GENDER AND PEST MANAGEMENT IN THE ECUADORIAN ANDES

Megan LeAnna Byrne

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Maria Elisa Christie
Timothy W. Luke
Ralph P. Hall

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Abstract: This research was conducted to assess the intersection of gender and pesticide knowledge to identify gendered dynamics that may prove important to consider when implementing an Integrated Pest Management (IPM) program. Key findings include knowledge being associated with task undertaken, not necessarily the gender of a person. Often, due to social conceptions of appropriate gender roles, similar knowledge may be associated with a certain gender because they are engaging in similar tasks, but it is not their sex or gender that inherently gives them such knowledge. Therefore, knowledge generally associated with women can be associated with men if they are engaging in similar work. Additionally, triangulation of data through using various research methodologies, and interdisciplinary research are imperative for developing comprehensive research or development programs. Finally, even people who are concerned with the negative human and environmental health effects of pesticides may not be using them in a cautious manner. Outside factors such as market sale, education and income level must be taken into account when assessing why pesticides are used and the best methods to introduce an alternative pest control method, such as IPM.

Dedication

I would like to dedicate this thesis to my parents who are the most inspiring and supportive people in the world. Without their wisdom and love I would not be the person I am today, and I credit them for instilling in me many of my academic interests even though they may not see the connection. Also, this work goes to my fiancé, Andrew, who has unconditionally and selflessly supported my aspirations, challenged me intellectually and consistently encourage me. I only hope that I can be half of the support he has been to me during his upcoming thesis work.

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I, Megan Byrne, took all photos displayed in this thesis in the year 2010 unless otherwise noted. I would like to thank Andrew Puhl and the IPM CRSP for allowing me to use their photos when appropriate.

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ADHD: Attention Deficit Hyperactivity Disorder
EPA: United States Environmental Protection Agency
EU: European Union
GAD: Gender and Development
GGT: Gender Global Theme
GHS: Global Harmonized System
IARC: International Agency for Research on Cancer
ILO: International Labor Organization
INIAP: El Instituto Nacional Autónomo de Investigaciones Agropecuarias
IPCS: International Program on Chemical Safety
IPM: Integrated Pest Management
IPM CRSP: Integrated Pest Management Collaborative Research Support Program
NIH: National Institutes of Health
NTP: National Toxicology Program
PAN: Pesticide Action Network
UNEP: United Nations Environment Program
USAID: United States Agency for International Development
WHO: World Health Organization
WID: Women in Development

1. Introduction

Gender, as a socio-cultural manifestation, permeates society. It is defined in this thesis as the social constructions of what is expected of, allowed and valued in a woman or man in a given culture, context, time and/or location; whereas sex is defined as biological differences between men and women. Gender forms characteristics attributed to the male and female sex and also shapes a person's reality. It is one of the most fundamental elements that define human beings in their own minds and to the outside world; gender, the learned characteristics representative of cultural conceptions of what attributes the biological sex of male and female embody, greatly influences the human experience (Cornwall 1997). Ideas about gender roles, spaces or tasks help fundamentally shape the knowledge that a person gains in their everyday lives.

Therefore, gender is a crucial element of life that must be taken into account no matter the work being completed because different outcomes will arise from men and women simply based on their gender-based placement within society (Hanson and Pratt 1995). It is ill advised for any project to expect men and women to harbor the same knowledge and conduct the same practices, particularly agricultural development programs that attempt to facilitate technology and knowledge transfer (Beneria 1992). For a project to be sustainable and advantageous to all participants, gendered elements of knowledge, spaces and tasks must be assessed and incorporated into planning,

implementation and decision-making at the grassroots level (Ferguson 1994). It is important for researchers and development programs to understand women's knowledge, beliefs and perceptions surrounding plants and agriculture to fully tap in to their potential as participants.

Women have played an important role in agricultural development, but men and women experience different vulnerabilities based on their different role in agriculture. Women, however, often remain overlooked as many cultures recognize men as the farmers because they contribute to the productive sphere, which is valued through economic indicators such as paid work and markets. On the other hand, women are not commonly viewed officially as farmers by the public or themselves because they are thought to only contribute to the reproductive sphere, located primarily in the home, or view their work as only support for their husband's work in the field (Carr 2008). However, a high percentage of women worldwide work agricultural lands and produce food for domestic consumption as well as market sale (IFPRI 2005). On average women make up around 43% of the agricultural labor force worldwide, varying from around 20% in Latin America and the Caribbean to nearly 50% in sub-Saharan Africa and Southeastern Asia (FAO 2011).

Marked by former U.S. President Harry Truman's call for the U.S. and other developed countries to solve the "problems" of the developing world, development has become a job title and common term used in national and international institutions, programs, policies and common discourse.

Development, though, is hard to define and its definitions are subject to location, culture, history, economy and evolving ideas (Potter, Binns et al. 1999). This paper draws on Arturo Escobar's (1995) framing of development:

> I propose to speak of development as a historically singular experience, the creation of a domain of thought and action, by analyzing the characteristics and interrelations of the three axes that define it: the forms of knowledge that refer to it and through which it comes into being and is elaborated into objects, concepts, theories, and the like; the system of power that regulates its practice; and the forms of subjectivity fostered by this discourse, those through which people come to recognize themselves as developed or underdeveloped (p. 10).

Indeed, the discourse initiated by President Truman laid the groundwork for the creation of a global order of knowledge that positions the Third World as underdeveloped through measuring its success against formalized Western economies that had been developing for a longer period. Mohanty (1984), Said (1978), Bahba (1994) and Escobar (1995) all mark the importance of this discourse in shaping and creating development, because it results in specific ways of conceptualizing and acting through which the Third World image and peoples are produced, defined and treated. They argue that conceptualizing the Third World as a monolithic, backward place that needs help from the developed First World ignores the complexities of life and culture that people of the Third World face. It is not enough solely to rely on economic progress as defined by the West to demarcate the development of a country because everyday complexities and the human element are lost.

The many definitions of development indicate that meanings of development derive from its discourse, which is historically and geographically

specific and changing. Overall, though, the discourse of development, in its fragmented multi-world definitions, does not accurately account for the state of the world and reflect definitions of development from multiple localities.

One major critique of development is that it has become conflated with economic growth and relies greatly upon capitalist ideologies that not all countries necessarily share (Potter, Binns et al. 1999). Peet and Hartwick (2009) contend that development and growth are not the same thing, and argue that development is about social conditions of economic growth and changing the world for the better, rather than channeling more money and power to the already wealthy to which economic growth pertains.

The economic contributions of women often stay left out of formal economic indicators because much of their work occurs in the informal sector and private sphere. Development, and development research programs, should not be about making poor, underdeveloped— for lack of better vocabulary— countries look like the rich, developed countries, but rather helping communities who want help enhance their chosen ways of life without imposing a set standard of change upon them. To accomplish this, it is necessary to recognize that all people, regardless of race, gender, nationality, etc. as having specific knowledge that is unique and valuable. One way to accomplish this is through the lens of gender.

Development literature and organizational strategies prove that women are important in agricultural development (Boserup 1966; Boserup 1970; Doss

2001; Gates Foundation 2008). If gender is not taken into account and women are left out of development projects, the project may assume that men are in charge of particular tasks and train them in on particular method that in reality the women complete, thus having low success results for the project. For example, in West Africa crops are considered to belong to either men's or women's crops and such categories are linked to and express cultural obligations, but also influence the assigning of crops by a specific gender (Padmanabhan 2007). Another important thing to note is that knowledge about crops is often gendered and can be used to aid development programs, as in the case of women being able to tell which plants are noxious through conducting their weeding activities, as noted in the Integrated Pest Management Collaborative Research and Support Program (IPM CRSP), East Africa program in Uganda (Erbaugh, Donnermeyer et al. 2003). In order to have sustainable results a project must address the appropriate problem and the appropriate actors, and for this reason, gender and its associated roles and knowledge are prime factors to evaluate.

