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Faculty of Tropical AgriSciences



Women's role in agriculture and their access to agricultural information in Cusco region, Peru

A Case study of T'umi and Queromarca rural communities

Master Thesis

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Declaration

“I hereby declare that I have worked on this Master thesis: Women’s role in agriculture and their access to agricultural information in Cusco region, Peru. And I only used the resources listed directly in the references, at the end of this work.”

In Prague 18.04.2016

Fanny Puntaca Mamani

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Abstract

The present study analysed the role of women in agriculture and their access to information on farming issues in two rural villages from the high lands of Peru. The main focus of this thesis was the identification of specific farming tasks performed by women during agricultural production process. The thesis was also focused on defining the socio-economic factors that influences women roles. Another relevant aim, was to determine the access to farming information. This research used mainly inferential statistics tools such as the Spearman's Rho and Pearson correlation methods to determine the significance level of the proposed hypothesis. Fisher exact test and Paired T-test were also applied during that process. The thesis's findings indicated that the role most performed by women in agriculture are the helping works, which are considered as a secondary activity in the Andes. This research found that about 79% of sampled women were dedicated to helping works, usually helping their husbands in tasks such as seed selection, post harvesting work, and small animal breeding (guinea pigs mostly). Other 54% of females attended to work as main workers performing the hardest work in the fields which include soil preparation, planting, harvesting, and animal husbandry. Selling and marketing of products was the third activity more realized with 45% of women dedicated to it, while innovation and planning were found as the less carried out. There were no big differences between the studied villages in terms of education level and there is still prevailing low level of education among women farmers. It was found that the 65% of females achieved only elementary school. The 30% of females in both areas have secondary and less than 5% of them reach techniques or university instruction. Concerning to education, it was determined that women with higher education are involved in more intellectual agricultural activities such as planning, innovation and selling. And regarding to age, it was found that the age of women determines their level of participation in farming. More than 60% of females were between 36 and 60 years old and the majority of them were especially dedicated to helping works. Related to information that women managed, it was defined that the location of the studied villages, T'umi and Queramarca, plays a relevant role.

Key words: Peru, Cusco region, women, agriculture, markets, information services.

Contents

1	Introduction.....	1
2	Literature review	2
2.1	Women in developing countries agriculture	2
2.2	Women role in Latin American agriculture	4
2.2.1	Mexico, Central America and Caribbean countries.....	5
2.2.2	South American countries.....	6
2.3	General information about Peru	9
2.3.1	Historical development about the women role in Peru.....	10
3	Objectives of the thesis	13
3.1	Main objective.....	13
3.2	Specific objectives	13
4	Methodology	15
4.1	The study area	15
4.2	Data sources	16
4.2.1	Primary data Sources	16
4.2.2	Secondary data Sources	16
4.3	Data collection	17
4.4	Target group and sample size.....	18
4.5	Timeframe	18
4.6	Data analysis	19
5	Results.....	23
5.1	Descriptive statistics results	23
5.1.1	Social and economic factors which influence role women on farming.....	23
5.1.2	Specific data regarding to roles and information.....	26
5.2	Inferentials statistics results	28

5.2.1	Testing hypothesis	28
6	Discussion.....	37
7	Conclusions.....	40
8	References.....	41
9	Appendices.....	49

List of Tables

Table 1. Frame time	19
Table 2. Age of the respondent * Village	23
Table 3. Education of the respondents	24
Table 4. Household income * Village	25
Table 5. Spent time/day into agriculture * Village	26
Table 6. Agriculture roles	31
Table 7. Spearman's rho Correlation test result 1	33
Table 8. Spearman's rho Correlation test result 2	33
Table 9. Main work.....	34
Table 10. Helping work	34
Table 11. Innovation	35
Table 12. Planning	35
Table 13. Paired Samples Statistics	36
Table 14. Paired Samples Test.....	36

List of Figures

Figure 1. Study area description in the Cusco region.	15
Figure 2. Age of respondents	23
Figure 3. Education.....	24
Figure 4. Household income	25
Figure 5 Time spent in agriculture per day	26
Figure 6. Roles in Agriculture	27
Figure 7. Information recieving period.....	27
Figure 8. Level of participation in agriculture	29
Figure 9. Involvement on intellectual work.....	32

List of used abbreviations

RIMISP	Latinamerican Centre for Rural Development
CGIAR	Consultative Group for International Agricultural Research
CCAFS	Climate Change Agriculture and Food Security
CEPES	Peruvian Center of Social Studies
IWMI	International Water Management Institute
CAN	Andean Community
CIAT	The International Centre of Tropical Agriculture
FAO	Food and Agriculture Organization
FRD	Federal Research Division
LOC	Library of Congress
GDP	Gross Domestic Product
IDB	Inter-Developing Bank
IICA	Interamerican institute for Agriculture Cooperation
INEI	National Institute of Statisticstic and Informatic of Peru
MEF	Ministry of Econmy and Finance of Peru
MERCOSUR	Southern Common Market
MINCETUR	Ministry of Foreign Trade and Tourism of Peru
MRD	Mountain Research and Development
MTPE	Ministry of Labor and Employment Promotion of Peru
OECD	Organization for Economic and Development
SENAMHI	National Service of Meteorology and Hydrology of Peru
SUNAT	National Superintendent Office for Customs and Taxes of Peru

UN	United Nations
USMP	University of San Martín de Porres
WB	World Bank

1 Introduction.

Women plays an important role in the agriculture sector worldwide. Particularly in the rural areas from developing and developed countries, they contributes with the eradication of poverty and hunger. However, there are many factor that still make impossible their overall development such as discrimination and gender stereotypes. In agriculture, women have not equitable access to productive resources and farming services (Agulló , 2011).

In Latin American context, women are considered a crucial source of income for their families and traditionally they are involved in agricultural activities. It was found that their level of involvement on agriculture has increased during the last two decades (FAO, 2010b).

Peru is a typical Andean country from South America, the agriculture sector is one of the main economic activities. Peruvian agricultural sector employs more than 2 million people, from this, 30.8% are women and 69.2 % are men. The data comparing with statistics from the year 1994 shows that the count of men employed in agriculture increased 14.2%, while the count of women increased about 100% (INEI, 2013). There are many aspects that are linked with the role of women in Peruvian agriculture, particularly with their social and economic status in the rural areas and their access to agricultural resources such as land, information and others.

The main objective of this research, is to study the women role in agriculture, their access to agricultural information between two selected rural villages from the Cusco region in Peru. The method used to determine the relevance of statistical findings and analyse the proposed hypothesis is mainly the statistical correlations such as Spearman's rho, Pearson correlation coefficient. Another methods applied were Fisher exact test and Paired “t” test which were used particularly to compare both studied areas and determine the confidence level of analysed data. The specific goals analyses the social and economic factors which influence women role and their level of participation in farming, the types of female’s activities on farming, the possible constraining factors which can limit women’s role in agricultural production and factors that influence ability access to relevant information. The thesis’s methodology specifies the villages were the research has been carried out (T’umi and Queromarca). In this part are mentioned the sources, collection and analysis of data. The results, shows the testing of hypothesis regarding to women roles on farming and their access to information. The discussion talks about the thesis results with other previous studies.

2 Literature review

2.1 Women in developing countries agriculture

The term “Gender roles” refers to the differences and social responsibilities between men and women at the family level which are learned and changeable. They can also differ widely between cultures and within them. Gender roles are learned behaviors in a given society. Those roles are based on social conditions that assigned activities considered appropriate for women and also those considered appropriate for men (Geneflow, 1991).

The roles assigned to women in developing countries are many, and always linked to the family environment. Females are considered as a family’s labour source, the same as their children and husband (Charlton, 1984). The labour division in agricultural production in developing countries are connected with the roles that each family member does, and these roles are regulated to certain cultural patterns of each places. For instance, a study published about the social status of Andean women (C. Bourque and Warren, 1981), details that the relationship between women’s and men’s roles are always a mutual agreement that is also called the tradition of complementarity. While, current studies indicate that women in the Philippines, India, and in sub-Saharan Africa show how diverse can be the roles that females perform in farming beginning with food production process, preservation, preparation, marketing, technologies they use, and planning the family nutrition (Charlton, 1984).

The process of globalization and technological advances has been motivating different social phenomena such migration from rural to more urban areas, mostly involving man. This present situation influences directly the agriculture system from the rural areas mostly and women’s roles as well. This is one reason why now exists the feminization of agriculture in many places in the world. For example Chile is the country with 30% of their lands cultivated only by women (Chiappe, 2009; FAO, 2013). Other African countries has been also experiencing similar process, with the difference that it was originated as a result of the shifting farming system applied in these places, an example of that are the Central African Republic and Gambia (Nazneen et al., 2007).

According to FAO (2006), the agriculture sector is crucial for developing countries and estimates that women involved in agricultural work as a food producers are about two thirds of the labour force. This report shows that women involved in agriculture worldwide was around 50% through 2000, while another current publication informs that 43% of women in

developing countries contribute as essential agricultural labour force even owning less resources, inputs of production, and being less active in commercial agriculture

(Croppenstedt et al., 2013).

FAO (2010b) reported that female's proportion in economically active population engaged in agriculture between 1980 and 2010 activities has experimented an increasing tendency from 40.4% to 42.7% in all over the world.

The women contribution to the national economies is high. In Asian countries they contribute mainly into the labour agricultural inputs. Bangladesh, Bhutan, Cambodia, China, India, Myanmar, Nepal, Pakistan and Vietnam have particularly high percentages of women employed in the agricultural sector, with ranging between 60% and 98% (FAO, 2006).

