

TRADE IN QUINOA: IMPACT ON THE WELFARE OF PERUVIAN COMMUNITIES



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**TRADE IN QUINOA:
IMPACT ON THE WELFARE
OF PERUVIAN COMMUNITIES**

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Trade in Quinoa: Impact on the Welfare of Peruvian Communities

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This report examines the impact of the international quinoa prices on the livelihoods of communities in the Peruvian altiplano. The paper presents results of an ITC household survey showing that the well-being of households in traditional quinoa growing regions has risen and fallen along with quinoa prices. Quinoa-growing households benefited from higher quinoa prices at the height of the quinoa price boom of 2013 and their welfare declined as prices have fallen since 2014. Farmers are willing to help efforts to increase biodiversity to combat the problem of monoculture that has resulted from an increased focus on exporting a single quinoa variety. The report is relevant for importers and exporters, regulators, policymakers, non-governmental organizations, community representatives and researchers seeking to improve sustainability of the quinoa trade and the associated benefits derived by local people in Peru.

Descriptors: **Seeds, Prices, Biodiversity, Small-Scale Producers, Peru, Agriculture**

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English

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Foreword



Most of the world's 1.4 billion poor live in rural areas, and the majority of them are agricultural smallholders. Investing in agriculture to help farmers move up the value chain is therefore a clear strategy to ending poverty. The United Nations Sustainable Development Goals identify trade as a means to eradicate extreme poverty by 2030. Trade continues to play an important role in supporting smallholders and is thus a key sustainable development tool.

Globalization has in many cases meant increasing opportunities for farmers, cooperatives and small and medium-sized enterprises (SMEs) in developing countries to produce for the growing middle classes around the world. With the increase in consumer demand, we have seen higher prices, often resulting in higher farm incomes. However, this virtuous circle has also presented challenges for farmers who may have weak bargaining positions with traders, endure severe climatic conditions, depend on unreliable infrastructure, face volatile market prices and have limited access to credit.

It is with this in mind that the International Trade Centre (ITC), through its Trade and Environment Programme, is supporting quinoa producers in the Peruvian altiplano to increase resilience to climate change and access international markets with organic certification. To examine the welfare impacts of the trade in quinoa on these smallholders, ITC conducted a survey of households in the altiplano between September 2014 and August 2015. The study found that when quinoa prices fell substantially, so too did the well-being of rural Peruvian families. Towards the end of the 2015 harvest, quinoa prices fell 40%. As prices fell, total food consumption of surveyed households declined by 10% and wages fell by 5%. Companion research conducted by the Peruvian authorities yielded similar results. In a nutshell, the welfare of rural communities in the altiplano is linked to prices for quinoa – this is especially the case for women, who being the majority of quinoa smallholders benefit the most from the trade in quinoa.

Several important lessons can be drawn from ITC's findings. Smallholders of the altiplano are vulnerable to competition from quinoa producers in Peru's coastal region. As such, they need support to differentiate their product according to the nutritional benefits of a wider range of varieties, through organic certification, as well as by building improved business capacity. Incentive structures for storage could be devised as a way to mitigate the volatility of quinoa prices, and allow farmers to protect their crops from pests and rodents. There are also opportunities to establish payments for ecosystem services schemes so that smallholders can sell different varieties of quinoa. This will help them to diversify their income sources and conserve the Andean region's biodiversity. Farmers could also benefit from government and Aid for Trade initiatives to gain access to technical services and credit.

I would like to thank the ITC team, the Peruvian researchers who collected the data over 2014 and 2015, the University of Minnesota and Towson University, and Peru's Export and Tourism Promotion Board (PROMPERU) for supporting this research. I trust that these findings illustrate the benefits of trade to rural communities while recognizing that many challenges still exist for improving the lives of rural people. It is now incumbent upon all of us to translate these policy options into solutions for quinoa smallholders.

A handwritten signature in blue ink, appearing to read 'Arancha González', written over a light blue horizontal line.

Arancha González
Executive Director, International Trade Centre

Acknowledgements

The research was conducted by Marc Bellemare (University of Minnesota) and Seth Gitter (Towson University). The project was directed by Alexander Kasterine, Head of the International Trade Centre's (ITC) Trade and Environment Programme, and managed by Ann-Kathrin Zotz, Associate Expert (ITC).

ITC would like to express its appreciation to the farming households in the altiplano of Peru that agreed to be interviewed for this study. ITC also expresses gratitude to Lesly Vera and Renatto Canepa (both ITC consultants) for coordinating the ITC household survey, to Efrain Obregon, Erver Liceta and Yovana Vega (all ITC consultants) for undertaking the field research and Veronica Rey for translating the questionnaire. The research benefited from comments and feedback from Anders Aeroe, Director of Division for Market Development, Robert Skidmore, Chief of Sector Competitiveness Section, and Benjamin Smith (all ITC).

The study was edited by Cheryl Rosebush. Editorial management was conducted by Natalie Domeisen, and production by Evelyn Seltier with support by Ana Patricia Batalhone (all ITC).

The study was carried out by ITC within the context of its programme to promote exports of biodiverse agri-food products from smallholders in Peru.

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Abbreviations and Notes

Altiplano	Peruvian High Plateau
ENAHO	Encuesta Nacional de Hogares (Peruvian national household survey)
GDP	Gross domestic product
ITC	International Trade Centre
INEI	Instituto Nacional de Estadística e Informática (Peruvian national statistics office)
PEN	Code for Peruvian sol (Peruvian currency)
PPP	Purchasing power parity
Quinoa	Chenopodium quinoa
UNCTAD	United Nations Conference on Trade and Development
WTO	World Trade Organization

Unless otherwise specified, all references to dollars (\$) are to United States dollars, and all references to tons are to metric tons.

Executive summary

This report presents the results of an International Trade Centre (ITC) study looking at the impact of fluctuating global quinoa prices on rural Peruvian households dependent on the product for their basic food security.

Peru is one of the world's leading producers of quinoa. Over the last 10 years, this protein grain has become a much sought-after product, especially in North America and Europe. As a result of increased demand, the price of quinoa nearly tripled between 2004 and 2013.

This price rise garnered international media attention in 2013. Several articles published that year argued increasing quinoa prices were reducing the welfare of rural Peruvian households because families could no longer afford to buy this basic food staple. Other reports contradicted this, saying rising quinoa prices were 'the greatest thing that has happened' to rural Peruvian families.¹ Amidst all this, campaigns emerged discouraging consumers from buying quinoa in order to make it more affordable to poor Peruvian families.

Throughout this debate, there was little data to support arguments on either side. For this reason, ITC decided to conduct primary research with the University of Minnesota and Towson University to measure the impact of changing quinoa prices on the welfare of households in the Peruvian altiplano. ITC's study surveyed 150 households in Peru's traditional quinoa-producing regions of Cusco and Puno, between September 2014 and August 2015.

