducing portion sizes was used, households were asked: *In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?* and *10 years ago, in a 4 week period, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?* Of the quinoa farmers' sample, only 10.7% did reduce their portion size, and when asked if they used this coping strategy 10 years ago, 89.3% said they had. This is different to the control group, of whom 21.9% were presently coping in this way and of whom 59.3% did so 10 years previously. Therefore, the quinoa producers were more likely to have used this strategy 10 years previously than the sample group, but less likely to need to use it present

Table 8: (10 Years Ago) In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?

	Presently (in %)		10 Years Previously (in %)	
	Yes	No	Yes	No
Quinoa Producers	10.7	89.3	89.3	10.7
Sample Farmers	21.9	78.1	59.3	40.7

10.5.1.2 Diet Diversity and Food Preferences

A third coping strategy was investigated by asking the question: *In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?* and *10 years ago in a 4 week period, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?*

Table 9: (10 Years Ago) In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?"

	Presently (in %)		10 Years Previously (in %)	
	Yes	No	Yes	No
Quinoa Producers	10.7	89.3	89.3	10.7
Sample Farmers	21.9	78.1	59.3	40.7

The research then asked the following question: Do you feel you and your household are eating healthier foods than 10 years previously?

The quinoa producers respondents felt that they were eating healthier foods, explaining that they now have regular access to vegetables, unlike before, and that their children enjoy improved health. Those that responded in the negative reasoned that the increased availability of fast food with a high fat content meant their diet was worse than previously.

10.5.2 AVAILABILITY

The key indicators of availability within the research were either economic access to an effective market system for the ability to purchase, sell or exchange food items; or domestic food production such as landownership, agricultural choices and environmental factors. Availability also includes transport networks.

10.5.2.1 Economic Access

Their greater income, thanks to the quinoa trade, means quinoa producers are able to purchase a higher volume of foods, greater variety and can afford imported foodstuffs, rather than rely on limited local produce. They are able to get more value per calorie when trading quinoa, this was explained thus:

Previously, four sacks of quinoa would be exchanged to one sack of rice, now for one sack of quinoa I can get four sacks of rice, Quinoa Farmer, Salinas Region.

The research asked if the quinoa farmers were purchasing more, equal or less foods now than 10 years previously. 67.9% stated that they are purchasing more, 25% equal amounts and 7.1% less.

When the farmers were asked, the concluding question of Do you feel you are more food secure than 10 years previously? , 82.1% did feel that they were more food secure. They all gave the reason for these positive responses as the increased income with which they are able to purchase more nutritious foods than previously.

10.5.2.2 Greater Opportunities, Retail Outlets and Transport Links

The increasingly effective market system meant greater availability through retail channels of imported food stocks, as now there was a viable market within the Altiplano region. Previously, poverty prevented the possibility. In addition, many of the new small businesses are those of quinoa farmers, who have capital to start additional income generating activities.

Since the growth in quinoa, better infrastructure has been put in place to make the quinoa trade viable. These transport networks have also opened the way for a variety of other food stuffs. In addition, the sale of fresh, perishable items is viable now that they can be delivered in a shorter time than previously possible.

10.5.2.3 Home Production

Quinoa producers have moved from self-sufficiency to producing a cash crop. As aforementioned, there has been a reduction in the amount of homegrown produce and homereared livestock. There is also a reduction in the amount of quinoa that is for domestic consumption, as well as land dedicated to non-quinoa production. However, it is important to note that climatic and agricultural conditions already make the Altiplano unproductive. Therefore, this negative effect of food security already existed.

10.5.3 STABILISATION

The stabilisation of food supply can bring stability to food prices, the supply of waged labour and production, improving the availability of food all year around. In order to even out their income, farmers often do not sell all their quinoa at once, especially those who sell to intermediaries rather than directly to co-operatives or export companies. Once the quinoa is harvested and cleaned, they store it and sell in increments when cash income is needed. This helps them avoid any severe shortages and manage their finances. The only issue with this is that quinoa, if not washed, cleaned and stored properly is vulnerable to infestation by insects and rodents. Also, those who sold at a lower cost to intermediaries were often those in a more remote region, with lack of access transport and often did not produce the premium quinoa.