In Latin American region has been observed a significant increase of females dedicated to agriculture between 1995 and 2010, from 18.1% up to 20.9 % (FAO, 2010b). In South American countries were noticed the growth of rural households numbers headed by women. These females are considered as the crucial source of income for their families and are traditionally involved in agricultural activities.

Another region where the female work is consistent is Africa, which also registered an increasing tendency from 46.4% up to 48.5% during the last two decades. But not all the African continent has shown similar tendencies, whoever the Southern African region, countries such as Namibia and South Africa reported a decreasing figures regarding to female participation in agricultural issues.

A case study from Nigeria, in the west of Africa, female's participation in agricultural co-operatives reveals that they have not sufficient access to land, credits and production inputs. This research even showed up a low level of education and some cultural barriers that women have to lead comparing to men farmers (Ogunbameru et al., 2010).

In India other gender study realized in 12 villages from the Vaishali district also agrees that women farmers have poorer access to agricultural extension services and training programs than men (Mehtar et al., 2016).

Generally facts show the female role has been increasing in different regions or sub-regions worldwide, particularly in developing countries from Latin America and Africa where even is evidenced an agricultural feminization phenomena (IICA and IDB, 1996).

When, it is compared developed and developing countries in topic such as the female work in farming, it shows the opposite proportion. For instance the Western and Eastern Europe had reported a decreasing trend in female work regarding agriculture comparing to South American region which shows an increasing figures almost in the same proportion as decrease the first one (FAO, 2010b).

Another issue that has been seen throughout the global scope is agricultural extension services which has to improve agricultural practices around the world according to FAO survey from 1989, agricultural extension organisations cover 97 countries and only 5% of all extension resources were directed towards females. Only 15% of the extension personnel were female (OECD, 2012). This case shows the weak participation of women even in the high international spheres.

2.2 Women role in Latin American agriculture

Latin America has experimented an important growth in agriculture sector. According to current statistics, it was reported that mostly South American countries has increased their GDP in agricultural sector with an average annual growth rate of 5% between 2000 and 2008 (UN, 2010). Whoever, another report explains that Latin American agriculture suffers from slow growth in productivity arguing that the annual rate of growth of total productivity in the region was nearly 2% between 1961 and 2007 (IDB, 2015). Considering that GDP is an indicator based in the productivity, then those dates shows a contradiction. A study conducted in five countries such as Brazil, Chile, Colombia, Mexico and Paraguay reported that their real GDP and employment generation in agriculture sector between 1990 and 2005 had considerably increased, but it has not reflected in their rural sectors in the majority of them. This research shows mainly the relationship between the agricultural GDP and incomes generated for famer in rural areas (UN, 2010) .

Generally talking, agriculture sector in Latin America has been developing from different perspectives and not only from the economical point of view. Aspects such as gender roles, family member's tasks in agriculture, the role of women. The technologies used in

agricultural production and the way how they manage information on farming are becoming actual agents which determines this sector's development.

To analyze the performance of women in agriculture, in Latin America, it has been consulted several studies that are explained in the subchapters below.

2.2.1 Mexico, Central America and Caribbean countries

Women comes to be a fundamental member for food and agriculture sector in Latin America, especially for Caribbean and Andean countries, where the data for the involvement of women and men in agriculture are generally confined to transactions in the formal market sector. Statistics from the Caribbean region, shows the production and marketing of the principal export crops, such as banana and sugar, indicate that men are predominant in the control and marketing of export or cash crops, meanwhile Caribbean women play important roles in household food security as income earners and managers of natural resources and biodiversity (FAO, 2014).

In Mexico, the only Latin American country part of North America's territory geographically speaking, a study conducted in the rural areas shows that women have grown as work labor in agriculture sector. This research highlights the importance of women in the household as member who generates family income, in addition to it, women manage agricultural production and participate in community's social life. Females contributes also to children's education. Despite that, the role of women is not fully appreciate in the mentioned areas they perform (Acosta , 2008).

Another research conducted in the Southeastern of Mexico, reports that women participate more in agriculture activities due to migration of the man, there has been produced a relevant changes in the farm labor management regarding to agricultural resources such as land, hired labor and decision making process (Radel et al., 2012).

In a context more related to the environment, the role of women also plays a crucial factor in the preservation of biodiversity and maintaining access to household food security. This is the case of two communities in the Central of Mexico (Bee, 2014).

In Central America and Caribbean countries, women increase their level of participation in agriculture sector. An example of it is Guatemala where the production of small vegetables

caused increase of women working in the farming export market. Other situation presents Dominican Republic where the increment of women participation in fruit production, improves their status inside their families (Lastarria-Cornhiel, 2008).

Several studies about women roles, refers to the relationship between the typical agricultural foods produce in deferent region, and female participation. In case of Caribbean region are vegetables, cassava and sweet potatoes. Central America indicates that bean and corn are the most common food products. This research highlights the type of task provided by women in farming (IICA and IDB, 1996).

2.2.2 South American countries

In South America one of the most common type of Agriculture system developed is the Andean agriculture, which is characterized by being a subsistence and extensive system. This type of farming is also called “Agricultura familiar” or Family farming, where each family member fulfill a key function in the production system, taking part of the decision making process in agriculture and contributing to the family income (FAO, 2014).

According to CAN (2011) Family farming is at risk because 66% of them are still in subsistence condition, but women in this type of farming systems are better involved in agriculture activities for many reasons such is the family size. It is the case of women from the Ecuadorian Amazon, they are more involved in agriculture because of their young children. Antagonistically in case of crop production happens that women are less dedicated to agriculture. It is because they prefer to work in livestock production that requires less labor than the crop (Keshari et al., 1996).

The population in the Andes are strongly involved in activities concerning to agriculture not only because it is a source of their subsistence, but also because for their historical and cultural tradition. Countries such are Peru, Bolivia, Ecuador and Colombia share common features, which determines the way how they work in agriculture. Those are geographical Socio-cultural. The vast majority of farming activities are managed, as is written above, by the family members. Even children under 12 years of age participate on it. Reciprocity which includes the participation and cooperation between many families from the community called „ayni” and “minka”. Many agricultural practices are still influences by their heritage customs and traditions.

An experimental research about the women's labour in the northern highlands of Peru has shown that in Chetilla, Cajamarca's province, the seed selection and conservation is an exclusive domain of women. On the other hand, in Aymara's region in the southern Peruvian highlands, man is involved in the classification of tuber's seed and they cooperate in the introduction of new varieties. This verifies that same task can be realized by different gender in different places of the Andes. This situation is linked to tradition and socioeconomic situations of each locations (Mario E. TAPIA, 1996).

Agriculture production in each Andean country is diverse dependent on each territory's regions, it tends to vary from one place to other. For instance Peru has develop an intensive market agriculture on its Costa line next to the Pacific ocean, while in the Sierra's high lands and the traditional population from the Amazonian regions have been practicing the subsistence and shifting farming for many years (PromPerú, 2009). This aspect is directly linked to female's participation, particularly in the case of high lands or "Sierra" region. It is because women tend to excel in subsistence's type of farming than in only market oriented agriculture. (Flora and Santos, 1986).

In many places of the Andes, women contribute one-half of their total time, mainly in activities such as crop production, livestock production and marketing, however many of them are not considered in the official labour force statistics because they work without wages (IICA and IDB, 1996).

Another example relating to female's role, according to The International Centre of Tropical Agriculture CIAT (1991), it has been reported that places such as Eastern Antioquia in Colombia and Cajamarca in Peru, more than 64% of its female population are dedicated to agriculture. At that time was shown also that 49% of cases studies about women's role in farming agrees that females are responsible for rearing, grazing, milking, feeding the animals (CIAT, 1991).

In Ecuador, the research conducted by Elena Bastidas (1999), described that male do the physical hardness works in the field, while female help with the seed's selection process, planting, weeding and harvesting. She found that sometimes women can cook for paid workers and their family members. And usually they also decided about the family income generation by going to the market to sell small animals that the family farm has produced.

Similar block of countries, which geographically are part from the Andes, but not geopolitically e.g. Argentina and Chile, which belongs to the main exporters of South American agriculture food production. Several studies has been conducted regarding to gender roles in “Family farming” systems on these territories, for instance, in The Southern Common Market “MERCOSUR” (2016) integrated by Brazil, Paraguay, Uruguay, Argentina and Bolivia, it has been reported that “Family farming” systems were found in a relatively small amount in Argentina and Uruguay, while in Brazil and Paraguay (Del Pilar Foti, 2015) the predominant type of farming is “Family farming”, where more people participate in the divisions of agriculture tasks. In this type of system women are more involved as well.

In Chile, the national institute of statistic shows that 71.5% of households considers the man with the highest participation in the agricultural production and only 28.5% of women are the main producers (INE, 2008). And other research, specifies, that in rural places of Chile the number of women dedicated to agriculture has increased in 7% comparing to male which has increased only 4% (Namdar-Irani, 2014).

Meanwhile, according to a published research; in rural areas of Brazil, has been found an imbalance between men and women due to migrations – there has been registered more females than males who migrate. The main reason were many, but mainly was motivated by many reasons such as the low consideration to female work in the fields, little territory gained by women in commercial agriculture and low designation resource for women such as land. And the authority of man is almost always prevailing in social contracts rights like in the transmission of heritage and towards the rural property (Staduto et al., 2013).