Contrary to the media's assertions in 2013, ITC's study found that when quinoa prices fell substantially, so too did the well-being of rural, Peruvian families. Towards the end of the 2015 harvest, quinoa prices fell 40%. As prices fell, total food consumption of surveyed households declined by 10% and wages fell by 5%.

ITC's study also presents key results from companion research on the impact of quinoa price fluctuations, based on data collected by the Peruvian Government. Both ITC's study and the companion research confirm that the well-being of households in Peru's quinoa-growing regions has risen and fallen along with quinoa prices. The evidence strongly suggests that quinoa consumption in developed countries contributes positively to the development of poor, rural communities in Peru.

ITC's study found that with falling prices, producers increased the amount of quinoa they stored. Farmers showed a willingness to purchase silos to improve their storage capacity and prevent loss from pests. Also, more than 80% of quinoa farmers said they would be interested in increasing quinoa biodiversity by planting additional varieties of quinoa in exchange for payments as little as \$10.

Based on these results and the companion research, ITC's study makes three key recommendations for policymakers. In terms of storage, the study suggests considering an incentive structure for motivating the distribution of metal silos among quinoa cooperatives, as a way to mitigate the volatility of quinoa prices, and allow farmers to protect their crops from pests and rodents. To enhance the biodiversity of quinoa species and diversify income sources for smallholders, policymakers may wish to establish a payment for ecosystem services scheme.

Lastly, quinoa producers in Peru's altiplano are less competitive than those in coastal regions. In order to reduce this competitiveness gap, trade and development promotion programmes should focus on helping rural cooperatives to differentiate their quinoa according to the nutritional benefits of its wide range of varieties and the organic nature of their produce, as well as by building improved business capacity.

¹ The Globe and Mail (2013a)

Chapter 1 Booming international demand, increasing production

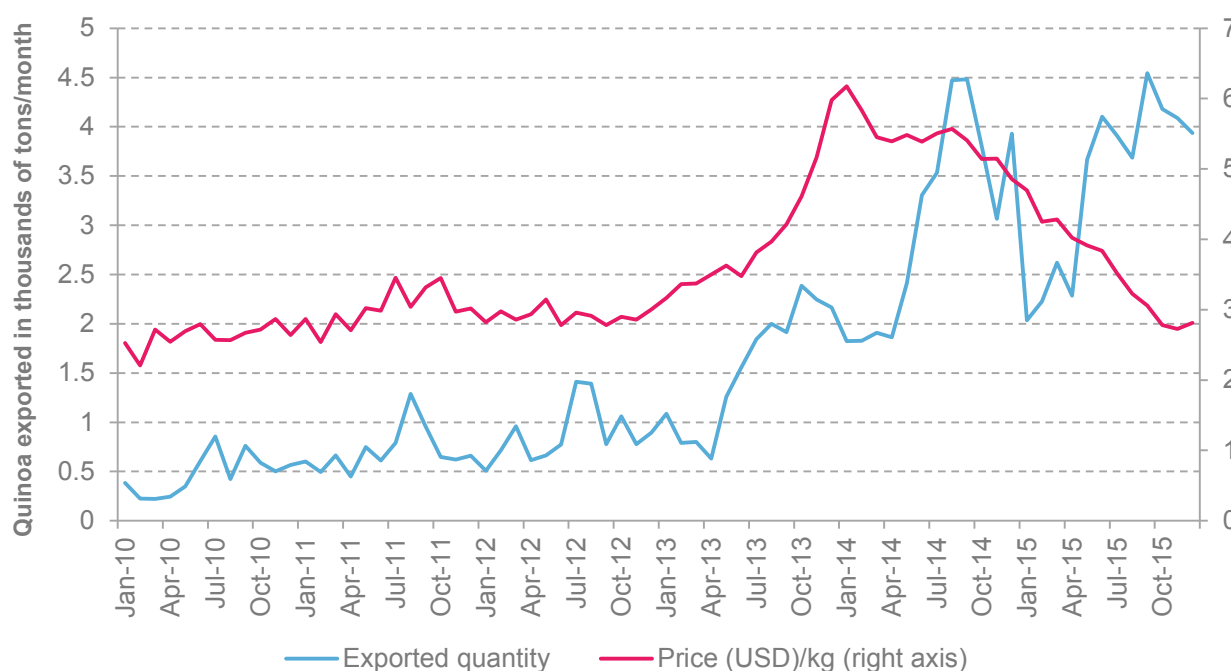
Quinoa is an Andean grain whose high protein content has made it a much sought-after product among consumers in the last 10 years, especially in North America and Europe. As a consequence of the increased demand for quinoa, the value of global quinoa exports rose by more than 235%, from \$135.53 million in 2012 to \$321.56 million in 2015. In recognition of this rapidly growing global market, and the grain's potential to contribute to global food security, the Food and Agriculture Organization of the United Nations declared 2013 the International Year of Quinoa.

Farmers in Peru's altiplano have traditionally grown quinoa for their own household consumption rather than to sell as a cash crop. However in response to increasing global demand, Peru has become one of the world's leading producers of quinoa. Peruvian quinoa exports have increased almost tenfold since 2010, growing from \$15 million in 2010 to \$143 million in 2015.

As of 2015, the United States is by far the largest market for Peru's quinoa exports with a share of 46%, followed by Canada with 7.8%, the Netherlands with 7.7%, the United Kingdom with 5.6%, Italy with 5.1%, Germany with 4.6% and France with 4%.²

Figure 1 illustrates the sharp increase in quinoa prices between 2010 and 2014 and the subsequent decline in 2015. While the total export value declined from 2014 onwards, the quantity of exported quinoa continued to increase, given continued demand.

Figure 1 Peru's monthly quinoa quantities exported and price/kg, 2010–2015³



Source: UN Comtrade Database, 2016

In response to the increased demand, in 2015 Peru set a record level of quinoa production, with over 105,000 tons — a 163% increase over 2010. Yet during the period between 2010 and 2015, land under quinoa cultivation only increased by about 50%. In other words, yields roughly doubled, from about one ton per hectare to almost two tons per hectare. This increase in yields was largely the result of moving quinoa from traditional mountain areas such as Cusco and Puno, where yields remain relatively low at around one

² UN Comtrade Database, 2016

³ Until 2012, quinoa exports were categorized under HS code 100890. From 2012 onwards, quinoa exports were categorized under HS code 100850.

ton per hectare, to coastal Arequipa, where yields have averaged five tons and have reached as high as eight tons per hectare.⁴ Arequipa's high yields may be the result of access to irrigation that was originally intended for rice cultivation, and the use of pesticides, which is not part of traditional, organic quinoa cultivation.