Women's gendered knowledge, belief and perceptions contribute vital information that could affect the adoption and impacts of technology transfer, such as the case of integrated pest management (IPM). IPM is an ecologically and environmentally sensitive approach to managing pests by increasing the understanding of pest life cycles and their interaction with the environment (Norton, De Datta et al. 2005). Managing pests by the most economical means with the least possible harm to humans and the environment is the goal of IPM

methods practiced in developed countries for years and is steadily spreading to developing areas with help from programs like the Integrated Pest Management Collaborative Research Support Program (IPM CRSP).

The IPM CRSP[1], funded by the United States Agency for International Development (USAID), seeks to expand the use of IPM to developing countries where reliance on harmful chemical inputs is vast. In response to concerns regarding environmental and human health risks associated with pesticides coupled with pests' growing resistance to chemicals, the IPM CRSP demonstrates that site-specific, alternative pest management techniques can reduce reliance on chemical inputs to control pests, reduce crop losses on account of pests and lead to a more secure, long-term and sustainable agricultural system (Muniappan, Vaughan et al. 2010).

Being a collaborative research program, the IPM CRSP goals and focus are different from traditional development programs, and relies heavily on farmer input. One of the components of the IPM CRSP is the crosscutting Gender Global Theme (GGT)[2] that works with all IPM CRSP regional programs to facilitate the inclusion of both genders in research and training. The overall goal of the GGT program is to improve farmer livelihoods and protect human and environmental health while supporting gender equity and women's empowerment.

[1] For more information about the IPM CRSP and its programs around the world see: http://www.oired.vt.edu/ipmcrsp/

[2] For more information about the Gender Global Theme and its projects in each IPM CRSP region see: http://www.oired.vt.edu/ipmcrsp/WhatWeDo/Gender&IPM.html

The IPM CRSP regional program in Latin America and the Caribbean[3] works in Guatemala, Honduras, Ecuador, Jamaica, Dominican Republic, Trinidad & Tobago and smaller islands in the Caribbean with a focus on solanaceous, cucurbits, diversified highland vegetables, cacao and plantain crops. It seeks to address pest management issues for selected seasonal and perennial crops that may function to contribute to income and exports, help reduce poverty and food insecurity and provide engines of growth for lagging regions. The program uses a comprehensive, participatory approach building on past successes and relies on multi-disciplinary research to improve environmental quality through biodiversity monitoring and reducing the use of pesticides.

This research project is a very small contribution to the GGT efforts in the Latin America and Caribbean regional program's work in Ecuador. For a visual diagram of where exactly my research fits into the much grander structure of IPM CRSP, GGT and the Latin America and Caribbean regional program, see Figure 1 (size is not proportionate to

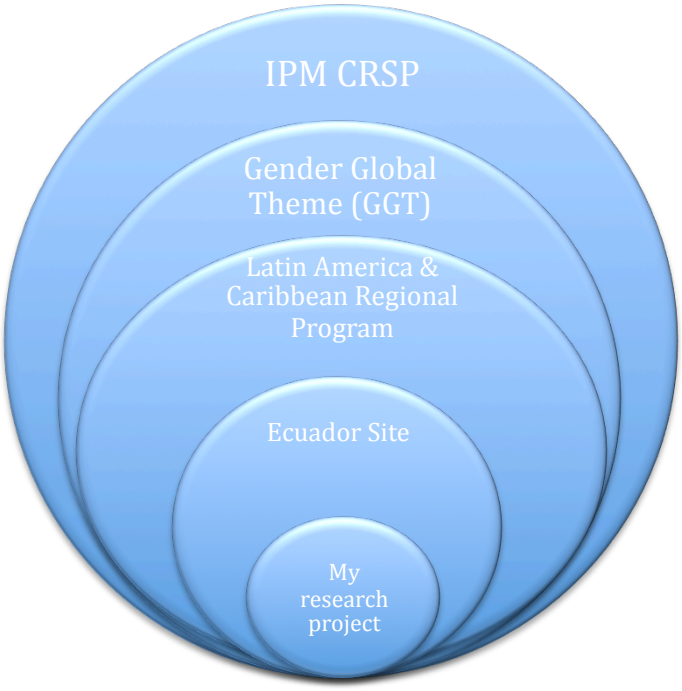


Figure 1: Where my research fits into the IPM CRSP

[3] For more information about the Latin America and Caribbean Regional Program see: http://www.oired.vt.edu/ipmcrsp/WhatWeDo/LatinAmerica.html

impact or importance). My research aims to identify gender-based constraints and opportunities for the adoption of IPM technologies in the Bola de Oro. It seeks to contribute to the IPM CRSP and their partners in country, El Instituto Nacional Autónomo de Investigaciones Agropecuarias (INIAP), through learning about the gender differences in the area of chemical pest control. IPM CRSP began work in Bola de Oro, a small village in the region of Chillanes, which is located in the Bolivar province of Ecuador. Bola de Oro sits in the Andes and is primarily comprised of a mestizo population and a handful of indigenous farmers. It is a small community located about two hours by car south of Guaranda, the capital of the Bolivar province, and roughly 30 minutes by car from the town of Chillanes. The hypothesis for this work is that IPM will appeal to women through their gender roles that expose them to negative impacts of pesticides on their lives and on the lives of their families.

The main emphasis of this research was to gain insight into the role of women in pest management and to assess pesticide knowledge and practices to determine what role women might play in agricultural development programs. Constraints and opportunities for IPM adoption are identified by utilizing the Gender Dimensions Framework (GDF) created for the Greater Access to Trade Expansion project of the Women in International Development (WID) office of USAID (Rubin, Manfre et al. 2009). The dimensions on which my study heavily relied were women's beliefs and perceptions about gendered pesticide practices

and participation in pest management. The focus particularly centered on activities in bean, corn and potato crops.

Pesticides are documented to negatively affect the health of men and women differently, due to their biological makeup and to the ways in which they are exposed which greatly depends on their gendered tasks. Therefore, one possible way to increase IPM adoption is through highlighting the negative effects of using pesticides, and building on men and women's beliefs about them.

In many IPM sites women have considerable influence over agricultural production returns, sustainability impacts and household food security outcomes (Hamilton, Moore et al. 2005). For the recommendations proposed by IPM CRSP to be broadly adopted and sustainable in Bola de Oro, Ecuador, it may prove important to include women in their programs. A woman has gendered knowledge and participation may be important for not only the betterment of local pest management practices but also for the adoption of techniques, that IPM CRSP is seeking to introduce.

2. Review of literature

Women consistently have less access to agricultural assets, inputs and services than men in the majority of countries and contexts (FAO 2011). However, women are important for development programs for many reasons, one being that they have different gendered knowledge than men due to the nature of gendered tasks and responsibilities. People learn from what they do, and men's and women's gendered knowledge is not exclusive but is influenced and complemented by one another (Gururani 2002). It is this specialized knowledge that is important to development programs, specifically agriculturally focused, to create successful and sustainable projects that benefit the maximum amount of people.

Pesticides effect the environment, humans and animals in all areas of the world. Often, gender plays a role in how pesticides manifest in human health, and where everyone needs to be informed about pesticide effects and safety measures, women may be the most in need of such education since on average they have lower education and literacy rates than men in developing countries (Johnson-Lans 2008). Their education might also affect the adoption of development programs for the better since it is often women's responsibility to take care of the sick and health of the family.

IPM programs, due to their reliance upon site-specific pest life cycles, intrinsically rely on local knowledge to supply the information needed to develop

an appropriate IPM package for the community. Both men and women's knowledge, then, contributes to the design, implementation and success of IPM programs.