All this aspects are relevantly linked to role of women in Agriculture sector in one or another regions from South America. It is necessary to mention that women in „Family farming” systems according to the above analysed studies in entirely influences by their local environment in this case, rural places, economic situation, culture and traditions. Social and political phenomena such as migration, governmental policies, organizations.

2.3 General information about Peru

Peru is a South American country located in the central western coast of the continent facing the Pacific Ocean. Peru is a biodiverse country with habitats ranging from the arid plains of the Pacific coastal region in the west to the peaks of the Andes mountains vertically extending from the north to the southeast of the country to the tropical Amazon Basin rainforest in the east with the Amazon river (SINANPE, 2012). The country has a variety of climates and three natural regions, the costa, the sierra and la selva that is favouring to the cultivation many kinds of products. Peru exports mainly coffee 6%, maize 3.7% and others cash crops from the costa region, the other regions produce for the national consumption only (Tafur, et al., 2015).

Politically, Peru is divided into 25 regions and one constitutional province. Each region has its own government represented by one regional president.

Talking about Peru's population, Peru has 30.814 billion inhabitants (INEI, 2014) is the fifth country in South America with the highest population after Brazil, Colombia, Argentina and Venezuela.

Ethnically Peru is composed by Mestizos 57.6 %, Quechuas 22.5%, whites 4.5%, Aymara 2.5%, Afro-Peruvians 1.5%. Other such is Japanese, Chinese, and Arabs represents 9%. It shows the country's multicultural environment (INEI, 2007). This situation is comparable with the languages they speak. The officially recognize and the most spoken language is Spanish 83.9%, Quechua 13.2 % is the second more spoken especially in the northern and central Andean territories, Aymara 1.8% language is mostly predominant in the southern Andean part and other natives Amerindian languages in the Amazon (INEI, 2007).

The majority of its inhabitants are Christian: Catholics 81.3%, follows by Evangelists 12.5% and other 3.3% (INEI, 2008).

The annual population growth rate in the country is 1.5%, female population represents around 53.3% and male 49.7%. The urban population 75.9% is predominant while the rural population reaches about 24.1% (2008). Peruvian women working in agriculture represents 21.3% (Anderson, et al., 2011) from the Peru's economically active population 53.3% (INEI, 2014). And the majority of them live in the rural areas.

The Peruvian Institute of Statistics and Informatics reported that agriculture is an important activity which occupies 30% of its national territory, the majority of it is covered by high land mountainous area 28% (2014). However the agriculture sector is only 7% of Peru's GDP, it is a crucial component for the country's economy because it employs more than 3.7 million Peruvians (INEI, 2013). Agriculture produces more employment in the country than any others sectors. Nonetheless the agriculture activities generates less national income in comparison to other sectors, such are mining and services which together make more than 90% of country's GDP (INEI, 2013).

2.3.1 Historical development about the women role in Peru

The history shows that the women has been playing an important role in the development of agricultural activities. The Paleoindian epoch approximately 18 thousand years ago tells about the women's role as a food processor member in the group and the men rather dedicated to hunting activities. For example the women of Guitarrero Cave used to process plants fibres and made mats, meanwhile men were experts nomadic hunters 9,800 thousand ago (Olsen and Stothert, 2014)

In the Andes, since the Inca civilization the native Amerindians used to create gender differences within their own social system that featured interdependence and complementarity. Unfortunately there wasn't any form of writing from in the ancient Andean society as is known from another cultures such as European or Asian, but there are items as paintings, textiles and ceramics that shows the daily activities that these people carried out at that time. For Andean society was crucial to create a social and symbolic metaphor which meanings the complementarity between women and men that was necessary for the functioning of the whole society. (Ambrosio and García , 2006)

During the Colonial epoch, the Andean territories such as Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile and Argentina experimented a period of transformation in agriculture due to the introduction of trade, but the appearance of the property rights promoted the displacement of agriculture by mining. The appearance of early manufacturing activities such as textile manufacturing in Cusco and later in Cajamarca forced native population to abandon their farmlands and work in the new industries (Hudson and Rex, 1993).

The colony influenced the gender roles and divided the role of women according to their social condition. The elite's woman had as mission the conservation of the Spanish traditions, promoting religion at home and the consolidation of the model of family life. Their roles at home were mainly raising children, managing household affairs and ensure compliance and teaching of cultural and moral values. In the private sphere, women were housekeepers and ladies at home (Rostworowski, 1995). Nonetheless the mestizo woman had to be engaged in productive and service activities such as trade, domestic paid labour and light manual work. They also worked in grocery stores, which makes them to have more contact with the outside society (Hampe and Meza, 2007).

During the Colony the gender division of labor in the Andes was deeply unstructured by "encomienda" and market society. The native population had to paid „encomindas“ which were tributes imposed for living in their own territory. Women were abandoned by their husbands because they had to migrate to the emerging mining centres. This phenomenon increased the mortality of natives by hard work.

Native women were identified primarily as weavers, mothers and agricultural workers. They acquired great power and were active on market. They also had to learn Spanish and use money even before than their husbands (Graubart, 2007).

Catholicism introduced by the Colony, influenced changing native women activities in another way that was not agriculture. They were obliged to behave according to the Catholic religion as submissive, willing to accept what men say. (Meza, 2007)

In the XIX century, the emerging Republic led to social and economic changes that increased participation of women at work. At that time the incursion of women on the market, in social, political and economic spheres implied their participation in issues that were oriented only for men.

In 1955, one event changed the history of women in Peru. It was recognized their rights to vote through the women's suffrage law 12931. (Lanata , 2014)

The events that happened in Peru from 1969 radically changed the reality of the Andes, thanks to agrarian reform provided by Juan Velasco Alvarado by the de facto government were many farmers recovered their land that long time ago had been taken. Peasant women

were also part of that circumstances. Even when years later had to deal with another type of conflicts (Marutián, 2003; La Via Campesina , 2014).

Later in the eighties and nineties from the past century, Peruvian Andean woman has involved in various abuses by subversive groups and the Peruvian government. During this time were murdered 70 thousand people. The commission of truth and reconciliation-CVR (2003) has shown that from 79% of victims were from the rural areas, 56 % of them were from the Andes. Most of them were population dedicated to agriculture activities.

During the last decade the Peruvian society has been experimenting a great changes, including the rural sectors. A consequence of such political conflict, mentioned above, the situation in the rural Andes has been changed. Many people had immigrated to urban areas.

The actual Andean agriculture and the situation of women started forward in these recent 15 years without any conflicts of any types.

3 Objectives of the thesis

3.1 Main objective

The main objective of this thesis, was to determine the women's role in agriculture and to analyse their access to agricultural information in two rural communities, Queromarca and T'umi from the region of Cusco in Peru.

3.2 Specific objectives

The specific objectives helped to the achievement of thesis's main goal. They were as follows:

- To identify social and economic factors which influence women role and their level of participation in farming.
- To determine the type of female's activity in farming and their level of participation on it in the communities of Queromarca and T'umi.
- To identify possible constraining factors which can limit women's role in agricultural production in Queromarca and T'umi.
- To identify possible factors that influence ability access to relevant information

Hypothesis: The specific objectives were matched with the following hypothesis, considering the thesis's main objective.

The following hypothesis were strictly linked to the roles of women in agriculture and agricultural information aspects.

- a. The following three hypothesis were focused on the socio-economic aspects of women, considering factors, such as household income, age and education. Each one linked with the time that women spent in farming activities and the location between T'umi and Queromarca.
 - i. *As the women farmer becomes older, their level of participation in agriculture tend to grow and count of types of their roles increase.*
 - ii. *Women with higher education are involved in more intellectual agricultural activities.*
 - iii. *In poorer families man is usually employed in non-agriculture activities. Because of this, the level of women participation is higher.*