Fundamentally, the issues of stability in food security stem from vulnerability, as previously mentioned in the livelihoods section. This includes environmental threats, vulnerability associated with low yield, and macro level issues with the global market, such as a boom and bust cycle, lack of regulations, and outside competition. These all affect the price of Bolivian quinoa, changes which acutely affect farmers, and who understandably strive to sell the quinoa at the highest price.

10.5.4 UTILISATION

While focused on accessibility and availability, the research highlighted other important points which arose during its course. Access to medical care, sanitation and education play an important role, but the scope of the research is limited to dietary aspects of food quality, hygiene and nutritional values.

The research found there was a general awareness among participants of the benefits of a diet rich in fruits, vegetables and unprocessed foods. In addition, there was an understanding of diet-related health issues, for example diabetes, artificial hormones in chickens, fat and sugar intake. In addition, these were all mentioned as reasons for dietary choices and changes by the farmers, especially as reasons for a reduction in sugar and fat. However, there is still a proportion of farmers consuming less nutritious, high fat and high sugar items which pose health risks.

The research notes that changes in attitude to diet are a long term process and progress involves basic services education, health and social care. These and other basic social services are slower and later to extend into this region.

10.6 SUMMARY OF RESULTS

The research has shown that the increased export of quinoa has positively impacted the diets and the food security of quinoa producers. The diets of the quinoa farmers have changed, and overall, for the better. While there was a decrease in the consumption of quinoa, respondents stated that they are still consuming part of their own production of quinoa. The respondents noted the greatest area of change was the consumption of fruits, vegetable and meats.

There has been an improvement of the farmers' food security since the growth of quinoa for the export market. Firstly, there has been a reduction in the number of farmers using coping strategies such as reduced food portions or giving up their preferred foods. There was also a significant reduction in anxiety regarding food among the quinoa farmers compared to the control group. The quinoa farmers reported a greater dietary diversity which was due to a greater income which increased affordability, an improved local market and improved transport network. The quinoa producers felt that this was a healthier diet, as they were able to purchase foods, especially fruit and vegetables, which they could not produce themselves nor they could afford previously as subsistence farmers.

The main risk posed to farmers' food security is its close dependence on the sustainability of quinoa as a long term income generator. Access to food is reliant on the income generated from quinoa. Households and communities would be all the more affected by poor crop yields or nationally by any changes in the global market price, because there are few income generation opportunities outside of the production of quinoa. This poses a risk to the stability of their current improved food security.

As the diet and food security have increased, these findings contradict the alarmist articles that appeared in press as mentioned earlier in the text. The reduction of quinoa have allowed a greater food security. As regards food security, though farmers in most parts of the world are subject to good or adverse fluctuations in the global market, Bolivian farmers, in common with others of poorer countries, do not have many alternative income options, nor recourse to the same levels of state help available in richer countries.

11. DISCUSSION

11.1 INTRODUCTION

This chapter will discuss the research findings, policy implications, research process and future research. It will then conclude the research by reflecting on the implications of the results for the quinoa trade, those whose livelihoods depend on it, and food security.

11.2 IMPROVED LIVELIHOODS AND FOOD SECURITY

Reflecting on the main research question which guided the research:

To what extent has increased demand for quinoa for the export market lead to improved livelihoods for Bolivian quinoa farmers? If changes have occurred to their livelihoods, how have these changes impacted their food security?

This question was in two parts; the first evaluates the impact of the quinoa boom on its growers' livelihoods. The second part looks at the consequences of these livelihood changes for the growers' food security, so as to understand in more detail the relationship between the two aspects. The research sought to ascertain if abandoning a staple diet, albeit with an improved income, would lead to food insecurity, as has been suggested in the press, or whether this was being wrongly blamed for precarious food security.

The research found that increased demand for quinoa for export and the rise in its price had improved the farmers' income, causing a shift from subsistence farming to the generation of a viable income. Previous opportunities to grow cash crops, be self employed or find waged occupations were severely lacking in the Altiplano region.