2.1 Gendered Knowledge

Knowledge is "situated" differently according to a person's physical and social surroundings as well as their tasks, gender, race, ethnicity and class (Bordo 1986; Haraway 1988; Fortmann 1996; Sachs 1996; Huvio 1999; Jewitt 2000; Gururani 2002; Howard 2003; WinklerPrins and Barrera-Bassols 2004). People's positions create their realities and the way they view the world. Focusing on situated knowledge involves looking at the multiple-perspectives that people use to create their viewpoint of the world. These lived realities generate knowledge, and thus people harbor different knowledge depending on how and where their multiple-perspectives of thought and life converge. The gendered division of labor creates differences between men's and women's knowledge (Voeks 2007). Everyday life is a key area of research to understand socio-cultural reproduction and gendered knowledge (de Certeau 1984; Christie 2006; Christie 2008).

Some feminist theory, such as that drawing from situated knowledge, posits that all knowledge is partial and embodied, which makes claiming universal theories or truths impossible (Haraway 1988). This is not the goal, however, of situated research. Rather, it is the understanding that all knowledge is partial that brings to light the importance of gathering both men and women's

knowledge in research to create a more holistic picture. It is not just about gender, but introduces the idea that context, geography, history, education and all other factors that go into identity creation situate a person's view of the world and processes around them.

For rural women, their knowledge is grounded in the daily tasks they undertake, social expectations of women and their specific localities (Sachs 1996). Men and women's knowledge will differ, and is therefore important for creating projects and programs that benefit all members of society. Men's voices are often heard in development because they have more opportunities to accumulate and express agricultural knowledge, and do not face the cultural constraints, such as mobility or communication, that prevent women from accessing and articulating knowledge (Jewitt 2000). Furthermore, men tend to have more experience in the public sector, giving them comfort and confidence in group settings. As a result, gender bias and an assumption that men accurately represent the knowledge of an entire culture results in incorrect findings and misinterpretations of knowledge and people-plant relationships (Howard 2003).

Although both men and women possess gendered knowledge based on their diverse experiences, men's knowledge is often considered unbiased and factual, while women's knowledge is unrecognized or disregarded (Harding 1986). Besides gender dynamics, age, class, caste, education, marital status and other factors influence knowledge production and the way it becomes shared or silenced. Asymmetrical gender relations give men the power to ignore women's

gendered knowledge, and can lead to an overestimation of men's knowledge (Gururani 2002).

This, however, is not an excuse to elicit men's knowledge exclusively and allow women to remain silent. Not only is their silence disempowering for women, but it also takes away from the applicability and accuracy of development projects. Despite women's vast knowledge, though, they are often overlooked in development projects, especially in extension and technology transfer activities (Huvio 1999).

Women's knowledge is not necessarily exclusive to women because of their sex, but rather that it is contextual and accumulates due to their roles and labor practices. This inherently offers a different perspective to that of men who have different roles and labors, and thus gain their own knowledge. Moreover, women's roles are changing rapidly in a variety of situations worldwide, so generalizations about their knowledge and roles warrant context. In fact, men who complete domestic tasks generally assigned to women are likely to have similar knowledge relating to the women who complete the same tasks, and vice versa. In this sense, gender is not as important in knowledge accumulation as the tasks undertaken, although such tasks remain strongly structured along gender lines. There are certain tasks that are commonly associated with one gender or another, thus forming patterns of knowledge associated with gender.

2.1.1 Productive and reproductive spheres

There are many debates regarding what qualifies as reproductive or productive work (Leonard 2001; Neysmith and Reitsma-Street 2005; Dunaway 2008). Women's lives do not clearly take place in one sphere— inside or outside the household— just as work cannot be so cleanly divided by women as contributing reproductive (read: household) labor and men only contributing productive (read: economic) labor (Dunaway 2008). Women's work can be located in the market or in the home, and constitutes a diverse array of strategies, networks and community (Neysmith and Reitsma-Street 2005).

Regardless of the location in which reproductive or productive work occurs, it regularly is not counted; there are some tasks that are commonly associated with a certain gender that may not be reported in official statistics such as reproductive work in the home or work in the informal sector. Gender roles may change because of the situation in the family, but some common themes persist in regards to completion of tasks and association with gender. One of those themes is that even though women across the world face different realities of everyday life, they are primarily responsible for unpaid domestic labor and childcare activities no matter their employment in the formal or informal labor force (Leonard 2001).

Furthermore, only focusing on women's labor in the productive spheres hides women's extensive workload in reproductive spheres. Often, women's productive and reproductive work is interrelated and thus cannot be solely

counted in one sphere or another, making quantifying hours contributed to one labor or another difficult (Sachs 1996; Dunaway 2008). Because of the difficulty in cleanly dissecting women's work, research has now moved to documenting women's perceptions of their work, with women often minimizing their work as simply "helping" the man, which in effect is an articulation of their subordinated position to men ingrained by society. By internalizing their subordination to men, women also shape men's consciousness and beliefs about women's work (Sachs 1996).

2.2 Women in Agricultural Development

Ester Boserup's (1970) research and writings argued that women are fundamental for development and their contributions must be counted and enhanced the visibility of women's role in development. Boserup's work showed that women and women's work does have important impacts on the economy, and that women's labor has been seriously undercounted. Her main contribution was highlighting the significance of women's work, particularly in agricultural development, which opened the door for the conduction of research regarding women's work and their effects on development policies.

What Boserup does not account for, however, is the political and social context of land appropriation, accumulation of capital and women's reproductive roles as also contributing to a new sexual division of agricultural labor (Beneria and Sen 1981). This may not have been the focus of her research, but is certainly an area in which this thesis can add to and broaden her argument. She

does discuss, though, the negative effects that capitalist development have on women in terms of belittling their status, and creating more difficulties for women in feeding their families. Her work inspired others to appropriately count for women's labor. Furthermore, Boserup calls attention to technology's role in privileging men by referencing the introduction of the plow, bringing along heavy physical demands, as signaling the switch in farming systems from woman-based to man-based. Culture and changing technologies thus affect the roles assigned to men and women (Momsen 2010).

Women play an important role in agriculture in the following areas: producing and keeping traditional knowledge, preserving biodiversity, processing food, preparing food and providing food security for their families (Karl 2008). Men may also take part in these tasks, but on average women dominate in those areas. Development planners should not overlook these specialized knowledges for several reasons. The first reason is that their project may not aid as many people as possible because they are leaving out a key portion of the population. Secondly, assuming that all families pool income or information is inaccurate; when income or information dissemination stops with one family member there is no genuine improvement in society, only improvement for those who have access to trainings and projects. Empirical evidence has shown that when men's income increases the nutrition and health status of children does not necessarily increase. In contrast, children's health and nutrition as well as agricultural

productivity increases when women control land, physical assets and financial assets (Meinzen-Dick, Behrman et al. 2011).

By making women's work more visible, Boserup and others hoped that agricultural development policy and programs would reorient themselves to benefit women. However, it decades of research since then proves that simply documenting women's work is not enough to change policies and women's lives: research has to be reshaped to understand women's participation in agriculture more fully and dynamically.

Women on farms are unique in their role as "farmwives" in that they are not only responsible for the same chores as "housewives" (ex: cooking, cleaning, bathing, reproducing, etc.) but also chores associated with running a farm enterprise (ex: bookkeeping, milking, care for household crops, preserving food, etc.) (Mies 1982; Sachs 1996). However, rather than recognizing the unique position of "farmwives", historically Western development programs mimic their perceptions of Western farm families which operate under the assumption that the man is the producer and their wives are housewives whose responsibilities and contributions lie in the home and are limited to reproductive activities (Beneria and Sen 1981; Mies 1982; Sachs 1996; Momsen 2010). This misrepresents the conditions of women on family farms in developing areas, and encourages development programs to address them as farmer's wives rather than farmers themselves. Men can take on the "housewife" role as well if their

wife becomes the breadwinner[4], which is becoming more common in areas where women have better opportunities to find work in industry because of their acceptance of lower pay and typecasting as better at menial tasks. However, this is currently the exception and not the experience of the majority of farmers in developing countries.