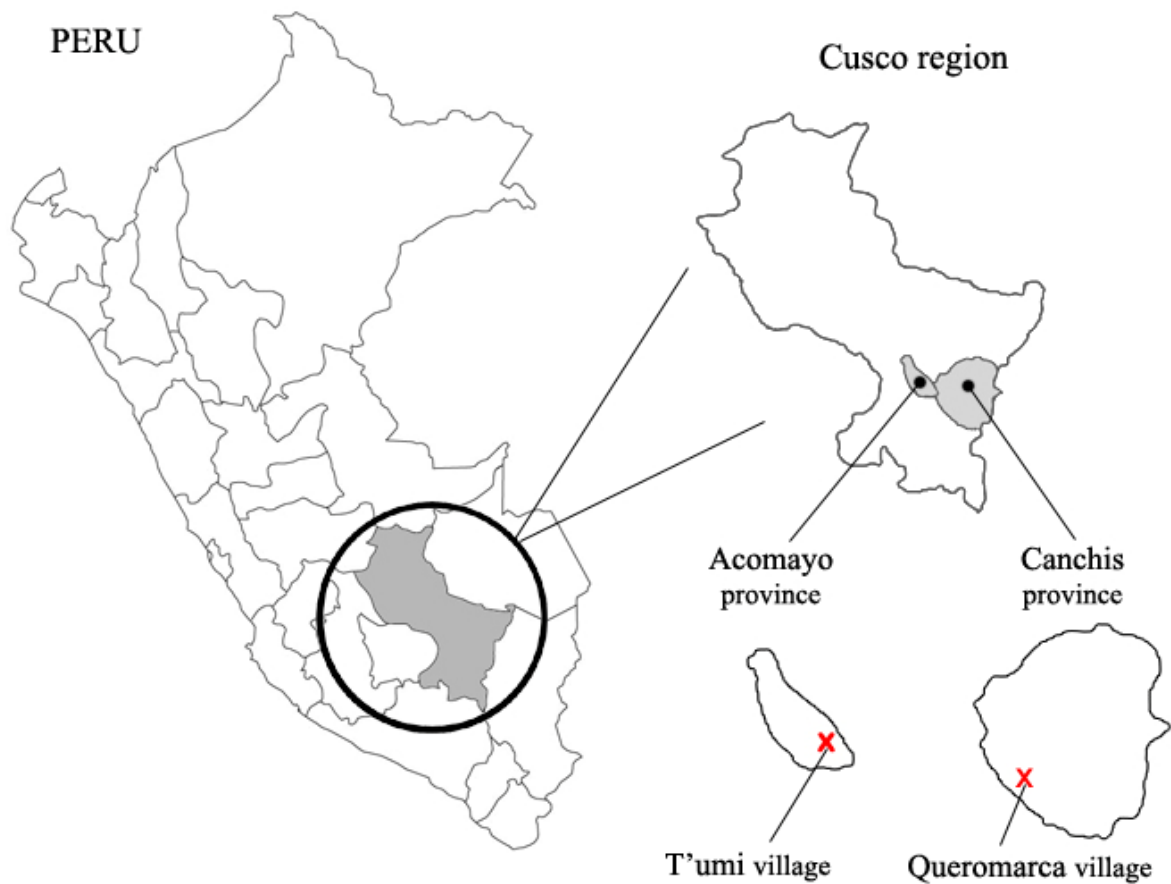
- b. The fourth hypothesis was focused on the types of tasks that women realize in farming. For that reason, it had been identified the main women's attributes such as age and education linked to the type of work they manage in each studied community. The following affirmations were tested:
- iv. Women in T'umi are involved in more hard or main work than in Queramarca and are participating in agriculture more.*
- c. The fifth hypothesis was related non-traditional activities that women can do in farming. This hypothesis has been formulated appealing to the traditional aspects of gender labour division in agriculture in the Andes (C. Bourque and Warren, 1981). In fact, the hypothesis's intention is to know, if woman has been changing the tasks that traditionally used to do in farming.
- v. Women in Queramarca are more involved in roles such as planning and innovation.*
- d. The sixth hypothesis was regarding to location of these communities' that can influence in the type, quality and periodicity of information they received:
- vi. Queramarca as is located in the valley has a better possibilities to get the information than T'umi which is located in the farther mountainous area.*

4 Methodology

4.1 The study area

The research was provided in two rural communities: T'umi and Queromarca. They are located in Acomayo and Canchis provinces in the southern part of Cusco Region in Peru.

Figure 1. Study area description in the Cusco region.



Source: Author's compilation, 2016

Community of Queromarca: Queromarca is located in the southern east of Cusco region, at a high of 3484 m.a.s.l. It is situated in the valley of Vilcanota. Its population is around 1206 inhabitants, the population density is 20 inhabitants per kilometre square. (Tinta, 2015)

Talking about its climate, Queromarca has a humid subtropical mild summer climate that is dry with mild winters and mild and rainy summers. Its annual average temperature is 12°C. The annual precipitation averages 737 mm (SENAMHI, 2016).

Queromarca is traditional highland community, where the native population are dedicated to the subsistence and market oriented agriculture extensively. The surplus of production is an important mean to maintain the family income on the place.

Community of T'umi: T'umi is located in the southern central part of Cusco region. Its elevation is about 3810 m.a.s.l. It is situated in the higher than Queromarca. The community had a population of 380 according to the last national census (2007).

The climate is dry because of its elevated location, but there are two lagoons which moderate the weather. Its annual average temperature is around 9°C (SENAMHI, 2016).

T'umi is a native Quichuan community as Queromarca. Most of the families in T'umi raise cattle and work in subsistence agriculture, growing a wide range of crops such as potatoes, beans, wheat, and barley. They are also engaged in fisheries because of the lagoons near.

4.2 Data sources

During the research period primary and secondary data were collected.

4.2.1 Primary data Sources

This type of data were gathered by the questionnaires and personal interviews that has been provided with female famers directly in the work places, Queromarca and T'umi.

To complement the research, another personal interview was done with the director of the Ministry of Agriculture from the province. Then it was as well provided a direct observation of farmers in their field or workplace.

4.2.2 Secondary data Sources

It refers to the scientific data, which was used in this thesis, as a formal resource and references. Such information was collected from the scientific journals such as: *Revista de la Sociedad Química del Perú*; *Women, Work and Development*; *Journal of Agricultural Extension*, *Revista de la Sociedad Química del Perú*, *Journal of Rural Studies*, *La Revista Agraria*, among others.

Another sources were also state institutional centres of Peru such as: National Institute of Statistics- INEI, Ministry of Agriculture and irrigation – MINAGRI, National System of Protected Natural Areas by the State – SINANPE.

International recognized organizations reports are as well utilized: Food and Agriculture Organization-FAO, The International Centre of Tropical Agriculture – CIAT, International Food Policy Research Institute – IFPRI, The World Bank – WB and many others.

4.3 Data collection

The instrument which has been utilized to provide the data collection were the structured questionnaires.

Questionnaires

The questionnaires were separated in 17 questions and divided into four main aspects, each of them focused on specific information about:

- **Socio-demographic data**, such as age, education and gender.
- **Socio-economic data**, like family income.
- **Specific questions about the women's role in agriculture**, such as the time they spend in farm activities, when they start to work on it, the type of agricultural tasks they are engaged in, the responsible from the decision making concerning to farming in the family. If the farm production is for sell or self-consumption only.
- **Basic questions about their access to farming information**, like their possibilities and accessibilities to receive information in agricultural issues.

Pilot testing

To begin with the research a small pilot testing was applied in the first study area – Queromarca. In which, has been tested 20 questionnaires with 20 females, who were randomly selected. The results indicated that it must be changed the structure of the questionnaires, reducing the numbers of questions from 23 to 16 and modifying them, respectively. The initially created questionnaires were in English language. Later then to begin with the pilot testing it has been changed to Spanish language to facilitate the communication whit the native farmers. Even many of them have not speak Spanish, because their native language is Quechua, in those cases the questionnaires were provided in Quechua.

Other event that happened, was the changing of the initially planned research area, instead of Raqchi it had been replaced by Queramarca community. The reasons are explained in the “Timeframe” subchapter below.

4.4 Target group and sample size

This study, was mainly focused on women, who, are involved in agriculture and economically active. The research’s respondents were chosen based on three basic criteria:

- Females in a productive age: from 15 up to 60 years
- Females dedicated to farming
- To reside in that target area for a minimum of 5 years

The total sample size were 100 females, randomly selected. They were native farmers from T’umi and Queramarca communities. And were 50 respondents from each place.

4.5 Timeframe

The duration of the study research was planned and accomplished according to the table below (see Table 1). It explains four stages which were fully, according to the conditions of time and space involving a study of this nature. The first stage begun with the thesis proposal in November of 2013 followed immediately by the second stage with the introduction and literature review which were constantly developed to April of 2014. And later on, until July of 2014 were formulated the thesis aims, part of the methodology such as the formulation of questionnaires to make it ready for the fieldwork.

The third stage, begun with the study trip to Peru and fieldwork establishment which took place two months, July and August of 2014. In these areas happened two relevant aspects which motivated it to make some changes in the research: The first was, the results obtained from the pilot testing that is detailed above in the subchapter „Pilot testing”. And the second was the changing of study area - Queramarca was chosen instead of Raqchi because the required conditions had changed. It did not fulfil the requirements of the thesis’s aims and the proposed criteria such as “the females have to be traditional native farmers dedicated exclusively to agriculture”. After the direct observation provided in those three areas were selected T’umi and Queramarca, where after 3 weeks on the field, the data collection started.

The last stage, was the time when the analysis and coding of collected data took place. Results were subsequently interpreted. Immediately after that, discussions and final conclusions were made. This stages took place in October of 2014 and March of 2016.

Table 1. Frame time

ACTIVITY	2013		2014												2015												2016				
	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	
I.																															
II.																															
III.																															
IV.																															
V.																															

- I. Proposal Thesis
- II. Chapters 1, 2: Introduction and literature review
- III. Chapters 3, part of 4: Development of thesis aims, methodology
- IV. Field-work: Data collection
- V. Chapters 4,5,6,7: Data analysis, results, discussions and conclusions

4.6 Data analysis

For describing main features of sampled data, all data was processed through standard methods of descriptive statistic, using mainly cross-tabulation computation and frequency analysis. For better understanding some of the data have been visualized. For this purpose was used SPSS23 program.

For hypothesis testing was used means of inferential statistic. Result of inferential statistics were compared with standard Chi square distribution table in purpose of obtaining probability – p-value, which was compared to selected significance level of 0.05.

Inferential statistic tools used are described below.

Spearman's rho correlation

Spearman's Rho correlation is a non-parametric test. This method is usually used to measure the strength of association between two variables. For this specific research was applied for “n” = 100 samples sizes, the n raw scores from the variables X_i, Y_i were converted into ranks $rg X_i, rg Y_i$. The calculation and results are shown below in the subchapter below (Testing hypothesis)

Formula

The following formula (see Equation 1) was used to calculate the Spearman's Rho correlation,

$$r_s = \rho_{rgX,rgY} = \frac{\text{cov}(rgX,rgY)}{\sigma_{rgX}\sigma_{rgY}} \quad \text{Equation 1.}$$

Where:

- r_s is the Spearman's rho correlation coefficient, the value $r = 1$ means a perfect positive correlation and the value $r = -1$ means a perfect negative correlation.
- ρ is a Pearson correlation coefficient applied to the rank variables.
- $\text{cov}(rgX,rgY)$ is the covariance of the rank variables.
- σ_{rgX} and σ_{rgY} are the standard deviations of the rank variables.