Smallholder farmer from the altiplano (© Tomás Munita)

⁴ USDA, 2014

Chapter 2 Impact of increasing quinoa prices in Peru

1. Increasing prices, increasing livelihood benefits

Before presenting details of ITC's study methodology and results in chapters 3 and 4, this chapter summarizes key results from a companion research study undertaken by Marc Bellemare, Johanna Fajardo-Gonzalez and Seth Gitter in 2016.⁵ Their study is based on national-level survey data collected on Peruvian households (Encuesta Nacional de Hogares- ENAHO) by Peru's national statistics office (Instituto Nacional de Estadística e Informática- INEI). ENAHO data show the well-being of quinoa-producing households generally improved during the price spike of 2013. The Bellemare et al study nuances this conclusion by showing that the average well-being of households rose faster in areas with a high concentration of production, compared to areas with a lower concentration of quinoa farmers.

To study the welfare impacts of rising quinoa prices, Bellemare et al looked at the well-being of households between 2004 and 2013, which gave them a sample size of more than 220,000 households. They measured well-being by the value of all goods and services consumed by a household, including those goods and services produced by the household itself. Forty percent of the value of total consumption of quinoa-producing households is food produced by the household in a given year, which is referred to as total consumption. The companion study examined both with and without quinoa included in total consumption and found the factor had no impact on the conclusions. This part of the data was collected by the Peruvian national statistics office as part of a national annual survey of over 20,000 households across Peru.

In each year between 2004 and 2013, surveyed households reported data on the crops they grew, including quinoa, as well as their sales of all crops. Households were classified into three categories: producers (i.e. households who produce quinoa); consumers (i.e. households who report consuming quinoa in the two weeks prior to the survey); and non-consumers (i.e. households who report not consuming quinoa in the two weeks prior to the survey and did not produce quinoa). Overall, consumers were the richest, with an average household consumption of \$12,307 in 2004.⁶ Non-consumer households had an average household consumption of \$9,230, and quinoa producers, the poorest of the three categories, had an average household consumption of \$4,615, less than 40% of the value of total consumption for quinoa consumers. The story that emerges from these numbers is that quinoa consumers are much better off than quinoa producers.

ENAHO data also allowed Bellemare et al to quantify the effect of rising quinoa prices on the welfare of the average household in areas where quinoa was consumed (see regression results in appendix table A7). In places where quinoa was not consumed, there is no quinoa price that can be used to conduct a similar analysis. ENAHO data also allowed the companion study authors to estimate the impact of quinoa price increases on the average household's total consumption. This estimate covers all kinds of households, from consumers to producers of quinoa, including households that neither produce nor consume quinoa.

Bellemare et al found that in areas of Peru where quinoa was consumed between 2004 and 2013, a 10% increase in the price of quinoa translated into a 0.7% increase in the welfare of the average household (see appendix table A7). The authors controlled for changes in overall prices by using departmental-level price adjustments. Though it might seem odd that an increase in the price of quinoa would be associated with an increase in the well-being of the average household in areas where quinoa was consumed, the result may capture what economists call the general equilibrium effects of a quinoa price increase. That is to say, it reflects the far-reaching macroeconomic effects throughout the entire Peruvian economy of an increase in the price of quinoa. The effect includes additional income to quinoa producers that in turn boosts parts of the economy where producers spend their income.

To compare how the value of consumption evolved for different types of households, each category of household (i.e. quinoa producers, consumers and non-consumers) was normalized by the value of that category's average household consumption in 2004. Inflation was controlled for by using data at the

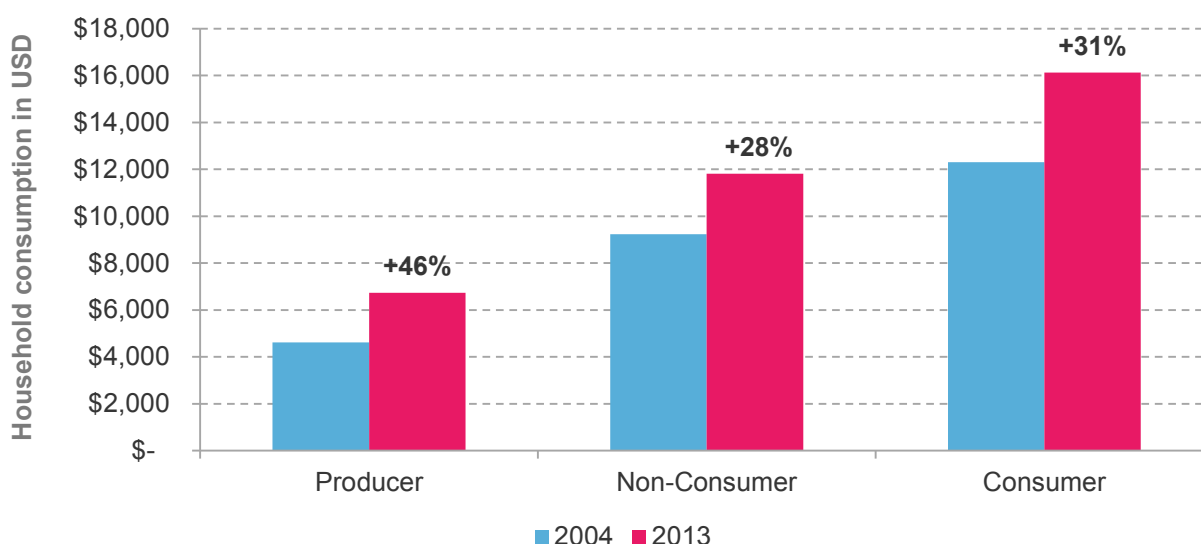
⁵ Bellemare et al (2016)

⁶ 1.3 PEN = \$1 Purchasing Power Parity (PPP) adjusted

departmental level to control for price changes for all goods and removed quinoa consumption from the total to control for rising prices.

Figure 2 shows how welfare evolved for those three types of household. At the end of the 2004 to 2013 period, producers of quinoa were 46% better off than at the beginning of the period. Quinoa consumers were 31% better off, and non-consumer households were 28% better off. Most of the difference in those well-being growth rates occurred between 2012 and 2013, when quinoa prices spiked.

Figure 2 Peruvian household consumption evolution, 2004–2013



Source: ENAHO (2015)

2. Increasing prices, steady quinoa consumption

Though household income increased from 2004 to 2013, ENAHO data show that as quinoa prices spiked, there was little change in quinoa consumption by producers or consumers. The data show that roughly 30% of households consume quinoa in Peru and that this proportion has been relatively constant since 2005. There has been a drop in total quinoa consumption for both quinoa producers (almost 50%) and consumers (20%) since 2004. However, this decline has been steady, and has not been in line with the quinoa price increase, indicating that the trend is not price-driven, but likely due to a change in consumer preferences. Between 2010 and 2013, quinoa consumption only fell by 5%.

Overall, quinoa represents a small share of the average household budget of quinoa consumers, as it has remained around 0.5%–0.6% of total household expenditure. This means that, since 2008, around \$1 out of every \$200 in the average quinoa-purchasing household budget has been spent on quinoa.