The invaluable role of women in agriculture is not in question in policy and academia, yet many research and development programs do not achieve such inclusion. Development projects not only need to include women, but they must also work to identify the broader socio-cultural, economic, and political structures and inequalities which impact women's access to and control of resources (Jewitt 2000). Women play a significant role in contributing to world food supply, gross domestic product (GDP) and their unpaid, household work gaining greater value through gender equality has been proven to be linked to a country's economic growth (Rubin 2009). Women's potential impact on economic growth is thus limited due to gender inequalities that limit the effectiveness and sustainability of development assistance programs. Women are the majority of smallholder farmers and food producers worldwide, and their participation in development efforts are critical to the success of such projects (World Bank 2009).

2.3 Pesticides and Integrated Pest Management (IPM)

Over recent decades, the world has witnessed a push for developing countries to become the "breadbasket" of the world as well as supplying

[4] For a discussion of men and women's changing roles see Silberschmidt in World Development, 2001 and Mies 1998.

nontraditional agricultural products to a global market. Such a shift from traditional crops, such as potato or rice, for local use to non-traditional crops, like blackberry or quinoa, for worldwide consumption in the global food chain not only impacts what poor people consume but it also impacts their living situations (Kay 1997; Deere and Leon 2001; Liverman and Vilas 2006). Consolidated seed control and markets chosen by large corporations, such as Monsanto, makes it difficult for poor farmers to have food sovereignty and choose what and how they grow crops because of the hold of these large corporations that are looking for ways to maximize profits at the expense of the poor countries (Magdoff and Tokar 2009).

Rising pressure on developing countries to increase export crop production in order to provide for the global market has also increased dependence on pesticides. For example, the Ecuadorian government subsidized pesticides, which encouraged farmers to use them because of their low prices (Yamagiwa 1998). As a result, a notable increase in potato production in Ecuador has derived from the modernization of cultivation including a high dependence on pesticides (Mera-Orces 2001). Pesticides flow into developing countries from developed countries either because developed countries are no longer producing the same volume of food crops, or companies have already produced pesticides and need new markets in which to sell them because they are now banned in the developed world due to associated hazards of use (Ecobichon 2001).

Working with high volumes of pesticides in small plots and spraying them by hand rather than with large farming equipment like that used in developed countries puts farmers in developing countries at high risk of long-term exposure and intoxication. Poor farmers and local ecosystems must absorb these negative impacts of pesticide use in order to shoulder the burden of food production for the globe. Such negative impacts, however, do not simply affect farmers in the developing world with close contact with such chemicals, but spread to other countries on the crop itself. This “circle of poison”, as depicted by Weir and Schapiro (1981), affects consumers worldwide.

Rachel Carson (Carson 1962) in her groundbreaking book *Silent Spring* first drew the public’s attention to the connection between pesticides and the environment, crops and human interactions, leading to public awareness about pesticides and the environmental revolution in the United States. The author argued that animals, birds and humans were being harmed and/or killed by the use of pesticides without critical examination and stringent control of what was being used, and how it was being used (Carson 1962).

Spurred by this research, many academics have since researched environment, human and crop interactions and analyzed the impacts that chemical usage can have on all forms of life (Hynes 1989; Schettler, Solomon et al. 1999). It is farmers and farm workers who apply pesticides and live near treated agricultural land that are at the highest risk of pesticide exposure (McDuffie 1994). Farmers in developing countries often still use older,

unpatented, toxic and harmful pesticides regardless of their human or environmental effects. They do so because such products are inexpensive, and programs that are meant to control pesticide use or inform farmers of proper management are nonexistent, limited or abandoned due to governmental or financial restraints (Ecobichon 2001).

Lower standards of occupational protection, awareness of safety measures and hazards, low enforcement of regulations, insufficient labeling of containers and poverty have contributed to the higher percentage of farmers in developing countries being affected by pesticide intoxication and health problems related to high rates of toxicity in humans than in developed countries (Pimentel and Greiner 1996; Ecobichon 2001). In rural, developing areas of low education the majority of men and women likely do not understand all the listed directions, toxicity levels or security information and that the vast majority of farmers use highly toxic pesticides without proper protection (Yanggen, Cole et al. 2003).

One reason that toxicity levels are so much higher in developing countries, particularly where agriculture is strong, is that farm tasks are shared by all family members (Ecobichon 2001). Even if every family member is not spraying pesticides, they are likely exposed to them through drifting sprays, residues, storage, water and soil contamination, improper use of empty containers and the contamination of oils and food (Ecobichon 2001). Additionally, in high use areas pesticide residues can be found in the home, thus exposing everyone living in the household (Yanggen, Cole et al. 2003). My results echo a 2002 study in Carchi,

Ecuador finding that the entire family of farmers or living in farming areas is at risk for pesticide health effects and that women were nearly as affected by pesticide exposure as the pesticide applicators themselves (Sherwood, Crissman et al. 2002). Deficiencies with women's reproductive functions and the increase in children born with birth defects are found to be caused by simply living in areas where pesticides are sprayed and using water contaminated by pesticide runoff (Garcia 2003).

Pesticides can affect human health in similar ways for males and females, but differences in biology make women more susceptible to the toxicity of certain chemicals (Garcia 2003). Exposure to the same agricultural inputs can actually develop different cancers depending on gender because many pesticides function as endocrine disrupters that develop hormone-related cancers that effect women more than men (Alvanja, Akland et al. 1994; McDuffie 1994; Garcia 2003). These differences between men and women in health reaction to pesticides are important because it is reported that 43% of the agricultural labor force of farmers in developing countries is women, with some scholars arguing that the percentage of women in agriculture is actually much higher but underestimated (Garcia 2003).

Women's perceived role as a farmer's wife and not a farmer continues to leave them out of development or education programs that may educate them. For example, Tanzo's (2004;2005) study in the Philippines showed that women are not trained as often as men in pesticide management because it is the

common view that men, not women, are the farmers and thus need the training, not women. Atreya (2007) also found gaps by gender in observing wind direction while spraying, prior knowledge on safety measures, reading and understanding pesticide labels and awareness of pesticide labels, which she attributed to men on average having a higher level of education than women. Furthermore, men tend to decide what pesticides to use, thus not affording women the opportunity to learn about the toxicity levels or effects of pesticides (Atreya 2007).

Site-specificity is also important for reaching women in technology transfer, because women's roles change by locality as well. For example, there are great differences between indigenous and mestizo women's control over land and agricultural technology in the Ecuadorian highlands and the egalitarian structure of indigenous inheritance practices (Hamilton, Moore et al. 2005). Regardless of their regional variations, though, women play a significant role in agricultural production and including them in technology transfer has proved to be an effective strategy for development programs (Poats 1991; Doss 2001; Doss and Morris 2001).

IPM is a type of crop management that seeks to reduce the use of chemical inputs for crop production while at the same time increasing economic productivity (Kogan and Bajwa 1999). IPM is recommended to farmers to lower production costs, reduce exposure to pesticides and improve the long-term sustainability of agricultural systems (Mauceri 2004). These methods have the possibility to reduce poverty, enhance human and environmental health and

minimize pesticide use. A study by Mancini, Jiggins and O'Malley (2009) found that using organophosphates posed a serious risk for occupational poisoning of farmers. The adoption of IPM, however, halved the risk of acute pesticide poisoning. Thus, IPM can serve as a positive alternative to dependence on pesticides.

In Ecuador, the vast biological diversity of the country makes agricultural pest problems unique to each locality. This is an ideal setting for IPM, as knowledge and site-specific studies are imperative for designing appropriate IPM packages (Mauceri 2004). Women in Ecuador are active in making decisions and participating in pesticide use and storage, in conjunction with their husbands (Alwang and al. 2005). Women are also concerned with family health regarding pesticide use, and thus their gendered roles and knowledge affects decisions regarding pesticide use and management (Alwang and al. 2005; Moore 2008). Thus, women's investment in positive environmental and human health aspects can act as a valuable asset to IPM programs as it offers an alternative to extensive pesticide use.