Pearson correlation coefficient (r)

The Pearson correlation is a technique which investigate the relationship between two normally distributed variables, this type of correlation is mainly used to determine the degree of linear dependence between two variables. In this thesis was applied mainly to test our hypothesis using the variables “Education” and “Sum of intellectual work”- look at the subchapter below-Testing hypothesis

The following formula (see Equation 2) was used to test the above mentioned hypothesis.

Formula

$$r = r_{xy} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}} \quad \text{Equation 2.}$$

Where:

- r is a Pearson correlation coefficients
- x and y are variables
- n is number of samples

Fisher exact test

Fisher's exact test is usually used for binary data or two nominal variables. This test participates in the analysis of contingency tables. "X×Y table," where X is the number of rows and Y is the number of columns. Fisher's exact test is more accurate when the sample numbers are small such is the 2x2 tables (Weisstein, 2016)

The way how the Fisher exact test was applied in this thesis was to find the possible "P" value in following contingency tables below in the subchapter- testing hypothesis (see Table 9, Table 10, Table 11, and Table 12). The "P" value is a probability, thus value ranges from zero to one and it also depends on the elected level of significance (Buchan, 2000-2016).

Nowadays, this method is easily computed by diverse statistical programs such was SPSS23 in case of this thesis.

Paired t test

The paired t test's purpose is to determine if exist a statistical difference comparing two means that are from related units. This thesis applied Paired t test to determine the statistical significance on frequency of agricultural information received for more information consult below in the subchapter- Testing hypothesis.

Data analysis software used

The analysis of data were provided by statistical programs such as SPSS23 and Microsoft Excel. There were applied two type of statistics, descriptive statistics which helped to quantify and summarize the raw data obtained from the questionnaires, and inferential statistics tools were applied to test the formulated hypothesis.

Another tools that was used to define results was the program Graph 4.4.2. This was used in the thesis to draw some figures coordinating with our data system and in the calculations of functions.

5 Results

5.1 Descriptive statistics results

5.1.1 Social and economic factors which influence role women on farming

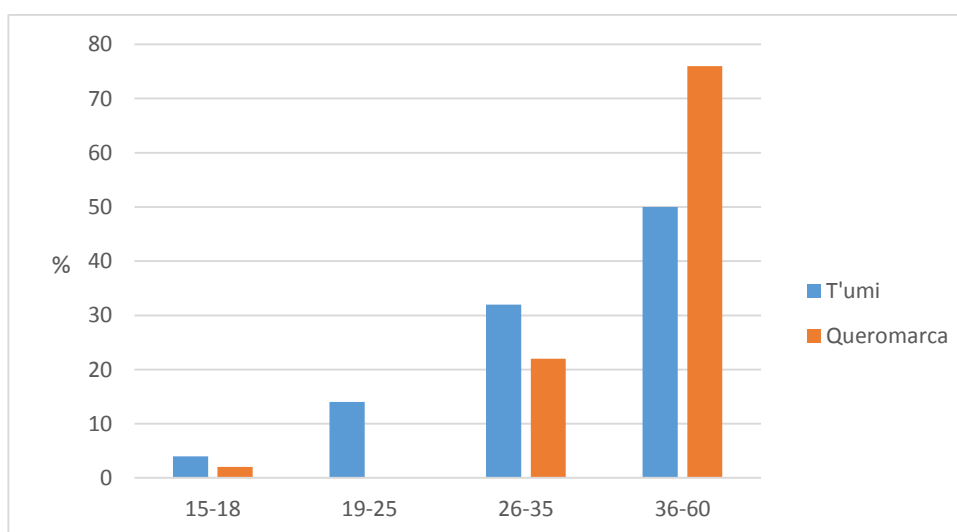
Age: As is shown in the table below (see Table 2). The age was categorized according to the Peruvian labour law, were is highlighted the minimum age for employment in agricultural work is 15 years (MTPE, 2006). This analysis was done comparing the research places, T'umi and Queromarca.

Table 2. Age of the respondent * Village

Age of the respondent		Village		Total
		T'umi	Queromarca	
Subcategories	15-18	2	1	3
	19-25	7	0	7
	26-35	16	11	27
	36-60	25	38	63
Total		50	50	100

The age of the respondents were divided in 4 subcategories (see Table 2), from that more than 50% of T'umi and 70% of Queromarca were between 36 and 60 years old (see Figure 2), the respondents between 15 and 18 year old did not even reach 10%. Then, it is shown that in Queromarca were no respondents between 19 and 25 years old, the group between 26 and 35 years old exceeds the 30% in case of T'umi and 20% in Queromarca.

Figure 2. Age of respondents



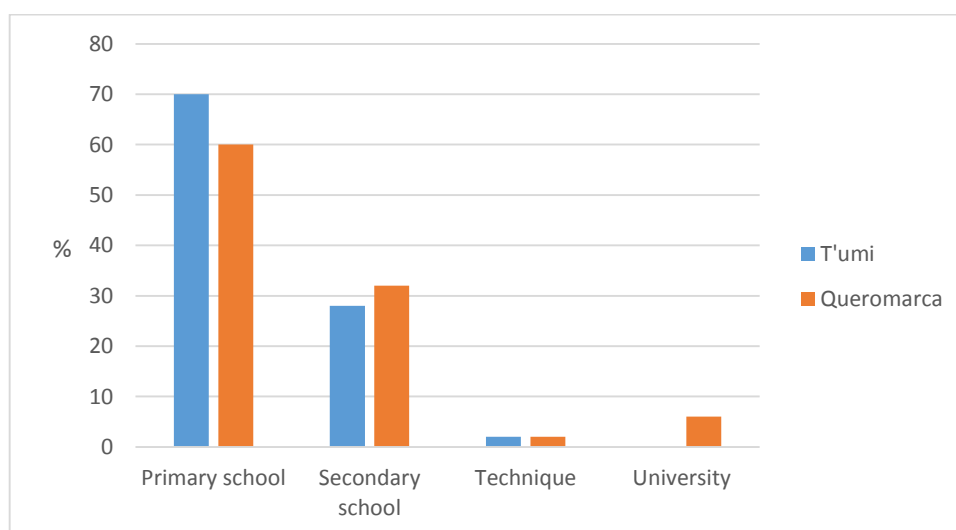
Education: The level of education of the respondents were subcategorized in 4 groups according to the table below (see Table 3). And these data were compared between studied villages T'umi and Queromarca.

Table 3. Education of the respondents

Education of the respondents		Village		Total
		T'umi	Queromarca	
Subcategories	Primary school	35	30	65
	Secondary school	14	16	30
	Technique	1	1	2
	University	0	3	3
Total		50	50	100

The figure below shows the results that were found in the data analysed. The majority of the respondents attended elementary or primary school which was around 70% of female's respondents from T'umi and 60% from Queromarca. The second relevant result was expressed by the attendance to secondary school where there is no a big difference between studied villages T'umi which did not reach 30% and Queromarca barely exceeds the same figure (see Figure 3). Only 6% from the total of the respondents have achieved university level and all of them were from Queromarca. On the other hand technique studies were achieved by only 2% of women in both villages.

Figure 3. Education



Household income

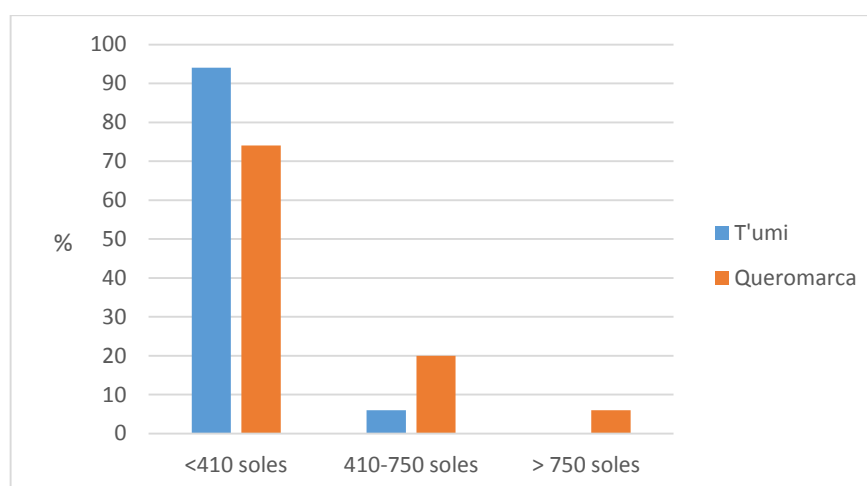
The income of the respondents in relationship to the studied villages as is shown in the table below (see Table 4) It indicates that the data was subcategorized in 3 groups according to the socio economic status from Peru (MEF, 2005).