There is also evidence that as prices increased, more producers decided to sell quinoa. The percentage of households who produced quinoa and who reported selling it doubled between 2010 and 2013, rising from 8% to 17%. Overall, revenue from quinoa tripled from 300 PEN to 900 PEN (about \$100 to \$300 in 2004 dollars) over that period, which represents a 10% increase in total household consumption for quinoa producers relative to their baseline consumption in 2004.

Chapter 3 Impact of price changes on altiplano communities

As chapter 1 establishes, global quinoa exports rose by more than 235% between 2012 and 2015. In 2013, international media outlets such as The Guardian⁷, Globe and Mail⁸ and the Washington Post⁹ raised concerns about how increased demand and prices for quinoa was impacting rural Peruvian households. Some journalists argued that rising prices were damaging the welfare of poor Peruvian households who traditionally relied on quinoa for their basic food security. Some campaigners called for consumers to boycott quinoa in order to make it more affordable to poor rural Peruvian households that traditionally consumed it. In contrast, other journalists such as Doug Saunders¹⁰ from the Globe and Mail argued, 'The price rise is the greatest thing that has happened' to rural Peruvian families.

During this debate, there was little data to support either argument. For this reason, ITC decided to conduct research with the University of Minnesota and University of Towson, to measure the impact of changing quinoa prices on the welfare of households in the Peruvian altiplano. ITC undertook a quarterly survey of 150 households over the course of the year spanning September 2014 to August 2015. The survey included questions about agricultural production, household food consumption, household composition, quinoa storage, and biodiversity.

Districts within the departments of Puno and Cusco were chosen for their experience with quinoa production. Puno is one of the oldest quinoa-growing departments in Peru, and has by far the highest concentration of quinoa producers and the highest rate of quinoa consumption. Cusco is also among the highest quinoa-producing areas of all Peruvian departments and has the second highest rate of quinoa consumption.

An effort was made to survey the same households four times over the course of a year, and 95% of households were surveyed in at least three of the four survey rounds. As expected, nearly all households in the sample reported consuming quinoa in the previous three months, and about 80% of the surveyed households were quinoa producers.

1. High dependency on agricultural and livestock income

National-level statistics show that quinoa farmers in Puno and Cusco are substantially poorer than the average Peruvian household. In these two states, total consumption (including consumption of food produced by the household) among quinoa producers is 40% less than the mean household in Peru. In the sample, the average quinoa-producing household reported roughly 600 PEN in income over the last three months. This translates to roughly \$400 (PPP) per quarter, or about \$1,600 a year.

⁷ Blythman, 2013; Collyns, 2013.

⁸ Verner, 2013

⁹ The Washington Post Wonkblog, 2013

¹⁰ Saunders, 2013

Table 1 summarizes the average characteristics of surveyed households.

Table 1 Average household characteristics

Household size characteristics	
Number of people	4
Children under 15	1.3
Adults 15-65 years old	2.5
Adults 65 years old+	0.3
Household head characteristics	
Average age	50
% Male	76
% Female	24
Years of schooling	7
Time spent on farm	6 months/year
Livestock ownership (round 1 survey results)	
% Households owning cattle	92
% Household owning chicken	62
Primary language spoken	Spanish



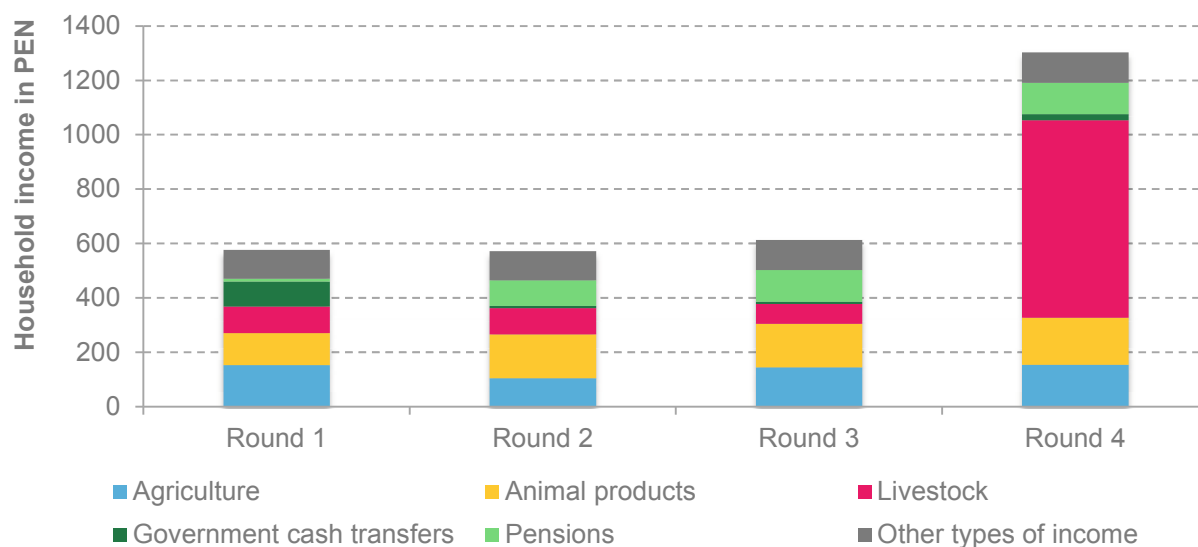
Quinoa farming (© Tomás Munita)

Source: ITC household survey, 2016

Many households grow food for their own consumption, an activity that contributes to a household's full income. Roughly half of reported income came from agricultural activities or livestock, and a third received cash transfers from the government, such as through the JUNTOS¹¹ programme, which aims to alleviate poverty through a conditional cash transfer system. There seems to be little income-earning economic activity outside of those categories. Income was relatively stable, around 600 PEN between survey rounds one and two, while in round three there was a slight increase.

In the fourth survey round, incomes doubled due to an increase in livestock earnings. The percentage of households earning livestock income more than doubled between survey rounds one and four. The median livestock income (including those with no livestock income) was 240 PEN in round four compared to zero in the other rounds. In comparison, in survey rounds one, two and three, the median livestock income for those with positive values was 260 PEN. Figure 3 presents the composition of the average household income per survey round.