However, the accumulation of financial capital has happened at a noticeable cost, that is, the despoilation of natural resources. The research found the drive for monetary income is pushing the carrying capacity of the lands to exhaustion. Again, in order to translate the popularity of quinoa into a long term livelihood, there needs to be a focus on sustainable farming methods that do not extinguish the natural resources which the farmers' livelihoods are dependent upon.

It is far from certain that long term sustainability will prevail over the present pursuit of maximum profit. There is a trend of farmers seeing it as a short term cash generating scheme, extracting the highest possible profits, to spend elsewhere or invest in different livelihood activities. This is sometimes a cause of friction with others who have the interests of the community at heart.

The second half of the research question is about how an improvement in livelihoods can translate into improved food security. Previously, food choices were extremely few, not just because of limited capital and supply, but because the hostile environment of the Altiplano offered very little diversity. Alternative crops simply cannot grow there as they

do in the lowlands of Bolivia where better conditions allow a variety of crops. Extra income meant better accessibility and availability of other foods and a more diverse diet, lessening their consumption of their staple, but not eliminating it. The quinoa farmers themselves saw this as an improvement to their own food security. The research shows how livelihoods and food security are fundamentally linked. However, it does pose a question about which is more secure: self sufficiency or being a part of a market system.

11.3 ROLE OF NORTH AMERICAN AND EUROPEAN MARKETS

The research found that the rise in demand for quinoa has brought about a new income opportunity for farmers living in the Altiplano. The consumer habits of the west have been portrayed as the cause of starving Bolivians being deprived of their staple food and leaving them penniless, in order to satisfy our own culinary whims. Indeed, many commodities such as coffee, tea or cocoa have a long history of sustainability issues around poverty, workers rights and environmental issues.

Quinoa was a unique product until only produced by small holders with a long historical relationship with the fair trade sector. Western interest has driven up the price and these customers are paying a higher premium, which the farmers would not have benefitted from if quinoa had remained solely for domestic use. CALOQUI noted that farmers were receiving 85% of the export price (Personal Communication, 2014). In addition, the Bolivian farmers interviewed had no preference as to their buyer was but were satisfied that their product, once despised, was recognized for its worth.

11.4 NUTRITIONAL VALUES

The research noticed there was an attitude in the press (non-Bolivian) and in some academic articles giving high-minded opinions on what the farmers should be eating. If farmers want to eat high sugar or high fat items, processed items and convenience food, they are not very different from their counterparts in a developed country.. Therefore, the issue of food security does bring up issues of value judgments of what persons should eat.

11.5 POLICY IMPLICATIONS

Whilst the purpose of the research is not to make recommendations, the need for certain policies is clearly implied. Firstly environmental sustainability: given that the key informants estimated that current methods of quinoa cultivation had a 3-5 year lifespan, help and training to bring about more sustainable farming practices are urgently needed before the damage becomes irreversible. The quinoa boom has made business people out of farming small-holders with little experience of business management. A second policy that would pay dividends would be the provision of advice and training to the farmers to help them make more informed choices in relation to investment and the business environment in which they operate. A third policy would be to raise awareness of nutritional values of both traditional food and more western food. Lastly, action is needed at government level if Bolivia is to retain its current primary position in a competitive world. They have a unique selling point, high quality, organic quinoa, but in many aspects are ill-equipped to compete if the market continues to expand.

11.6 STRENGTHS AND LIMITATIONS OF THE RESEARCH

A strength of the research is its originality, in that it looks at the rapid expansion of a local food staple that has been transformed into a world commodity, and while there has been a lot of discussion and speculation in news reports, there was a lack of research that assessed the outcome of this locally. On a wider scale, it also allows more insight into the repercussions of marketing 'super foods' in the west and how this has an effect on developing countries.