Table 4. Household income * Village

Household income		Village		Total
		T'umi	Queromarca	
Subcategories	<410 soles (US\$124)	47	37	84
	410-750 soles	3	10	13
	> 750 soles (US\$227)	0	3	3
Total		50	50	100

More than 90% of T'umi respondents had an income lower than US\$124. approx. In Queromarca the situation was similar, more than 70 % of their income did not exceed US\$124. approx. There were a few women in the villages, who, achieved the income between US\$124 and US\$227 approx. mainly in Queromarca were 20% of the respondents, while in T'umi the monthly income did not even reach 10% of women respondents. It was found that 6% of women from Queromarca achieved an income more than US\$227. approx., while from T'umi was not figured any respondents (see Figure 4).

Figure 4. Household income



5.1.2 Specific data regarding to roles and information

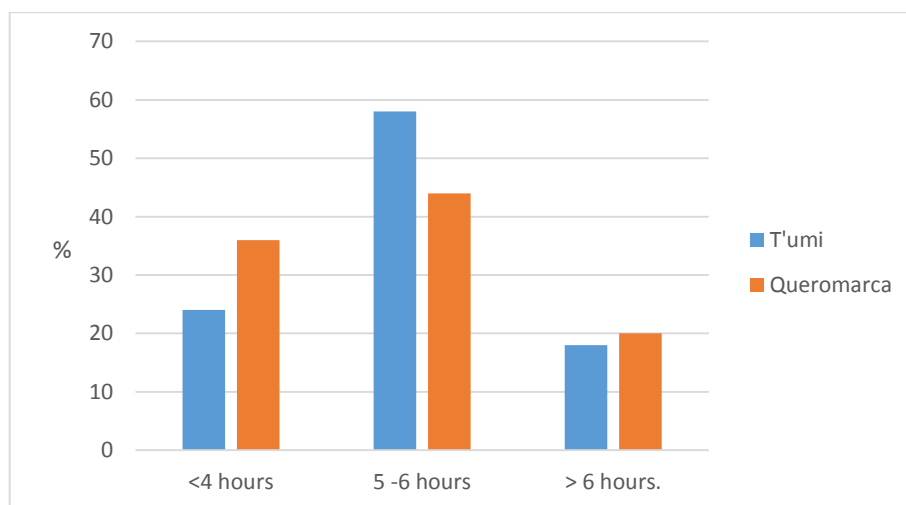
Time spent in agriculture activities: The variable expressed the time that women spent in agriculture activities. Those analysis was done considering the studied areas. As is shown in the table below the time spent per day in agriculture (see Table 5) were divided in 3 subcategories and the research areas of T'umi and Queromarca.

Table 5. Spent time/day into agriculture * Village

		Village		Total
		T'umi	Queromarca	
Spent time/day into agriculture	<4 hours	12	18	30
	5 -6 hours	29	22	51
	> 6 hours.	9	10	19
Total		50	50	100

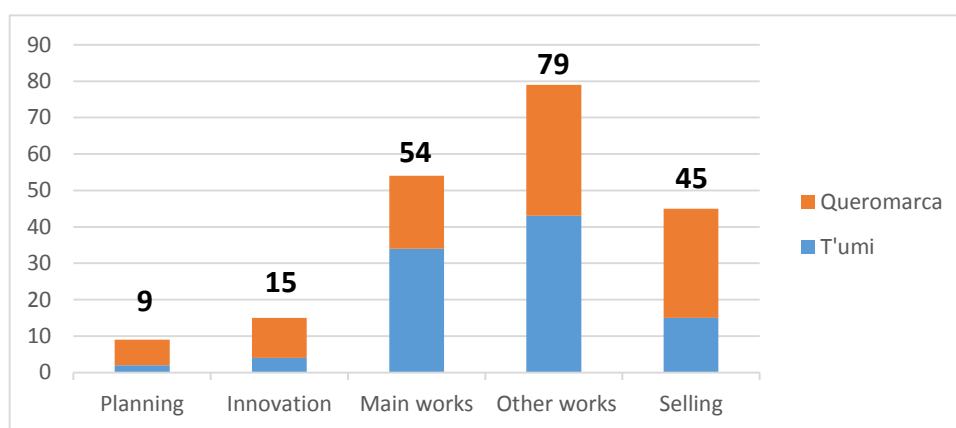
According to the figure below (see Figure 5) was found that the 58% of respondents from T'umi dedicated between 5 and 6 hours to farming tasks, while in Queromarca less than half (44%) of them. The majority of respondents who work less than 4 hours were found in Queromarca (36%), meantime in T'umi only 24% of them spent less than 4 hours. In general, there were found only 19% of women farmers who work more than 6 hours per day in both studied areas with a little difference of 2% more in Queromarca than T'umi.

Figure 5 Time spent in agriculture per day



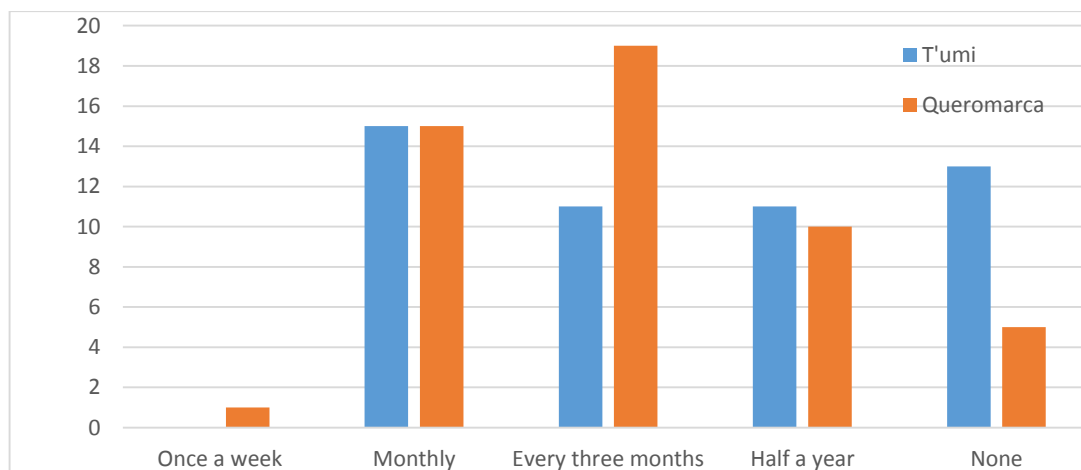
The most common roles of women in agriculture: Includes helping work with 79% of the respondents which was usually executed in the presence of their husbands such as seed selection, post harvesting work, and small animal breeding. Another relevant tasks were the main works with 54%, this includes soil preparation, planting, harvesting, and animal husbandry. Selling agricultural production was the third activity more carry out by women. Innovation and planning were found as the less frequent in both communities (see Figure 6).

Figure 6. Roles in Agriculture



Agricultural information receiving period: Agricultural informations were received in determined time intervals (see Figure 7). Results describes that the 30% of the respondents received information each three months 19 from Queramarca and 11 females from T'umi. About 30% got information monthly, 15 females from each villages. Receiving information less than two times a year were 21% from the total, 11 from T'umi and 10 from Queramarca. It was found that 18% of womens from both villages did not receive any information, only 1% of women from T'umi had acces to information weekly (see Appendix 2).

Figure 7. Information receiving period



5.2 Inferentials statistics results

5.2.1 Testing hypothesis

As an answer to the formulated hypothesis in this research, the following results are showing the main aspects which influences women roles in agriculture and the results concerning agricultural information that females farmers manage.

A. Hypothesis linked with roles of women in agriculture

- i. *As the women farmer becomes older, their level of participation in agriculture tend to grow and count of types of their roles increases.*

The analysis was provided in two parts, and for this, was applied Spearman's Rho correlation to test the relationship between the age of women farmer and her daily time spent in agriculture activities.

First part of calculation

Variables used

X= Age, Y= Spent time per day

Calculation

$R = \text{Covariance} / (X_{Ra} \text{ St. Dev.} * Y_{Ra} \text{ St. Dev.})$

Key

X_{Ra} = Ranks of Age values

Y_{Ra} = Ranks of Spent time per day values

$X_{Ra} - M_x$ = Age rank minus mean of Age ranks

$Y_{Ra} - M_y$ = Spent time per day rank minus mean of Spent time per day ranks

Sum Diffs = $(X_{Ra} - M_x) * (Y_{Ra} - M_y)$

Result Details

Age Ranks

Mean: 50.5

Standard Dev: 24.79

Spent time per day Ranks

Mean: 50.5

Standard Dev: 26.49

Combined

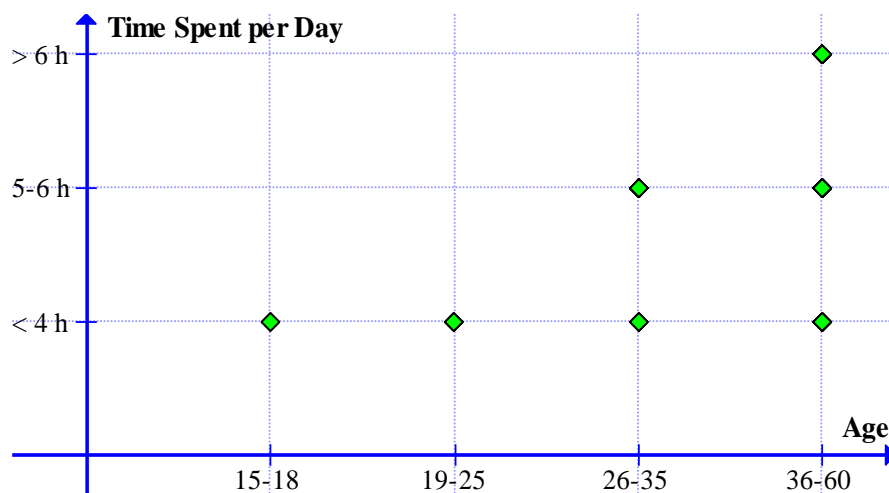
Covariance = 24655 / 99 = 249.04

$$R = 249.04 / (24.79 * 26.49) = 0.379$$

The value of R is 0.379 and the “p” value is 0.01 by normal standards, the association between the variables age and spent time daily is considered statistically significant which means that, indeed as women become older their level participation in agriculture increase, while it is not proven that their count of roles increase.