However, women face some gender-based constraints to IPM adoption. One of the most significant is attendance at natural pest control trainings. Women often do not directly receive the invitation to attend, they may not have available time to attend due to domestic and childcare obligations, social norms of acceptable travel may limit their mobility and the fear of embarrassment over low literacy rates often keeps women away from trainings (Meir 1999).

Overcoming these constraints is possible by appropriately planning and executing IPM projects that cater to the needs of women that differ from those of men by offering childcare, providing transportation and specifically inviting the women to attend.

Furthermore, the malleability of IPM packages allow room for developing packages that save labor and time, which women are more likely to adopt (Hamilton, Moore et al. 2005). This is important because it has been shown that once women have attended IPM trainings they are more likely than men to use such methods because they recognize the gains on human and environmental health when natural methods of pest management are used (Meir 1999). Thus women play a vital role in the success and sustainability not only of development projects in general, but specifically IPM projects because of their specialized knowledge gained from gendered tasks and activities.

3. Methods

Qualitative research methods have gained support throughout the social sciences as a means of collecting, organizing, and interpreting data in a flexible, sensitive, and creative way (Strauss and Corbin 1996). As such, qualitative research methods have been found to be particularly useful in measuring gendered differences in work, time use, perceptions and access to resources (Momsen 2010). Furthermore, workshops, focus groups and resource mapping prove particularly helpful in measuring and interpreting gendered perceptions and access to resources because women are more likely and able to participate in such methods (Grandin and Avila ; Wollenberg ; Thomas-Slayter, Esser et al. 1993; Colfer 1994; Feldstein and Jiggins 1994; Flora 1994; Christie, Kyamureku et al. 2010).

For six weeks from May to July 2010, I conducted a qualitative and quantitative study on the role of women in pest management in the Ecuadorian Andes. This particular group was chosen because the purpose this study is to gain insight into opportunities that will promote the adoption and sustainability of the IPM CRSP Latin America and Caribbean regional program in Ecuador. The community is working with INIAP in the IPM program, so the purpose of the site selection and sampling choice was to gain understanding of these particular farmer's perceptions about pesticides and the ways in which household decision-

making functions in households in order to build on local knowledge and identify improved strategies to incorporate women in the future program.

INIAP provided the connections to the community members that made it possible for me to visit the site and gather detailed information on the households. Without building on their established relationship I would not have been able to conduct as comprehensive of a study, particularly in such a short time frame. Participants were identified by INIAP as community members with whom they had developed relationships through previous work in other projects. Within the whole Bola de Oro community, there is an association of roughly 30 families with whom INIAP is working in the IPM CRSP program.

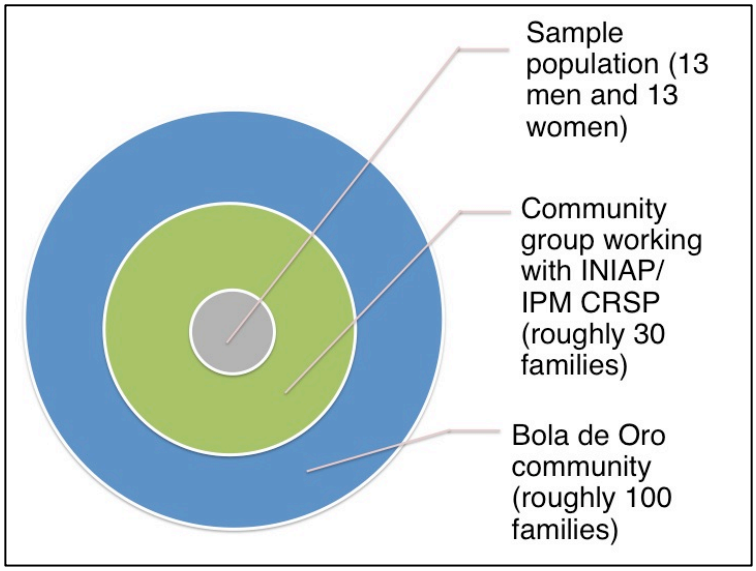


Figure 2: Sample population selection

Therefore, the 30 families of the Bola de Oro association made up my study population. The population was then stratified, as described by McNeill and Chapman (2005), by dividing the group into equal numbers of men and women, roughly 8% of men and 8% of women from the community group members to form the sample (see Figure 2).

The data collection methods I used consisted of: participant observation, participatory mapmaking, photo analysis, surveys including an activity chart, key informant interviews and a facilitated group discussion. Multiple data gathering techniques serve to triangulate data and capture the empirical reality of the participants, as each method reveals a different level of their reality (Dale 2004; Berg 2009). Mixing methods yields insights into discrepancies between results and reveal the partiality of knowledge that is produced in varying theoretical and methodological contexts (Nightingale 2003). Triangulation also creates a rich tapestry that captures multiple dimensions and gendered differences in knowledge, decision-making, access to and control over resources that together create a person's lived reality (Rocheleau 1995).

In the first week of the six-week study, I conducted household interviews with INIAP personnel to form a baseline study. The survey consisted of 30 questions divided into five sections, the first gathering demographic information and the other four reflecting the four dimensions of the Gender Dimensions Framework (GDF). The GDF was developed to provide guidance to USAID staff and partner organizations for working with USAID projects looking at promoting equitable opportunities in agricultural value chains. The GDF contemplates four dimensions: access to and control over key productive assets (tangible and intangible); beliefs and perceptions; practices and participation, and laws, policies and institutions (Rubin, Manfre et al. 2009). This study focused on the dimensions of beliefs and perceptions, and practices and participation.

3.1 Survey

Following the interview structure depicted by Berg (2009) non-threatening, demographic questions were asked first in an effort to increase participant's comfort with the survey and the interviewer. Within each of the next four sections pertaining to different aspects of the GDF, sections began with direct, but general questions relating to the dimension being studied, moved into more sensitive questions regarding that dimension and concluded with similar questions worded differently for validation of results. This pattern was repeated in each subsequent set of questions. In preparation for the interviews, questions were first written in English and then translated into Spanish incorporating local terms and phrases. The consent form, which was explained to and signed by each participant before the survey questions were asked, was also translated from English to Spanish. Two INIAP field technicians, one staff member, and three interns— consisting of three men and three women—helped conduct the interviews.

Figure 3: Interview with local woman. Used with permission of Andrew Puhl, 2011.

Interviews lasted roughly 25-30 minutes and were conducted by teams of two interviewers, one asking the questions and one observing, in the interviewee's home or a comfortable public space (such as the school; see Figure 3 for an example of an interview in progress[5]). All interviews were recorded and transcribed by INIAP personnel to ensure accuracy of results and to document any extra comments the interviewee might have made that the interviewers failed to write down.

Interviews were conducted with 26 members of the Bola de Oro community, 13 men and 13 women. These interviews were semi-structured and included an activity chart to identify who carried out agricultural tasks relevant to pest management. Men and women were interviewed separately on perceptions of pesticide use, types of pest problems and household decision-making. The final question of the survey asked the community member if they would host me as an observer for a day in order for me to learn more about the pest management practices of their community. During this time I proposed to help the participants with their work in the field, tying beanstalks, carrying wood, etc. If participants answered "yes" they were asked name a day and time to visit over the next two weeks. Once all the interviews were concluded, a calendar was generated from the days chosen by the participants and three men and three women were randomly selected for household visits according to their availability.

3.2 Participant Observation

[5] All photos included are from the author's personal collection unless otherwise noted.

Formal household observations started with scheduling a time to participate in the everyday tasks of local farmers and allowed for engaging in informal conversation about pest management and paying attention to the physical surroundings and a breakdown of tasks and men-women interaction (examples of tasks undertaken during observation are seen in Figures 4-7). Such

Figure 4: Elena moving cattle to a different pasture to feed

Figure 5: Cooking with Alejandra and Maria for community members working in their fields

Figure 6: Helping clear the brush from beanstalks. Used with permission of Andrew Puhl, 2011.