The research was conducted independently, and without any obligations to any organisations, with all positive and negative results clearly reported within the research. However, for the independent researcher there are greater limitations in terms of resources, time and access. The research was conducted with limited resources, contacts and without a host organisation, which proved problematic. One issue was the time spent gaining access to a suitable research site and finding a suitable gatekeeper to introduce the researcher to the communities. When access was gained, initial suspicion of an outsider meant taking the process very slowly in order to build up enough trust that people would open up. A benefit of working with an organization is that a researcher is taken on trust, and indeed Bolivians are wary of outsiders with no verifiable background. As a lone researcher, gaining access was not easy and meant that conducting field research became an overly time-consuming process. Fortunately, the quality or amount of information supplied was not affected.

Many stakeholders refused to go ahead with the interview in spite of having previously agreed by phone or email, especially in the private sector and the two main quinoa associations. In regards to the quinoa producers, due to poor transport networks, the researcher was restricted to those producers within reach of the main market towns of Challapta and L. Cabrera. Therefore the research does not include more isolated farmers. Also, the sample size was small because of restrictions on time and resources. In addition, with the control group, the research assistants would often too readily leave questions blank instead of persevering. This meant a lot of data had to be deemed unreliable and omitted from the survey.

An additional limitation, is that the research concerns the effect of increased global interest in quinoa and the interconnection with food security over a 10 year period. However, no data on this issue was collected over the past 10 years, so that this part of the research relied on the recollections of key informants and quinoa farmers of the changes that have taken place. There is therefore likely to be a subjective bias on the part of the respondent, who may or may not have a good memory. Another issue is the sincerity of the answers given by participants. The research cannot guarantee these are sincere and accurate. It is possible that participants wanted to show themselves in a good light, for example, and adjusted their answers accordingly.

Another drawback is the necessity for a translator. In addition, in many areas of Bolivia, Aymara and Quechua are the native languages, and respondents' level of Spanish was sometimes limited. An Aymara/Quechua translator was used so that the quality of results depended on the translator's skills. However, the research generally found a high level of

Spanish among farmers, therefore it was possible to have detailed discussions concerning the research topics.

Random sampling was not possible geographically, as distance and accessibility had to be the major factors in the choice of sites. The research is unable to conclusively say what factors benefits one area over another.

11.7. SUGGESTIONS FOR FURTHER RESEARCH

The research covered a broad range of subjects as there has been limited research concerning the area previously, and with a rapidly changing situation for the farmers many of the previous research is partially redundant in their conclusions. More research on sustainable farming methods would provide a greater level understanding of the carrying capacity of the lands, and provide a evidence and research based support to any programmes tackling this issue. On a social perspective, migrants returning to the community, are likely to play an increasingly important role economically and politically and may well change the balance of power between town and country. With regards to food security, the research found a knowledge gap in research between extreme hunger situations for food security. More research would be important for work within the food insecure but with no hunger, or greater understand of the complexity of macro forces on household food security.

11.8 CONCLUDING COMMENTS

The research has tried to reach a better understanding of the complex issues raised by the move of quinoa from subsistence to cash crop, and the impact this has on food security. The research concludes that the quinoa boom has provided a vital livelihood opportunity for the farmers in the Altiplano region. An increase in income and capital investment has brought about a reduction in poverty, the creation of working days, improved well-being and a greater diversity of diet, and most certainly has had a beneficial effect on the farmer's food security. Improvements on a national scale have ensued, particularly to the transport infrastructure. However, intensive farming methods and expansion of land cultivation are having major environmental consequences, particularly soil erosion and loss of soil fertility, causing an insupportable strain on the carrying capacity of the land.

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APPENDICES:

Household Survey

A. METADOTOS

Número	_____	Fecha De La Encuesta	_____
Comunidad	_____	Provincia	_____

B. PREGUNTAS SOCIOECONOMICAS

1) **¿ Cuantas personas por grupo de edad viven en su domicilio?** *Valor Numerico*

< 5 años	<input type="text"/>	<i>Valor Numerico</i>
>5 < 15 años	<input type="text"/>	<i>Valor Numerico</i>
15 – 49 años	<input type="text"/>	<i>Valor Numerico</i>
+ de 50 años	<input type="text"/>	<i>Valor Numerico</i>