The graph below shows this relation between variables (see Figure 8)

Figure 8. Level of participation in agriculture



Second part of calculation

Variables used

X= Age, Y= Count of roles

Calculation

$R = \text{Covariance} / (X_{Ra} \text{ St. Dev.} * Y_{Ra} \text{ St. Dev.})$

Key

X_{Ra} = Ranks of Age values; Y_{Ra} = Ranks of Count of roles values

$X_{Ra} - M_x = \text{Age rank minus mean of Age ranks}$

$Y_{Ra} - M_y = \text{Count of roles rank minus mean of Count of roles ranks}$

$\text{Sum Diffs} = (X_{Ra} - M_x) * (Y_{Ra} - M_y)$

Result Details

X Ranks

Mean: 50.5

Standard Dev: 24.79

Y Ranks

Mean: 50.5

Standard Dev: 26.44

Combined

Covariance = $1959 / 99 = 19.79$

$R = 19.79 / (24.79 * 26.44) = 0.03$

The value of R is 0.03 and the two-tailed value of P is 0.76554. By normal standards, the association between the variables age and count of roles were not considered statistically significant, therefore it was not proven that age of women farmers influence into the count of roles they do in farming.

ii. *Women with higher education, are involved in more intellectual agricultural activities*

For purpose of testing of this hypothesis, a new variable was introduced. This variable was given a value of function f (see Equation 3. Equation 3) which evaluates the rate of intellectual work women does. This function has been determined as followed:

$$f(w) = \sum_{i=0}^n r_i \cdot k_i \quad \text{Equation 3.}$$

Where:

w is respondent

r is a role of respondent

= 1 (if the answer is yes), or 0 (if the answer is no)

k is coefficient of rate of intellectuality of given role

Coefficient k was evaluated with following values (see Table 6):

Table 6. Agriculture roles

Role	K
Main works	0
Other works	0
Innovation	1
Planning	2
Selling	0.5

Then, the coefficient of intellectuality “ K ” which determined the more intellectual type of role in farming, was associated with education of the respondents. For this operation was applied Pearson correlation coefficient method.

Calculation

Used variables

X = Education, Y = Sum of intellectual work (see-function f)

Result Details and Calculation

Education Values

$$\sum = 143$$

$$\text{Mean} = 1.43$$

$$\sum(X - M_x)^2 = SS_x = 46.51$$

Sum of intellectual work Values

$$\sum = 55.5$$

$$\text{Mean} = 0.555$$

$$\sum(Y - M_y)^2 = SS_y = 70.448$$

Education and Scum of intellectual work combined

$$N = 100$$

$$\sum (\text{Education} - M_x) (\text{Sum of intellectual work} - M_y) = 37.635$$

R Calculation

$$r = \frac{\sum ((\text{Education} - M_y) (\text{Sum of intellectual work} - M_x))}{\sqrt{((SS_x) (SS_y))}}$$

$$r = 37.635 / \sqrt{((46.51) (70.448))} = 0.6575$$

Meta Numeric (cross-check)

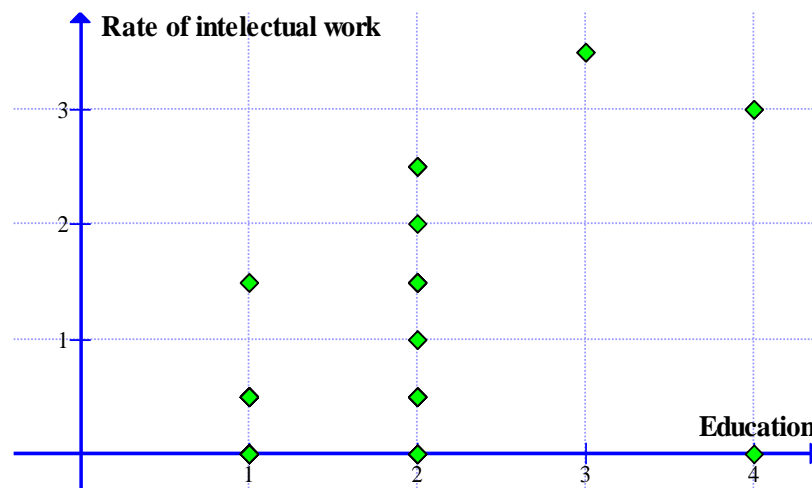
$$\mathbf{R= 0.6575}$$

The coefficient of determination

$$R^2 = 0.4323$$

The value of R is 0.6575, the correlation is significant at the 0.01 level. This means that there is a tendency for high “Education” variable scores go with high “Sum of intellectual work” variable scores (and vice versa). Therefore the hypothesis that women with higher education, are involved in more intellectual agricultural activities was admitted (see Figure 9).

Figure 9. Involvement on intellectual work



iii. In poorer families man is more responsible for household income and women participation in agriculture is higher.

For testing this hypothesis, was applied the Spearman Rho correlations test that proved the relationship between the following variables: “Responsible for contributes more to household income”, “Household income” and “Time spent for women in agriculture” (see the calculations below).

First result of calculation

As is shown in table below (see Table 7), the association shows that household income is significantly dependent on who, has the responsibility to contribute more for household income.

Table 7. Spearman's rho Correlation test result 1

			RCMHI*	Household income
Spearman's rho	Responsible for contributes more to household income	Correlation Coefficient	1.000	.646**
		Sig. (2-tailed)	.	.000
		N	100	100
Spearman's rho	Household income	Correlation Coefficient	.646**	1.000
		Sig. (2-tailed)	.000	.
		N	100	100

* Responsible for contributes more to household income

** Correlation is significant at the 0.01 level

The **Spearman rho** correlation was 0.646 at the level 0.01. Therefore the test was considered statistically significant and the tested hypothesis has been admitted.

Second result of calculation

The table below shows the operation provided by SPSS program in order to use **Spearman rho** correlation to calculate how dependent is the time spent per day in agriculture on household income (see Table 8).

Table 8. Spearman's rho Correlation test result 2

			Household income	Time spent /day into agriculture
Spearman's rho	Household income	Correlation Coefficient	1.000	-.256*
		Sig. (2-tailed)	.	.019
		N	84	84
Spearman's rho	Time spent /day into agriculture	Correlation Coefficient	-.256*	1.000
		Sig. (2-tailed)	.019	.
		N	84	84

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation result was -0.256 at the level of 0.05 which has been considered statistically significant. This proved that Household income in fact, depends on the time spent per day in agriculture activities. Therefore, the hypothesis has been accepted.

- iv. *Women in T'umi are involved in more hard or main work than in Queramarca, and are participating in agriculture more.*

For testing these hypothesis, it has been used the Fisher test which compared both communities relating to the type of task that women carry out in farming such is main work, helping work as is shown in the following tables below (see Table 9, Table 10).

Table 9. Main work

	T'umi	Queramarca	Total
Yes	34	20	54
No	16	30	46
Total	50	50	100

From the table 9, **Fisher exact test value was 0.0088**, it means that the result is significant at $p < 0.05$, Which means that in T'umi women perform more hard or main work than in Queramarca and in fact they are more involved in agriculture.

Table 10. Helping work

	T'umi	Queramarca	Total
Yes	43	36	79
No	7	14	21
Total	50	50	100

From the table 10, **Fisher exact test values was 0.1396** which means that the result was not significant at $p < 0.05$. This means that in T'umi women did not do more helping works or other works confirming the hypothesis.

- v. *Women in Queromarca are more involved in roles such as planning and innovation.*

To test this hypothesis, the Fisher test was used as in the process of accepting hypothesis above. The places of study were tested in the relationship to types of roles such as innovation and planning (see Table 11, Table 12).

Table 11. Innovation

	T'umi	Queromarca	Total
Yes	4	11	15
No	46	39	85
Total	50	50	100

From the table 11, **Fisher test value was 0.0905** that means that the association is significant at $p < 0.05$. Therefore, the hypothesis had been accepted, particularly regarding to innovation and agricultural issues.

Table 12. Planning

	T'umi	Queromarca	Total
Yes	2	7	9
No	48	43	91
Total	50	50	100

From the table 12, **Fisher exact test value was 0.1595**. This result is not considered to be statistically significant at $p < 0.05$. Reason for that, the hypothesis relating to planning and decision making was refused.

Then, by the value of chosen significance level, only innovation was considered relevant in Queromarca.

B. Hypothesis linked with Information

- i. *Queromarca as is located in the valley has a better possibilities to get the information than T’umi which is located in the farther mountainous area.*

To test this hypothesis, was applied Paired T-test which could prove the relationship between studied areas and their frequency of receiving information in agricultural issues.

Results Paired T test

The pared components were Queromarca and T’umi (see Table 13).

Table 13. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	T’umi	3.4400	50	1.18080	.16699
	Queromarca	3.0600	50	.99816	.14116

As it shows below (see Table 14), the value of “t” was 5.480170 and the value “p” was <0.00001. Therefore, the result was considered statistically significant at $p \leq 0.05$.