Figure 7: Husband and wife moving wood to make a fence

household observations occurred with three men and three women over a two-week time period, visiting the participant once before spending at least one full day with each participant. On one occasion, I spent full days separately with a husband and wife pair in an effort to gather the most insight into family dynamics and division of household labor. Furthermore, spending more time with limited numbers of people allowed me to become closer to contributing to part of their daily routine than short periods with a larger number of participants, and in turn produced more in-depth data and conversations (O'Reilly, Halvorson et al. 2009).

Figure 8: Community leader's home and children, where I stayed for two weeks

During this two-week span I stayed in the home of a community leader in order to gain a better insight into the underlying dynamics of the community (shown in Figure 8).

3.3 Participatory Mapmaking

Each observation consisted of completing daily tasks alongside the family members. At some point during the day the participants were asked to draw a map of the “path of the pesticide” (as shown in Figure 9) from its purchase

location to its final destination, to elicit perceptions about the life of the pesticide (Christie, Kyamureku et al. 2010). This time also provided an opportunity for casual conversation about perceptions regarding the effects of pesticides on humans and the environment, as well as a time to elaborate on questions from the baseline survey.

Figure 9: Participants drawing their map of the path of the pesticide

3.4 Facilitated Group Discussion

Toward the end of my field research one facilitated group discussion was held in conjunction with INIAP staff. Its format was modeled after Berg's (2009) structure. The community discussion, consisting of 10 women and 24 men, began with a photo analysis compiled from a series of pictures taken by INIAP personnel depicting Ecuadorian farmers of other regions using pesticides on their crops and/or using IPM methods. Farmers discussed the use (or non-use) of protective gear when spraying, consuming food near pesticides, proper storage and particular pests that farmers in the area manage.

The second part of the discussion centered on the most common crops being grown in Bola de Oro, the most common problems associated with those crops, and the ways in which the farmers treat such crops. Participants made it known that for the majority of them there was no notable difference in market crops versus crops for home consumption, so the INAIP team decided to make a list of the most commonly grown crops. Once a list was made of the most important crops grown for market sale and home consumption, participants identified the most common pest problems by crop and which pesticide is most often use to combat such pest problems. Finally, the session ended with INIAP briefly introducing the purpose of IPM methods to the community and asking if they were interested in learning some techniques. When the group responded yes, a date was set for INIAP's return visit.

3.5 Key Informant Interviews

From the baseline survey, household observations and the focus group, two groups of key informants were identified: the pesticide dealers in the nearby town of Chillanes where Bola de Oro community members bought their pesticides, and local medical personnel. INIAP personnel and I then conducted interviews over the course of two days with the highest qualified available employee or owner of the clinics or stores, respectively. All interviews were semi-structured, allowing for further discussion on key points. Interviews with healthcare providers were located at three health centers, in two cases with doctors and once with a nurse.

Three agrochemical stores served as pesticide seller key informants and interviews were held with this group in two cases with storeowners and once with a regular employee. The interviews provided both quantitative and qualitative indicators. For example, with the medical centers the numbers of intoxication victims were gathered and follow up conversation was held regarding the factors contributing to farmers suffering from chemical intoxication. From the agrochemical stores, data was gathered on the amount of pesticides sold of the chemicals indicated by the community as used often, and was followed with discussion of why the general public is buying certain chemicals and for what the agrochemical seller prescribes that chemical's use.

Figure 10: Key informant interview with the Bola de Oro community doctor. Used with permission of Andrew Puhl, 2011.

At medical centers doctors or nurses provided numbers of pesticide poisoning victims they cared for over the previous year to enable us to gain insight into the prevalence of pesticide poisoning in the region, and the proportion of people seeking help (Figure 10 shows such an interview with the community

doctor in Bola de Oro). Further conversation detailed the physical signs of pesticide poisoning, the reasons people chose to get help, what they knew, and what they did not know about the health effects of pesticides. The numbers collected from the agrochemical stores were used to form a chart documenting the quantities of pesticides being used in the region per harvest cycle. Discussions with the agrochemical sellers regarded their professional qualifications for pesticide sale, their trainings and their recommendations for pesticides to farmers who seek their advice regarding pest problems.

In accordance with ethical standards of the protection of human subjects, anonymity of the respondents has been maintained throughout the research by coding interviews and changing participant's names when quoted or pictured[6].

[6] IRB approval number 10-392

4. Findings

Tasks that women generally undertake within the family unit, such as reproductive activities like cooking, cleaning and caretaking, may make them more apt to recognizing the negative effects of pesticides on human and environmental health. Men, however, are generally in charge of productive tasks and make decisions regarding farming activities. Because men and women harbor different knowledge about pesticides and pests their mutual collaboration will be important for the IPM CRSP to gain a holistic understanding of what aspects may make men and women invest in their program.

4.1 Survey

Table 1: General statistics from Bola de Oro

Variable	Median	Standard Deviation	Minimum	Maximum
Number of family members	5.73	1.91	2.00	10.00
Age	36.77	11.08	23.00	66.00
Number of children	3.85	2.29	0.00	9.00
Number of children cared for in the home	2.50	1.61	0.00	6.00
Number of hours spent on crops for sale per week	6.92	3.14	0.00	12.00
Number of pesticide protective gear informants could name	1.81	1.58	0.00	6.00

Interviews revealed that in general the community agreed that women are in charge of reproductive tasks, and that men are in charge of productive tasks within the family structure. 81% of respondents reported that women undertook the tasks of cooking, cleaning and washing clothes, and 54% responded that childcare was solely women's responsibility. Thus, it was found that women do reproductive work commonly associated with the women in Bola de Oro. In terms of pesticides, 69% of respondents reported that men prepare the pesticides and 81% reported that men spray the pesticides. However, men were more apt to report that both men and women undertook productive labors and contributed to decision-making, as opposed to women who generally credited these jobs to men.

Both men and women believed that chemical pesticides were not good for their health. In fact, 96% of respondents reported that pesticides were bad for human health. However, 69% of respondents felt that pesticides were good for the health of the crop, which is one reason they use them. Respondents also reported that they use pesticides because they simplify pest management, produce higher yields and produce bigger and more colorful crops that are easier to sell in the market.

58% of respondents felt there were pesticide residues located in the crop produced and 60% of those respondents also felt that pesticide residues in food were bad for human health (see Figure 11). Of those that felt there was no residue in crops, 55% still felt that if there were residues in crops, they would be

bad for human health. In terms of toxic pesticides and their effects, though, community members were not able to name more than 1 or 2 harmful products at most. There was not much differentiation of which pesticides were more detrimental to human or environmental health than others, and regulations warning against the use of particular pesticides were not readily recalled.