¹¹ For more information on the JUNTOS programme: <http://www.juntos.gob.pe>

Figure 3 Composition of average household income

Source: ITC household survey, 2016

2. Falling prices, falling quinoa consumption

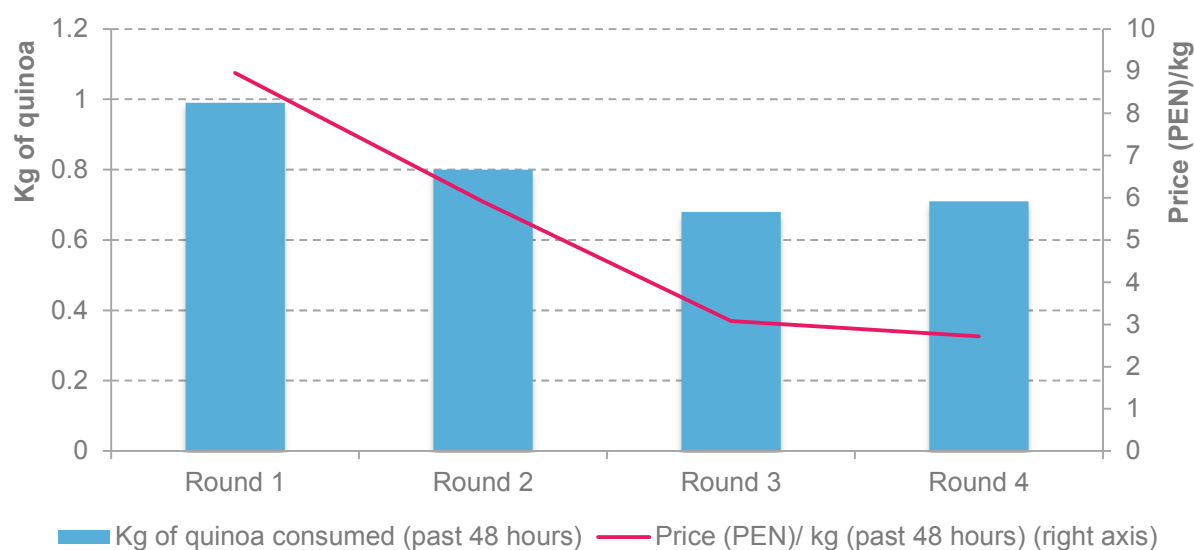
Nearly all households surveyed by ITC (i.e. more than 95%) reported consuming quinoa in the previous three months. Two clear trends emerged in terms of quinoa consumption between rounds one and four: both quinoa consumption in kilos and quinoa prices fell. A sharp increase in storage and reduction in sales despite falling prices may suggest that sellers stored quinoa and buyers were unable to purchase it locally. The first trend of declining consumption can be seen in Figure 4, which shows a sharp decline in the total amount of quinoa consumed. In the fourth survey round, households reported consuming about 40% less quinoa per week over the previous three-month period, compared to the first survey round. An almost 30% decrease is seen when asking about quinoa consumed in the previous 48-hour period.

Quinoa purchase prices fell dramatically from 9 PEN/kg to 4 PEN/kg between the first and fourth survey rounds. With declining consumption and prices, the average value of quinoa consumed by households fell from just under 8.96 PEN to 2.72 PEN in the 48-hour recall period of the survey.

In the first round, among the households who consumed quinoa in the previous 48 hours, 81% of the consumed quinoa was produced by the household itself. By the final two survey rounds, nearly all households consuming quinoa in the previous 48 hours were consuming quinoa produced by the households (i.e. their own production). Despite falling prices, fewer households were purchasing quinoa and when they did, they purchased fewer kilos of it. When asked if the household had purchased quinoa in the previous three-month period, survey results show a decline from 26% in the first round to 7% in the fourth round. Among households that purchased quinoa, the average number of kilos purchased fell almost 50%, from 13.3 kg to 6.8 kg between the first and final survey round.

The trends in quinoa consumption over the course of the study run counter to ENAHO data in Puno and Cusco. ENAHO data shows essentially the same consumption of quinoa throughout the year with the exception of a small increase during the harvest season (April and June).¹² ITC survey data shows the lowest quinoa consumption for all households was in the third round, after the harvest season had taken place. This suggests that sellers are storing quinoa while they wait for prices to rise, which is supported by increasing amounts of reported stored quinoa. Figure 4 illustrates the evolution of quinoa prices and quinoa consumption for the past 48 hours of each household interview. Detailed data can be found in appendix table A5.

¹² Based on the district and year, fixed effects regression on all quinoa consumers in Puno and Cusco from 2007-2013

Figure 4 Quinoa prices and quinoa consumption in past 48 hours


Source: ITC household survey, 2016

Households were asked about their consumption of 21 types of food in the past 48 hours, as shown below in table 5. When adding up the value of food consumption, households reported consuming roughly 33 PEN worth of food per 48-hour period in the first round. With an average of 4.1 persons per household, this equates to food consumption of roughly 3.75 PEN worth of food per person. This is around \$2.50 PPP per day.¹³

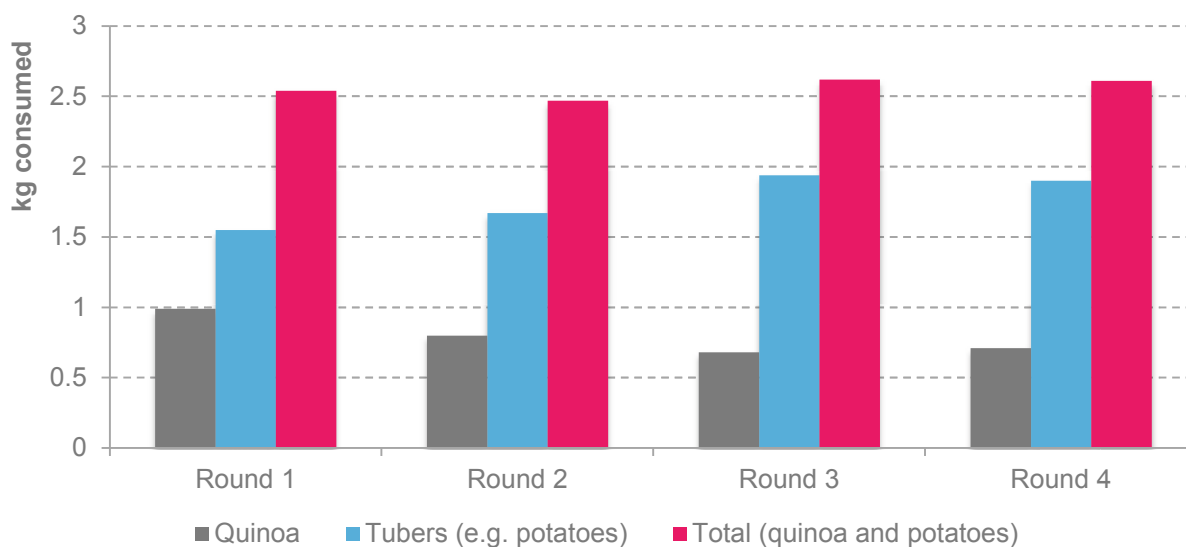
Almost all of the households consumed tubers (e.g. potatoes), vegetables, oil, sugar, and most consumed rice and bread. The diet of surveyed households appears relatively healthy as few households consume processed meats or alcohol, and only 10% consumed soda. During the past week, fewer than 3% of households had skipped a meal because they lacked the necessary income to purchase food.