Table 14. Paired Samples Test

		Paired Differences				t	df	Sig. (2 tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	T’umi- Queromarca	.38000	.49031	.06934	.24065	.51935	5.480	49	.00001

This test confirms the strong evidence ($t = 5.48, p = 0.00001$) that the location of studied area facilitates the frequency of information received. The 95% Confidence Interval of the Difference is from 0.3 to 0.5 proves that the differences on frequency of information received is statistically significant

6 Discussion

The main purpose of this research was to analyse the role of women in agriculture and their access to farming information. Therefore, this study mainly analysed the events and data obtained from the concrete target group.

The major findings identifies the most common roles of Andean women in the studied areas. These included helping works, about 79% of women were dedicated to secondary activities in agriculture, usually helping their husbands in tasks such as seed selection, post harvesting work, and small animal breeding. Other 54% of females execute the farming main works which include soil preparation, planting, harvesting, and animal husbandry. Selling and marketing of products was the third activity more realized with 45% of women dedicated to it. While innovation and planning were found as the less carried out in both communities.

Many studies were carried out in the same topic, but only some of them discuss what is really lacking in the studied places which in the case of this thesis were the importance of these two last roles mentioned above. Similar studies from Latin America, conducted by Bastidas (1999) and Acosta (2008) revealed that females do not do physical hardness works in the field. Bastidas's research agrees with the present's thesis findings, she even said that Andean women, sometimes can cook for paid workers and their family members. Other research has agreed with this thesis, reporting that 49% of cases studies about women's role in farming agrees that females are responsible for moderate works such as rearing, grazing, milking, feeding small animals (CIAT, 1991).

It was found that 70% of females from T'umi and 60% from Queramarca achieved only elementary school, the 30% of females in both areas have secondary and less than 5% of them reach techniques or university instruction. This results indicates that there were no big differences between both studied areas in terms of education, and there is still prevailing low level of education among women farmers. According to an Asian study conducted by Khushbu and Abdoul G. (2016) was also found that around 20% of women farmers achieved mostly secondary school in 2011 with a significant tendency to improve this figure during the time. This showed how thesis's results agrees with other similar research on the topic.

The thesis's hypothesis which indicates that women with higher education are involved in more intellectual agricultural activities, it had been admitted through using the valuating function (f – see Equation 3) to measure the rate of intellectual work that women makes,

and its elements “*k*” that was the coefficient of rate of intellectuality of given agriculture role (see Table 6). For testing the hypothesis each role was associated with the female’s education level. Verifying this testing process, were highlights activities such as innovation and planning as the more intellectual demanding works in agriculture. Which in fact depends on women’s educational level. Whoever, this thesis has found that only 15% of females were dedicated to innovated activities such as implementation new agriculture technologies. And 9% of women do planning such as management of farming work.

The studies carried out in Africa and India about women in farming, were in the majority related to theirs accessibility to natural resources, extension services, cultural barriers, education, economical resources, and always compared with men. (Ogunbameru et al., 2010; Mehar et al., 2016). These studies do not concentrate much in which type of activities females perform in the agricultural process of production itself. But rather make women victims of man who could well be her husband if the research took place in one area.

The present thesis’s funding shows that the age of women farmer determine their level of participation in farming, the older they become, the more time per day spent in agriculture, even doing repetitive activities. It was shown that 63% of females from both villages were between 36 and 60 years old and the majority of them were specially dedicated to helping activities (see Appendix 1).

On the other hand it was also proved that female’s age does not compromise the types of roles they do because they usually do not change the farming tasks that were always use to do, even they become older. This was the reason why the amount of roles did not increase, while the participation did. A research provided in Andean countries, revealed that total volume of hours that women spends in agriculture is about 42.5% and the majority are adults over 40 years old (IICA and IDB, 1996). Those results from past two decades, resembles to our results in terms of age and grade of involving.

T’umi and Queramarca resulted to have the typical prototype of Andean villages, were the family income do not reach the vital minimum wage established in the country which is no more than 254\$ approx. (MTPE, 2016). The 90% of families in T’umi reached lower than 124\$. approx. In Queramarca the 70% of families face the same situation. Other study shows similar results in the Andes argue that is the poorest region in the country due to persistent social problems (Peru Opportunity Fund, 2011). On the other hand, an official survey 176

rural poorest areas from Peru, argues that average income has increased during the last two decades (USMP, 2013).

Based on the thesis's results, it was accepted the hypothesis that argues that in poorer families, man is usually employed in off-farm activities and because of this situation, women increase their level of participation in agriculture. It was proven that household income fluctuation determined the economic status of the families. The poorest families have only the man as a source of off-farm income, while woman dedicates a lot of time to agriculture managing to produce food only for family's own consumption. This evidences that, indeed, woman contributes to family food security working actively in agriculture, as refers was also reported FAO about Latin America (2014) and in the case of Mexico (Acosta , 2008). In a similar published report, was shown that women are engaged in activities related to subsistence production. And theirs work is considered as an "aid" compared to that performed by men (Chiappe, 2009). The common reason why men were dedicated to off-farm activities was associated with the low agriculture income perceived in T'umi and Queramarca. This thesis was not proved that low income and male off-farm activities cause male migration as were shown in the study by Chiappe in Chile and Paraguay (2009).

7 Conclusions

The research was set out to determine the specific agricultural roles of women from the Southern Andes in Peru, and identify their access to information. For that reason the thesis evaluated T'umi and Queromarca, native communities in the Cusco region.

The main finding of the thesis was related to two aspects, roles and information managed by women farmers. Those were analyzed regarding to another conditioning factors such are the social, economical, educational, demographical.

The main thesis findings verified the importance of type of roles that females carry out in agriculture, the majority of women performed as a helping worker. Main work (hard work in the field) and selling (trading the products) are also the other activities most involved by female farmers. This research emphasized that the innovation and planning are roles that were executed by only a few farmers in those studied villages.

The education and age of women farmers were factors that considerably influencing their their participation in agriculture. It was found that women with higher educational level, that at least achieved secondary school, technical and university were dedicated to more intellectual farming roles such are planning, innovation and selling. The age also influences significantly in our results because the 63% of females were older than 36 years old, meaning that the youngest population were less involved in farming.

Another thesis's issue, was also that in poorest families, man is employed in off-farm labours and because of this situation, women increased their participation in agriculture spending more time in the field. This fact showed that women farmers contributes to the family food security producing food for its own consumption. Many studies in the context of Latin America showed their accordance in this gender topic affirming that women are crucial component for farming development (Herpen, 1991), is the case of this research as well.

Concerning to information in agriculture there was also determined that Queromarca as is located in the valley has a better possibilities to get the information than T'umi which is located in the higher mountainous area. This was define according to the frequency of information that farmers received. In term of communication and transport Queromarca showed a better geographical conditions. The frequency of information was identified as a facilitative factor for the communication and local trade of farming products.

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9 Appendices

Appendix 1. Other work in agriculture * Age of the respondent

		Age of the respondent				Total
		15-18	19-25	26-35	36-60	
Other work in agriculture	Yes	1	7	20	51	79
	No	2	0	7	12	21
Total		3	7	27	63	100

Appendix 2. Village * Frequency of receiving the information

		Frequency of receiving the information					Total
		Weekly	Each month	Every 3 months	Rarely (less than 2 times a year)	I do not receive any information from them	
Village	T'umi	0	15	11	11	13	50
	Queromarca	1	15	19	10	5	50
Total		1	30	30	21	18	100

Appendix 3. Questionnaire research

1. Name of Village:

- a) T'umi
- b) Queromarca

2. Gender: female

3. Age

- a) 15-18
- b) 19-25
- c) 26-35
- d) 36 -60

4. Education

- a) Primary
- b) Secondary school
- c) Technique
- d) University

5. What kind of activity do you do in agriculture?

a) Planning (make a plan in the farm)	
b) Innovation (Information, technologies)	
c) Main work (Hard work in the field, planting, harvesting)	
d) Other work (helping work, seeds selection)	
e) Selling(market of the product)	

6. How many hours a day do you spend in agriculture activities?

- a) <4 hours
- b) 5 -6 hours
- c) > 6 hours.

7. Who does make the decisions in your family about agriculture?

- a) Me
- b) My husband
- c) Both of us

Specify which kind of decisions:

8. How much is your household income?

- a) <410 soles.
- b) 410-750 soles.
- c) > 750 soles.

9. Who does contribute more to household income?

- a) My husband.
- b) Me.
- c) Both contributes equally.

10. The production in our farms is for:

- a) The own consumption
- b) To be sold in the local market
- c) Both of them

11. Do you get some information about agriculture?

- a) Yes
- b) No

Specify that type of information:

12. Who provides useful information about agriculture?

- a) The local municipality
- b) A non-governmental entity (NGO)
- c) Other media.

d) Nobody

13. What kind of information do you receive?

- a) Prices of agricultural products in the local market.
- b) Training in crop improvement.
- c) I do not receive any information

Specify

.....
.....

14. How often do you receive the information from the NGO or Governmental organization?

- a) Weekly
- b) Each month.
- c) Every 3 months.
- d) Rarely (less than 2 times a year)
- e) I do not receive any information from them

15. How do you use the agriculture information that you receive?

.....
.....

16. Do you think that agriculture is profitable in your village?

.....
.....

Appendix 4. Photos from research places



Collecting data in T'umi



Local market at Queramarca during data collecting.



Respondents from T'umi