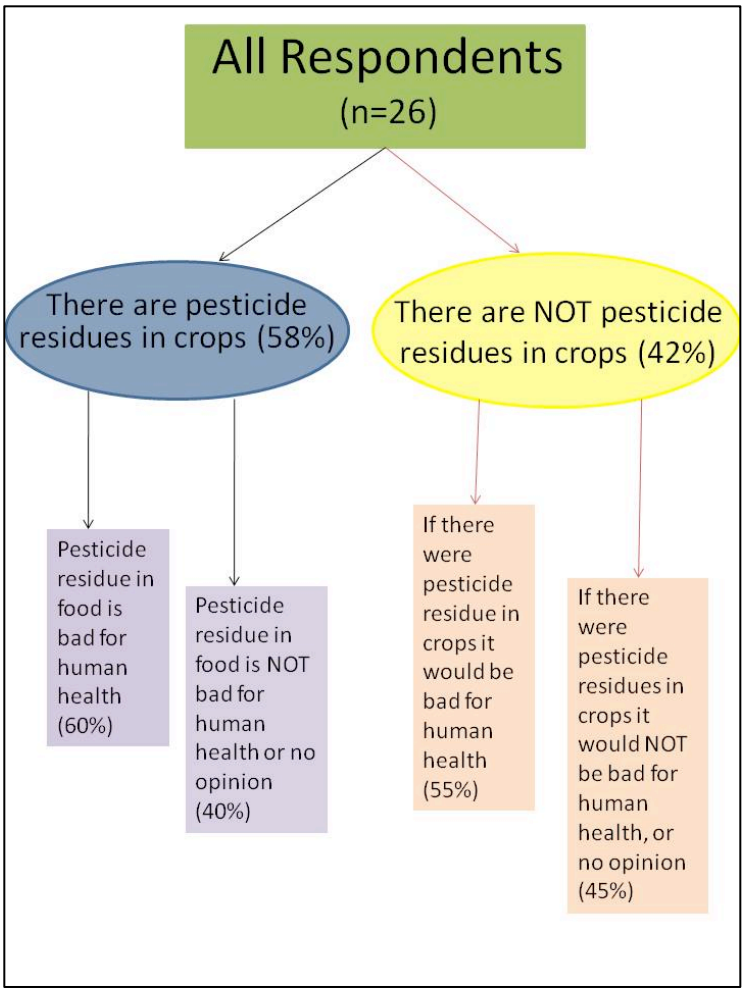


Figure 11: Beliefs about pesticide effects in crops

Farmers of Bola de Oro were not well informed on regulations relating to pesticides. Some farmers were aware that bottles with red and yellow labels are bad for health and should be used with caution, but no one could name a regulation about pesticides or give a detailed description about what the color of the labels meant other than yellow was worse than green, and red worse than yellow. Women knew the least about pesticide regulations, with 69% of women

survey respondents not being able to list any prohibited pesticides, as opposed to only 34% of men.

54% of respondents said that the men purchase pesticides but 39% say that men and women go into town and buy them together; this finding was supported by key informant interviews. According to the survey 100% of men respondents and 31% of women respondents indicated that they had their own personal pesticide sprayer; 54% of men responded they had access to a pesticide sprayer all of the time, versus 15% of women responding in the same manner.

Regarding finances, 38% of women responded that they were not in charge of the household budget, but 62% of women responded that they did have access to the money gained from the sale of their crops (see Table 2 for full data regarding how men and women answered the question that does what tasks).

Table 2: Activity Chart: Who does what?

Gender of Respondents	Men Respondents (n=13)				Women Respondents (n=13)			
Which gender undertakes the following task?	Women	Men	Both women and men	Do not undertake	Women	Men	Both women and men	Do not undertake
Productive Activities *Paid Activities*								
1. Clears the field	7.7	23.1	69.2	0.0	7.7	23.1	69.2	0.0
2. Applies the pesticide	0.0	84.6	7.7	7.7	0.0	76.9	15.4	7.7

Gender of Respondents	Men Respondents (n=13)				Women Respondents (n=13)			
Which gender undertakes the following task?	Women	Men	Both women and men	Do not undertake	Women	Men	Both women and men	Do not undertake
3. Make holes	0.0	23.1	76.9	0.0	7.7	30.8	61.5	0.0
4. Fertilize, seed and cover	7.7	7.7	76.9	7.7	7.7	15.4	76.9	0.0
5. Stake, tie up crops	0.0	23.1	76.9	0.0	7.7	0.0	92.3	0.0
6. Weeds	0.0	15.4	84.6	0.0	7.7	7.7	76.9	7.7
7. Irrigates	0.0	53.8	46.2	0.0	0.0	69.2	23.1	7.7
8. Controls plant illnesses	0.0	84.6	15.4	0.0	0.0	69.2	30.8	0.0
9. Harvest	0.0	15.4	84.6	0.0	0.0	0.0	100.0	0.0
10. Separate seeds	0.0	15.4	84.6	0.0	0.0	7.7	92.3	0.0
11. Classify, prepare for sale	0.0	15.4	84.6	0.0	0.0	7.7	92.3	0.0
Non-paid activities								
12. Decides on storage	0.0	61.5	30.8	7.7	15.4	15.4	69.2	0.0
13. Buys pesticides	7.7	61.5	30.8	0.0	7.7	46.2	46.2	0.0
14. Prepares pesticides	7.7	76.9	15.4	0.0	0.0	61.5	38.5	0.0
Reproductive Activities *Unpaid domestic work*								
15. Gathers water	30.8	7.7	38.5	23.1	38.5	0.0	38.5	23.1
16. Gathers firewood	7.7	38.5	46.2	7.7	23.1	7.7	61.5	7.7
17. Prepares food for the family	84.6	0.0	15.4	0.0	76.9	0.0	23.1	0.0

Gender of Respondents	Men Respondents (n=13)				Women Respondents (n=13)			
Which gender undertakes the following task?	Women	Men	Both women and men	Do not undertake	Women	Men	Both women and men	Do not undertake
18. Takes care of children	38.5	0.0	53.8	7.7	69.2	0.0	23.1	7.7
19. Takes care of the elderly	23.1	0.0	15.4	61.5	46.2	0.0	15.4	38.5
20. Cleans and arranges the house	76.9	7.7	15.4	0.0	84.6	0.0	15.4	0.0
21. Washes clothes	76.9	0.0	23.1	0.0	84.6	0.0	15.4	0.0
Community Activities *Unpaid community work*								
22. Participates in assemblies and meetings	0.0	53.8	46.2	0.0	30.8	38.5	30.8	0.0

4.2 Participant Observation

Observation contradicted some of the findings in the surveys, particularly in the presence of women in the field and caretaking. This is an important finding that supports the argument for triangulation of research methods, because without looking at the same questions from multiple angles congruencies and incongruence's in community responses would not come to light. Interviews indicated that only 54% of the population claimed women were primarily

responsible for childcare, but observation made it clear that on average women are much more responsible for childcare than men.

The one man, Ilbay, observed to be in charge of childcare was also in charge of all other reproductive household labors because his wife worked in another town. This both contradicted the perception that women were in charge of reproductive activities because a man was undertaking those tasks; but it also confirmed this stereotype due to the fact that he worked in such roles only because the mother was absent, and because his case was an exception, not common practice. Ilbay did have similar beliefs as women regarding pesticides, which supports the idea that knowledge is attached to tasks undertaken.

Observation proved that men and women both contribute to productive labors and manage pests, but men tend to make decisions about what pesticides to spray and how to mix them. This also contradicted survey results, which indicated that men dominated productive labors with women only serving a supporting role. Contradictions such as these proved the importance for data triangulation, as discussed later.

Another key finding from observation revealed children under school age or after school hours were often in the fields or playing alongside them with their parents if the mother is farming. When the woman was not farming, though, children often stay at home or in the location of the woman. This leads to the conclusion that since women are the primary caretakers of children, if they are in

the field and exposed to chemicals the children are being exposed to the same toxins as well.

Furthermore, farmers do not use protective measures when spraying pesticides, and did not seem to be concerned about being near crops being sprayed by pesticides or their children being in fields being sprayed because they made no mention of taking precautions or asking the children to stay at a distance.

4.3 Participatory Mapmaking

Giving participants a blank page on which to draw created a space for community members to express their realities without the constraints of responding to a question seeking a narrower range of answers. During mapping, three men and three women community members were asked to draw the path of the pesticide from its purchase to its final destination (see Figure 12

Figure 12: Community leader's map of the path of the pesticide

for an example, the path is marked by red arrows). From this prompt, most participants started by drawing the stores in a nearby town where they purchased pesticides, some drew dots or arrows on the road into their town; many drew their specific crops and showed where the pesticides are sprayed. Interestingly, all participants that chose to use colored markers to draw their maps picked the color red to mark the path of the pesticide. This could speak to its perception as toxic or dangerous, as the color red is often associated with warnings.

Maps mainly differed in the location that participants believe the path of the pesticide ended. Some stopped their line directly at the crop, some drew lines to the trees or water representing pesticide contamination through environmental factors and some drew lines returning from the crops to the kitchen table representing pesticides entering human bodies through pesticide presence in food. Two of six participants who drew maps of the path of the pesticide drew a line denoting the pesticide as returning to the house via food. Additionally, two of three women and one of three men who drew maps made note that the pesticide stayed in the soil and affected the environment through soil or water contamination. Two men who did not undertake reproductive tasks at home drew that the pesticides end in the field but did not note their effect on the soil, water or crop itself.