2) **¿Cuántos años ha vivido en su dirección actual?** años

3) **¿Cuál es el mayor nivel de educación en la familia?**

1 – Ninguna (analfabeto)	<input type="text"/>
2 – Primaria	<input type="text"/>
3 – Secundaria	<input type="text"/>
4 – Bachiller y superior	<input type="text"/>

4) **¿ Que idiomas habla?**

1 – Solo Quechua	<input type="text"/>
2 – Solo Aymara	<input type="text"/>
3 – Español y Quechua	<input type="text"/>
4 – Español y Aymara	<input type="text"/>
5 – Aymara y Quechua	<input type="text"/>
6 – Quechua, Aymara y Español	<input type="text"/>
7 – Solo español	<input type="text"/>
8 – Otros	<input type="text"/>

5) **¿Cuál es su principal ocupación? (Máximo dos)**

1 – Agricultor de cultivos (Quinua y otros cultivos)	<input type="text"/>
2 – Solo Quinua	<input type="text"/>
3 – Cultivos y ganado	<input type="text"/>
4 – Jornalero (local)	<input type="text"/>
5 – Jornalero migrante	<input type="text"/>
6 – Minero	<input type="text"/>
7 – pequeña empresa	<input type="text"/>
8 - Servicio domestico	<input type="text"/>
9– Artesano	<input type="text"/>
10 – Otros	<input type="text"/>

7) ¿Cuál es el estado de la propiedad de la tierra que trabaja?

1 – Propia	
2 – Alquilada	
3 – Propia y alquilada	
4 – Compartida	
5 – No sabe	
6 – No opina	

8) ¿En los últimos 10 años, cuantos familiares han regresado a casa de otras ciudades para razones trabajo?

Valor Numerico

9) ¿Comparado con hace 10 años, Ha habido un cambio significativo en sus ingresos?

1 – Aumento un poco	
2 –Aumento bastante	
3 –Aminoró un poco	
4 –Aminoró bastante	
5 – No, esta igual.	

11) ¿En los últimos 10 años ,Ha cambiado la principal fuente de ingresos?

1 – no 2 - Sí
 15ª) *Sí la respuesta es sí, Como?*

12) ¿Usted recibe giro o ayuda económica del failar fuera de ciudad?

1- No 2- Sí

C. AGRICULTURA Y PRODUCCIÓN DE ALIMENTOS DOMÉSTICOS
(GENERAL)

1) ¿Que es lo que usted produce en la época de cosecha y para que propósito? Marco según lo apropiado

	1 = Consumo domestico 2 = Para ventas 3 = Consumo domestico y ventas	aproximadamente en qué cantidad (kg/kg)
Papa (Número de variedades)		
Quinoa (Número de variedades)		
Cebada (Número de variedades)		

Habas (Número de variedades)		
Oca		
Alverja		
Kañihua		
Avena		
Tarwi		
Choclo		
Olluco		
Izano		
Frutas (especificar)		
verduras (especificar)		

2) ¿Hace 10 años, que producía en la época de cosecha y para que propósito?

	1 = Consumo domestico 2 = Para ventas 3 = Consumo domestico y ventas	aproximadamente en qué cantidad (kg/kg)
Papa (Número de variedades)		
Quinoa (Número de variedades)		
Cebada (Número de variedades)		
Habas (Número de variedades)		
Oca		
Alverja		
Kañihua		
Avena		
Tarwi		
Choclo		
Olluco		
Izano		
Frutas (especificar)		
Verduras (especificar)		

3) ¿Si usted es ganadero: En esta estación, cuáles y cuantos animales se mantienen y para que propósito?

	1 = Consumo domestico 2 = Para ventas 3 = Consumo domestico y ventas	aproximadamente en qué cantidad (kg/kg)
Cerdos		
Gallinas		
Otras aves		
Llamas		
Alpacas		
Cuy		
Ovejas		
Otros		

4) ¿Hace 10 años, cuáles y cuantos animales se mantienen y para que propósito?