Appendix table A6 shows the value in PEN of each of the food categories. Food prices in the first survey round are used so that comparisons can be made, adjusting for prices. Overall food consumption remained steady between rounds one and two; by rounds three and four, consumption had fallen almost 10% from the first round. The largest change was a substantial drop in quinoa consumption between rounds one and two. In round two, households compensated for this decline by increasing their consumption of red meat. By round three, red meat consumption had fallen below the figures of round one. In rounds three and four, surveys show an increase in potato consumption.

Looking at the data more closely in Figure 5, it looks as though households substitute potatoes for quinoa; as household quinoa consumption dropped, potato consumption increased. Given the relatively high protein content (for a grain) of quinoa, this substitution would likely reduce total protein consumed.¹⁴ Quinoa consumption went down by roughly 30% and potato consumption went up by roughly the same amount. Total consumption of quinoa and potatoes increased only 2.7% between rounds one and four.

¹³ The World Bank estimates the PPP exchange rate as 1.53 PEN to the USD.

¹⁴ Sanchez, 2012

Figure 5 Quinoa prices and tuber consumption in past 48 hours


Source: ITC household survey, 2016

3. Falling prices, increasing storage

Table 2 shows that both quinoa prices and sales dropped dramatically after the 2015 harvest, which took place between the second and third survey rounds (in January and May, respectively) in 2015. The price paid by consumers and the price received by sellers fell by 40% between the beginning of 2015 and the middle of the year.

Quinoa purchases and sales, however, both declined, and there is evidence that producers were holding on to their quinoa as the amount of quinoa stored had almost doubled between survey round one and four. In other words, there is evidence that many quinoa producers are holding out for higher prices before their stored quinoa perishes; or they are holding on to their harvest, to minimize the amount of quinoa they will have to purchase at a potentially higher price in the future. In response to the lost income from quinoa sales, households reduced their total food consumption.

The survey found an almost 7% decline in the value of food consumed by the average household between rounds two and three, suggesting that households were coping with lost earnings from quinoa by reducing their food consumption.



Quinoa storage (© Tomás Munita)

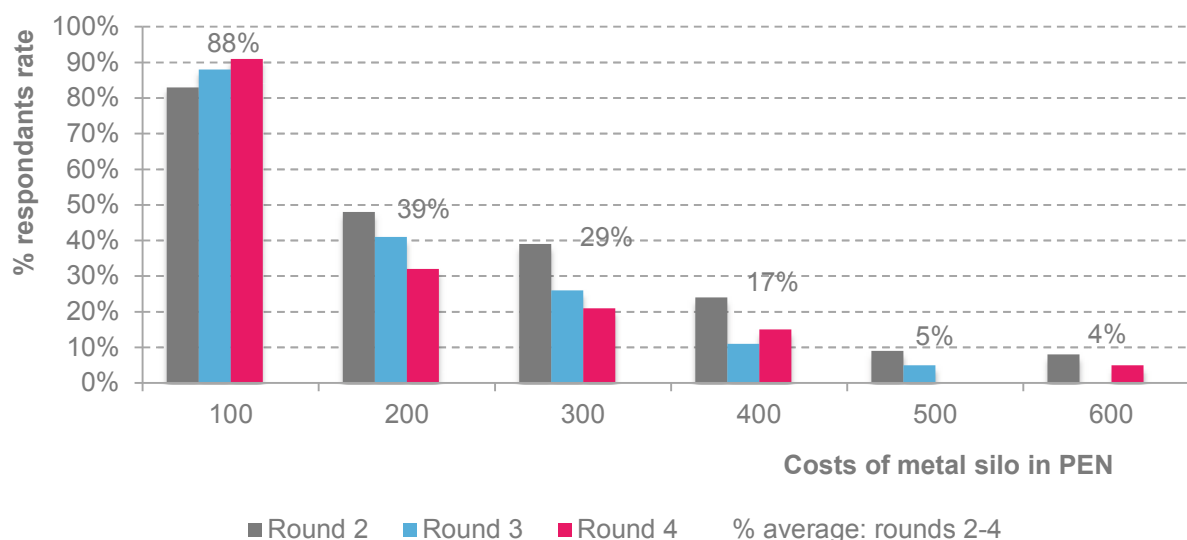
Table 2 Quinoa purchases, sales, and storage

Survey rounds	% Purchasers	Average kg purchased	Price per kg (USD)	% Seller	Mean Sale Price (USD)	kg Sold	Mean Storage kg	Total Food Consumption USD (Past 48 Hours)
Round 1: Sept-Oct 2014	25%	12.9	\$ 2.68	21%	\$ 2.35	30	31.3	\$ 9.74
Round 2: Jan-Feb 2015	20%	7.6	\$ 2.36	17%	\$ 2.18	63	27.7	\$ 9.56
Round 3 May-Jun. 2015	13%	5.2	\$ 1.37	9%	\$ 1.26	21	57	\$ 8.91
Round 4 Sept. 2015	7%	6.9	\$ 1.19	13%	\$ 1.12	22	52.6	\$ 9.00

Source: ITC household survey, 2016

During the year of the survey and falling prices, quinoa producers increased the amount of quinoa they held in storage. However, quinoa is typically stored in sacks, and is thus vulnerable to destruction by pests and rodents. One way to prevent the loss of stored quinoa is by using metal silos. The survey asked about respondents' willingness to pay for a standard-size grain silo. Data collectors set a hypothetical sale price for a metal silo between 100 and 600 PEN, based on the role of a die (the real value of the silo was 400 PEN). The average willingness to pay for a silo dropped substantially from 486 PEN before the 2015 harvest to 317 PEN after the harvest. See figure 6 and appendix table A1 for more details.

These findings suggest that one possible policy intervention to increase the welfare of those farmers would be to establish an incentive structure, for instance through subsidies, to motivate the distribution of grain silos within quinoa cooperatives.

Figure 6 Respondents' willingness to pay for a metal silo


Source: ITC household survey, 2016

4. Increasing storage, retaining price optimism

Respondents remained optimistic about quinoa prices. Each survey round asked respondents' about their subjective expectations regarding what the price of quinoa would be in the near future. In round three, (in May and June 2015), respondents predicted that quinoa prices would return to the high levels seen in the previous year. This appears unlikely given the increase in quinoa production in Peru's coastal region.

In the first three rounds of the survey, respondents did not appear to be making any distress sales of assets or seeking other forms of income to compensate for lower quinoa prices. Livestock, which is one of the largest assets for most families, did not see an increase in sales (see appendix table A3). The study observes no major changes in the reports of other non-livestock assets owned by the household (see appendix table A4). Surveys showed a decrease in TV and bicycle ownership, while radio and motorcycle ownership increased, however this might be due to attrition. In other words, no evidence of households selling assets to combat low quinoa prices was found. One reason for the lack of asset sales is that households appeared to still have sufficient money to purchase the food they needed. Fewer than 4% of households in any round reported skipping a meal due to lack of money in the previous three months, and no households reported skipping a meal in the final round.

5. Reversing biodiversity loss

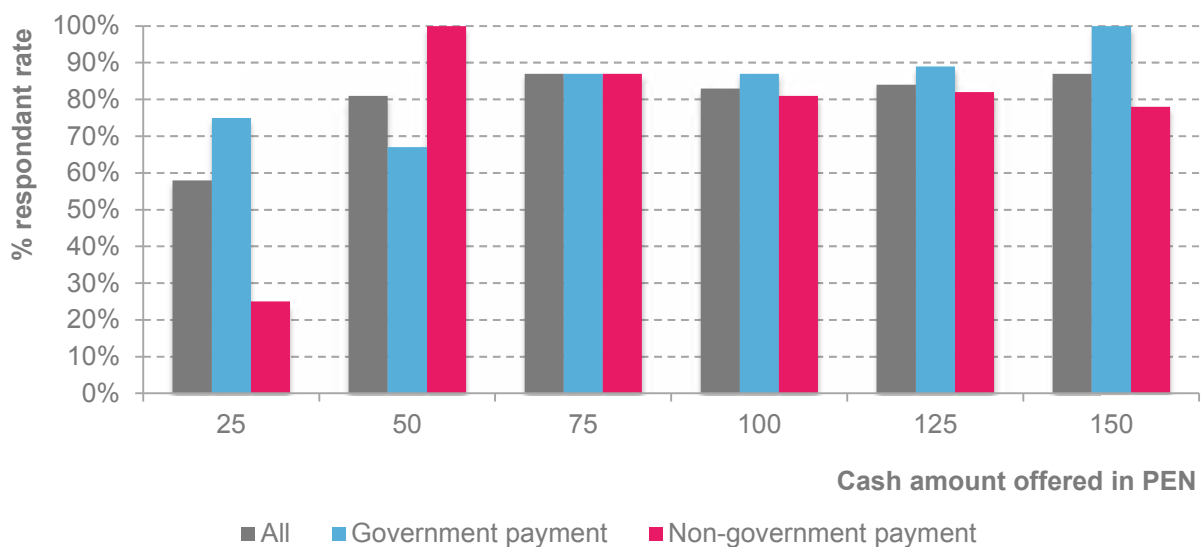
Expanding the cultivation of quinoa varieties that are in high demand internationally has reduced the number of varieties of quinoa grown in Peru.¹⁵ According to ITC's survey, the most common type of quinoa consumed was white quinoa, which 127 of the 150 households surveyed in the first round consumed. The next most popular was yellow quinoa, which only 20 of the 150 households surveyed consumed.

A similar concentration of white quinoa can be observed when respondents were asked what type they produce. Survey participants were made a hypothetical offer of between 25 and 150 PEN to plant 50 square meters of a new variety of quinoa. Respondents were randomly assigned an offer based on the roll of a die (the roll was multiplied by 25). On average, 82% of the time respondents said they would take the offer in the first round. There seems to be little difference between 50 and 150 PEN in terms of the likelihood of accepting the offer. Only 58% of respondents who were offered 25 PEN accepted the offer. This suggests that the optimum price point for an organization or government to promote biodiversity at the lowest cost may be between 25 and 50 PEN, though such a payment for ecosystem services scheme would require some enforcement mechanism to succeed. By the second round, 93% of participants said they would accept the offer, and once again, there was no difference between those who were told the government would make the payment versus another person or entity. In survey round three, all participants said they would accept the offer, and 97% of participants in round four said they would accept the offer.

This could indicate that households knew the game was hypothetical, and might say no when faced with a real offer. On the other hand, it could indicate that households would accept very small payments to plant a biodiverse crop and that their willingness to accept payments had increased even more after the fall in quinoa prices. Figure 7 illustrates respondents' willingness to plant biodiverse crops when offered cash payments.

¹⁵ Huanca et al., 2015

Figure 7 Respondents' acceptance of payments to plant biodiverse crops



Source: ITC household survey, 2016



Biodiversity of quinoa on the altiplano (©Tomás Munita)

Chapter 4 Conclusions and policy recommendations

1. Conclusions

Falling quinoa prices have reduced welfare of households

Quinoa prices are volatile and short lived. During the period between 2013 and 2015, the price of quinoa doubled and then fell back down to its original price level. The evidence presented in this study strongly suggests that quinoa consumption in developed countries contributes positively to the development of poor, rural communities in Peru.

Results of the ITC household survey between 2014 and 2015 show that as quinoa prices fell, total food consumption declined by 10% and wages fell by 5% for the average household. During the price fall, households reduced meat consumption and substituted quinoa with potatoes, thus likely reducing their protein intake.

Producers also responded to the price fall by storing quinoa in anticipation of a return to higher prices. However, their typical storage method, using simple sacks, left producers' stored quinoa vulnerable to pests and rodents. Surveyed farmers responded that they would be willing to pay for subsidized metal silos.

Rising quinoa prices increased welfare of households

Bellemare et al's companion research (based on ENAHO household survey data) shows that during the boom of 2013, the well-being of quinoa-producing households improved. A 10% increase in the price of quinoa translated into a 0.7% increase in the welfare of the average household.

The improvements to the well-being of quinoa consuming households is explained by a 'general equilibrium effect', namely, the far-reaching macroeconomic effects throughout the entire Peruvian economy of an increase in the price of quinoa. The effect includes additional income to quinoa producers that in turn boosts parts of the economy where producers spend their income.

Quinoa consumption unaffected by higher prices

ENAHO data show that as quinoa prices spiked, there was little change in quinoa consumption by producers or consumers. The data show that roughly 30% of households consume quinoa in Peru and that this proportion has been relatively constant since 2005. Between 2010 and 2013, quinoa consumption fell by 5%. This decline has been steady, and has not been in line with the quinoa price increase, indicating that the trend is not price-driven, but likely due to a change in consumer preferences. Overall, quinoa represents a small share of the average household budget of quinoa consumers, as it has remained around 0.5%–0.6% of total household expenditure.

Smallholders face tough competition from larger farms

Despite, producers' optimism about a return to higher prices in the future, it seems unlikely that prices will increase again given the growth in quinoa production in coastal areas where yields are substantially higher. One concern is that these relatively new, export-oriented quinoa producers in coastal regions may move quinoa production toward an export monoculture thus eroding the biodiversity of quinoa in the region.

Smallholders willing to supply a market for ecosystem services

ITC's household survey results indicate that farmers are willing to help efforts to increase biodiversity to combat the problem of monoculture that has resulted from an increased focus on exporting a single quinoa variety. When asked, most quinoa farmers would be willing to accept payments as little as \$10 to plant small plots of different varieties.