	1 = Consumo domestico 2 = Para ventas 3 = Consumo domestico y ventas (aproximadamente en qué cantidad)	aproximadamente en qué cantidad (kg/kg)
Cerdos		
Gallinas		
Otras aves		
Llamas		
Alpacas		
Cuy		
Ovejas		
Otros		

4a) ¿Porque perdió/redujo sus rebaños?

D. CULTIVO DE QUINUA

1) ¿Cuántas hectáreas de tierra de cultivo tiene en total? Hectá

2) ¿Hace 10 años, cuántas hectáreas de tierra de cultivo tenía en total? Hectá

3) ¿Cuántas hectáreas de tierra de cultivo utiliza para el cultivo exclusivo de Quinoa? Hectá

4) ¿Hace 10 años, Cuántas hectáreas de tierra de cultivo utiliza para el cultivo exclusivo de Quinoa? Hectá

5) ¿Cuál es el objetivo de cultivar Quinoa?

1. Con fines de lucro	<input style="width: 50px; height: 20px;" type="text"/>
2. Para consume propio	<input style="width: 50px; height: 20px;" type="text"/>
3. Sí es mixto, Indique la proporción (___/___)	<input style="width: 50px; height: 20px;" type="text"/>

6) ¿Cuál es el objetivo de cultivar Quinoa hace 5 años?

1. Con fines de lucro	<input style="width: 50px; height: 20px;" type="text"/>
2. Para consume propio	<input style="width: 50px; height: 20px;" type="text"/>
4. Sí es mixto, Indique la proporción (___/___)	<input style="width: 50px; height: 20px;" type="text"/>

7) **¿A quien vende usted la Quinua que produce?**

1 - Compañía exportadora		Especificar
2 - Cooperativa local		
3 - ANAPQUI		
4 - CECAOT		
5 - Intermediario		
6 - Amigos/ vecinos		
7 - Combinación		
8 - Solo uso domestico		solo pasar a pregunta 11

8) **¿A quien vendía usted la quinua que producía hace 10 años?**

1- Compañía exportadora		Especificar
2- Cooperativa local		
3- ANAPQUI		
4 - CECAOT		
5 - Intermediario		
6 - Amigos/ vecinos		
7 - Combinación		
8 - Solo uso domestico		solo pasar a pregunta 11

9) **¿Por cada kilo de Quinua, cuanto recibe ahora?**

Boliviano

10) **¿Cuanto recibía hace 10 años?**

Boliviano

10a) **¿Si es así, Cual terreno usted o su familia expandió para la producción de Quinua?**

1.Communitaria	
2. My propio terreno	
3.Vecino o amigo de familia	
4. No está seguro, no ha usado terreno	

11) **¿Para que fue usado el terreno previamente?**

1.Otros cultivos	
2. Pasteo de animales	
3. Terreno propio no utilizado	
4. Terreno comunitario no usado	

12) **¿Comparado con hace 10 años atras, puede usted ahorrar más?**

1 -Mas 2 Igual 3 -menos

13) **¿Su familia tiene mejores ingresos desde que cultiva quinua?**

1 – Mas	
1 - Igual	
3 -Meos	

14) **¿Cuáles son los beneficios del aumento de ingresos?**

[pregunta abierta]

E. MÉTODOS DE CULTIVO

1) **¿Como calificaría la calidad del terreno de cultivo donde usted cultiva Quinoa en relación a 10 años atrás?**

1 - Mejor que hace 5 años	
2 – Igual	
3 - Peor que hace 5 años	
4 - No sabe	

2) **¿Ha cambiado usted sus métodos de cultivo para producir más quinoa?**

1 - No		Sí es afirmativo , como?
2 - Sí.....		

3) **¿Usted rota el cultivo de quinoa con otros cultivos?**

1- No		Cuales?
2- sí		

4) **¿Cuanto tiempo le permite usted descansar a sus terrenos de cultivo ?** Meses

5) **¿Hace 10 años, Cuanto tiempo le permitía descansar usted a sus terrenos de cultivo?** Meses

6) **¿Esta reduciendo el numero de tipos de quinoa?**

1- No		a respuesta es afirmativa , porque?
2- Sí		

7) **¿Como fertiliza la tierra?**

1 – Abono de mis animales	
2 – Abono comprado	

3 – Fertilizante químico	
4 – No uso fertilizante	
5 – No sabe	

8) **¿Usa usted maquinaria mecánica para cultivar la tierra?**

Sí	Cuales?
No	

9) **¿Ha experimentado algún cambio en el clima?**

- 1- No
1 - Sí – Esto ha afectado los cultivos?

¿Como?

F. SEGURIDAD ALIMENTARIA-DISPONIBILIDAD

1) **¿En las últimas 4 semanas, se preocupo por la posibilidad de su familia no tenga suficiente comida?**

1 – No 2 – Sí

2) **¿En las últimas 4 semanas, Usted o algún miembro de su familia no pudieron comer la comida que prefieren comer por falta de dinero para comprarlos?**

1 – No 2 – Sí

3) **¿En las ultimas 4 semanas, Usted o algún miembro de su familia tuvieron que comer una ración mas pequeña de la que necesitaba porque no había suficiente comida?**

1 - No 2 – Sí

4) **¿Hace 10 años ,se preocupaba por la posibilidad de su familia no tenga suficiente comida mensualmente?**

1 - No 2 – Sí

5) **¿Hace 10 años, Usted o algún miembro de su familia no podían comer la comida que preferían comer por falta de dinero para comprarlos mensualmente?**

1 – No 2 – Sí

6) **¿Hace 10 años, Usted o algún miembro de su familia tuvieron que comer una ración mas pequeña de la que necesitaba porque no había suficiente comida, mensualmente?**

1 – No 2 – Sí

G. CONSUMO DE QUINUA Y DISPONIBILIDAD DE ELECCION DE ALIMENTOS

1) **¿Tu Familia come mas , menos o la misma cantidad de quinua que hace 10 años?**

1= mas		Porque mas o menos ? [pregunta abierta]
2= igual		

3 = menos		
-----------	--	--

2) ¿ Tu Familia come mas , menos o la misma cantidad de arroz, fideo y pan que hace 10 años?

1= mas		Porque mas o menos ? [pregunta abierta]
2= igual		
3 = menos		

3) ¿ Tu Familia come mas , menos o la misma cantidad de frutas y vendres que hace 10 años?

1= mas		Porque mas o menos ? [pregunta abierta]
2= igual		
3 = menos		

4) ¿ Tu Familia come mas , menos o la misma cantidad de alimentos con de contentia de azucur que hace 10 años?

1= mas		Porque mas o menos ? [pregunta abierta]
2= igual		
3 = menos		

5) ¿ Tu Familia come mas , menos o la misma cantidad de que pollo, pescado y carne hace 10 años?

1= mas		Porque mas o menos ? [pregunta abierta]
2= igual		
3 = menos		

6) ¿Cuanto cunsumes mas , menos o la misma cantidad de comida frita que hace 10 años?

1= mas		Porque mas o menos ? [pregunta abierta]
2= igual		
3 = menos		

7) ¿Cuantas veces al día come quinua?

Todos los días	
4 - 5 salidas a la semana	
2 - 3 veces a la semana	
una vez a la semana	
menos de una vez a la semana	

8) ¿Le gustaría comer más quinua?

1 – Si. Me gusteria come mas

2 – No, Me gusteria come menos

3 - No, esta gusteria come cantidad

9) ¿Ha habido cambios importantes en la dieta de su familia?

No - 1

2 - Sí

10ª. ¿cuáles son estos cambios?

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10. ¿Cuál es la razón por la cual usted cambio sus hábitos alimenticios?

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11. ¿Está comprando mas , igual o menos alimentos que hace 10 años?

1- Mas	
2 - igual	
3 - menos	

12. ¿Usted considera que tiene mejor acceso a mejores alimentos?

1 - Mas		porque?
2 - Igual		
3 - Menos		

13. ¿Se siente más seguro en como alimenta a su familia actualmente comparado con hace 10 años?

1- Mas		porque?
2 - Igual		
3 - Menos		