2. Recommendations for policies and Aid for Trade

Based on the results of ITC's household survey and Bellemare et al's companion research, this study makes the following recommendations for policymaking and the provision of technical assistance.

Subsidies for storage will help reduce price risk for smallholders

An incentive structure, for instance in the form of subsidies for motivating the distribution of metal silos among cooperatives, should be considered as a way to smooth out the volatility of prices that producers receive, as well as to allow farmers to prevent their crops from destruction by pests and rodents.

Establishing a market for ecosystem services will reduce risk for smallholders and increase quinoa biodiversity

Policymakers should consider establishing a Payment for Ecosystem Services scheme to incentivize the maintenance of quinoa biodiversity. This could be tested in the form of small cash payments to traditional farmers in return for planting heritage varieties that are less in demand in the international market. In this way, quinoa varieties can be preserved, livelihood strategies of quinoa farmers can be diversified, and income can be stabilized by commercializing varieties with lesser price volatilities.

Agricultural policies and aid for trade should support market differentiation strategies of smallholder cooperatives

Producers in Peru's altiplano are less competitive than those in coastal regions. In order to reduce their competitiveness gap, trade and development promotion programmes should further focus on supporting cooperatives in differentiating their quinoa according to the nutritional benefits of its wide range of varieties. Programmes can also further support organic farming practices and traditional production methods, as well as diversification strategies and improved business capacity.

Appendix

Table A1 Respondents' willingness to pay for a metal silo

Price (PEN)	Round 2	Round 3	Round 4	Total (Rounds 2-4)
100	83%	88%	91%	88%
200	48%	41%	32%	39%
300	39%	26%	21%	29%
400	24%	11%	15%	17%
500	9%	5%	0%	5%
600	8%	0%	5%	4%
Average*	486	317	310	371

Note: *Average is the sum product of the percent willing to pay and the price for each.

Source: ITC household survey, 2016

Table A2 Mean expected price

	Mean expected price July 2015	Mean sale price
Round 1	14.8	8.2
Round 2	12.2	7.4
Round 3	9.5	4.1
Round 4	*	3.8

Note: * As round four took place in September 2014, no question was asked about the expected price for July 2015 during this round.

Source: ITC household survey, 2016

Table A3 Livestock assets

		Round 1	Round 2	Round 3	Round 4
Owned	Cows	4.7	4.9	4.8	4.8
	Pigs	0.5	0.5	0.3	0.4
	Sheep	11.5	11.5	11.7	11.6
	Chickens	2.5	3.3	3.0	2.4
	Alpacas llamas	1.5	1.7	1.8	1.5
	Small animals	3.6	4.5	5.4	4.5
Sold	Cows	0.2	0.5	0.6	0.5
	Pigs	0.0	0.0	0.0	0.1
	Sheep	0.9	0.8	0.8	1.0
	Chickens	0.0	0.0	0.0	0.0
	Alpacas llamas	0.1	0.0	0.0	0.0
	Small animals	0.3	0.4	0.0	0.4

Source: ITC household survey, 2016

Table A4 Assets owned by percentage of households

	Round 1	Round 2	Round 3	Round 4
Plow	0%	0%	0%	0%
Cart	0%	0%	0%	0%
Harrow	0%	0%	0%	0%
Tractor	1%	0%	0%	0%
Car or truck*		3%	4%	3%
Motorcycle		31%	34%	38%
Agricultural tools	100%	100%	100%	100%
House	100%	100%	100%	100%
TV	41%	41%	37%	34%
Radio	88%	91%	91%	95%
Bicycle	45%	27%	31%	34%
Bank account	0%	0%	0%	0%
Silos	6%	3%	0%	0%
Chicken	62%	70%	69%	66%
Jewellery	0%	0%	0%	0%
Business	1%	4%	6%	7%
Land	99%	100%	100%	100%

Note: In round one, the question on holding a car or truck and motorcycle was combined. In order to ensure comparability, no answer is reported for the two assets for round one.

Source: ITC household survey, 2016

Table A5 Household quinoa consumption and purchases

Round	% Consumed in prev 3 months	Av. kg consumed per week (3 months)	% Consumed in prev 48 hours	Kilos consumed (48 hours)	Price per kg (48 hours)	Value PEN	% Own consumption	% Purchased last 3 months	Price (past 3 mths)	Kilos purchased
Round 1	98%	1.47	56%	0.99	9.11	8.96	81%	26%	10.5	13.3
Round 2	97%	1.31	43%	0.80	8.01	5.91	81%	23%	9.3	11.8
Round 3	96%	1.03	43%	0.68	4.67	3.08	97%	13%	8.6	5.2
Round 4	95%	0.88	52%	0.71	4.03	2.72	99%	7%	5.4	6.9

Source: ITC household survey, 2016

Table A6 Food consumption in previous 48 hours using round 1 prices (in PEN)

Food Item	Round 1	Round 2	Round 3	Round 4
Quinoa	5.06	3.10	2.67	3.40
Rice	2.06	1.76	2.08	2.04
Bread	1.33	1.14	0.99	1.08
Noodles	0.37	0.57	0.54	0.51
Red meat, alpaca, rabbit	5.32	7.25	5.20	5.09
Chicken, duck	0.66	0.73	0.58	0.98
Processed meat	0.00	0.00	0.00	0.00
Fish	1.66	0.83	1.04	0.75
Milk	1.83	2.10	2.08	2.06
Yogurt, cheese	2.89	3.77	3.97	4.65
Eggs	1.25	0.99	1.01	0.73
Oil	0.87	0.98	1.07	0.96
Tubers (e.g. potatoes)	1.81	1.97	2.36	2.28
Beans and legumes	0.58	0.74	0.44	0.95
Veggies and onions	1.92	1.70	1.98	1.90
Fruit	2.98	2.12	2.26	1.37
Sugar	1.18	1.14	1.03	1.04
Coffee or cacao	0.24	0.57	0.24	0.07
Processed food or restaurant	0.52	0.23	0.39	0.43
Soda	0.30	0.17	0.22	0.09
Alcohol	0.27	0.63	0.13	0.23
Total in PEN	33.1	32.5	30.3	30.6
% of round 1 consumption		0.98	0.91	0.92

Source: ITC household survey, 2016

Table A7 Pseudo-panel regression of total household consumption on the price of quinoa

Variables	(1)	(2)	(3)
Dependent variable: Log of total value of household consumption			
Log of price of quinoa	0.079** (0.037)	0.072 (0.094)	0.066** (0.030)
Constant	-55.711*** (9.780)	9.018*** (0.110)	-61.265*** (4.219)
Observations	1,590	1,590	1,590
Department fixed effects	Yes	Yes	Yes
Linear trend	Yes	No	No
Year fixed effects	No	Yes	No
Department-specific linear trends	No	No	Yes
R-squared	0.674	0.692	0.854

Source: Bellemare et al., 2016

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