Out of the six maps drawn, the participants who were in charge of reproductive labors (generally women with the exception of one man), such as child caretaking and cooking, all made comments that alluded to them being

more cognizant of the negative health and environmental effects of pesticides and traced their affects to water, food and trees. For example, Figure 13 shows a woman's map with lines going to the water, crops and back to the house. The sentence she wrote reads *"Se quedan en la tierra y los cultivos. Se contamina el agua"* (They [the pesticides] stay in the earth and the crops.They contaminate the water). She then drew a line from the bottom of this sentence back to the house, indicating their full circle of travel.

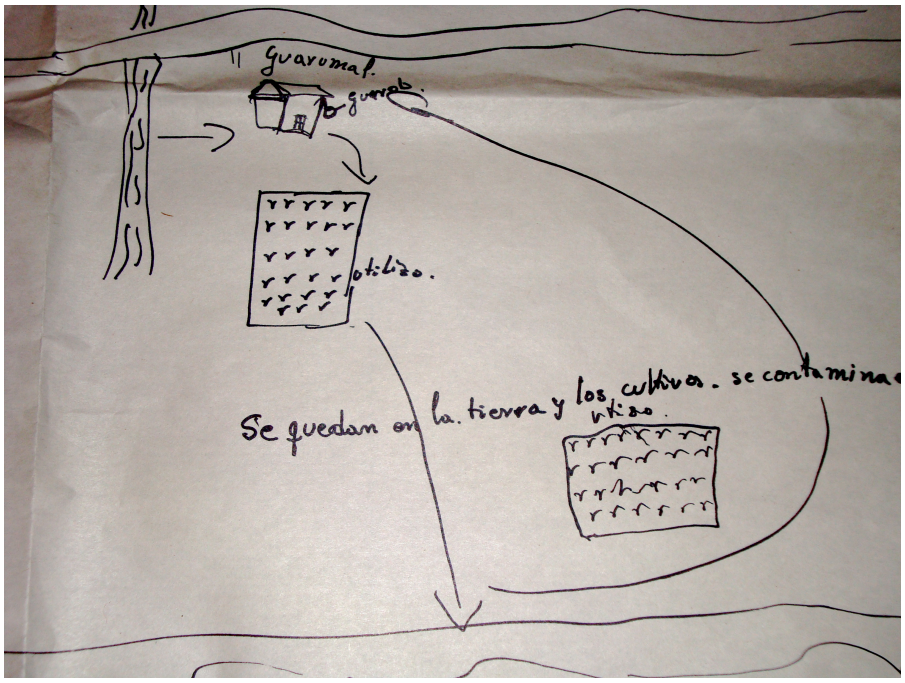


Figure 13: Woman's map showing the contamination of the field, crops and water from pesticides

In contrast, those people who did not participate as much in reproductive activities were more likely to report that chemical paths stopped wherever they were sprayed. They did not link them to surrounding areas, waterways or local foods. Generally women drew and spoke with insight into the multiple effects of chemical usage on crops; however, this was not simply a division between men and women but correlated with who carried out the reproductive tasks in the

household. It was found that the man in charge of reproductive tasks identified alternative locations that chemicals affected as well.

4.4 Facilitated group discussion

All 34 farmers who attended the discussion responded to the facilitators that they do not use all of the recommended pieces of protective gear when preparing or spraying pesticides when shown a photo of farmers spraying pesticides without wearing protective gear. They did mention that various organizations have told them that they should use protective gear such as gloves, masks, visors, boots and impermeable clothing. Community members said they do not use them because they are accustomed not to, because protective gear is hot and because the visor obscures vision.

As mentioned earlier, men were thought of as the farmers in the community whereas women were defined by their reproductive labors. This is reflected in the number of men that attended (24) the facilitated group discussion versus the amount of women (10) that attended. In fact, the man community leader told us that we had asked for farmers to attend and that is why the men were there, and women that had to stay home to take care of the children.

Farmers generated a list of the most important crops in the region for home consumption and market sale. Most expressed that they do not have enough land to grow these crops in separate places. Therefore they spray the same chemicals on crops for both home and market use. If they had the choice, however, they would opt to use fewer chemicals on the crops for home

consumption for health reasons. The active ingredients and global rankings according to different institutions of the pesticides listed by the community are shown in Table 3 by the crop on which they are used.

To assess the pesticides listed by the community I compiled rankings from IPCS, PAN and the EPA. The World Health Organization (WHO), in collaboration with the International Program on Chemical Safety (IPCS), has developed a WHO recommended classification of pesticides by hazard to provide a scientific basis for safe use of chemicals (WHO 2010). Its classification system ranks pesticide hazards based on oral and dermal exposure. The five levels include: U (Unlikely to present acute hazard) indicating a lethal dose (LD 50) of 5000 or higher; III (Slightly hazardous) indicating a LD 50 of over 2000 either dermal or oral; II (Moderately hazardous) indicating an oral LD 50 of 50-2000 and dermal 200-2000; Ib (Highly hazardous) indicating an oral LD 50 of 5-50 and dermal of 50-200; and Ia (Extremely hazardous) indicating an oral LD 50 <5 and dermal of <50 (IPCS 2010).

The United States Environmental Protection Agency (EPA) also classifies hazardous pesticides consistent with the Global Harmonized System (GHS) of classification. Their system incorporates physical hazards, such as flammability. It also incorporates health hazards, using the LD 50 values for dermal, oral and inhalation exposure and acute aquatic toxicity[7]. There are four levels ranging from practically non-toxic (IV) to most toxic (I).

[7] http://www.epa.gov/oppfead1/international/ghs/hazard-class.htm

The Pesticide Action Network (PAN) is a non-governmental organization (NGO) that provides an online database of pesticides toxicity gathered from the U.S. EPA, World Health Organization (WHO), National Toxicology Program (NTP), National Institutes of Health (NIH), International Agency for Research on Cancer (IARC), the European Union (EU) and the State of California. It provides information regarding chronic and acute human toxicity, ecotoxicity and regulatory information about pesticides active ingredients and transformative products[8]. PAN's assessment is closer to descriptions than rankings. To identify the set of pesticides that are most toxic to people, PAN classifies certain "bad actors". This label indicates that the pesticides is one or several of the following: a known or probable carcinogens that have the ability to cause cancer; neurotoxin cholinesterase inhibitors which affects the nervous system; known groundwater contaminant; reproductive and developmental toxins that cause birth defects or interfere with normal child development or pesticides with high acute toxicity which can be lethal at low doses.

Pesticides have different toxicities and can effect humans through a variety of methods, such as inhalation, dermal contact, or direct ingestion. These rankings do not indicate, however, the type of contact referenced. Therefore, that must be kept in mind when evaluating chemicals based on an overall level of toxicity. These classifications, however, do help conceptualize the hazard level of pesticides used in the Bola de Oro community. The products are listed by frequency of use as conveyed by the community during the group discussion.

[8] http://www.pesticideinfo.org/Docs/data.html

Table 3: Pesticides Used in Bola de Oro

Product	Active Ingredient	Crop	Global Toxicity Rankings		
			IPCS	EPA	PAN
Cipermetrina	Cypermethrin	Corn, beans, potatoes	Class II (moderately hazardous)	Class II (moderately toxic)	Bad actor; acute toxicity; possible carcinogen; suspected endocrine disrupter
Lorsban	Chlorpyrifos	Corn, beans, potatoes	Class II (moderately hazardous)	Class II (moderately toxic)	Bad actor; moderate acute toxicity; cholinesterase inhibitor; suspected endocrine disruptor
Mancozeb	Mancozeb	Beans, potatoes	U (unlikely to be hazardous)	Class IV (practically nontoxic)	Bad actor; carcinogen; potential ground water contaminant; developmental or reproductive toxin; suspected endocrine disruptor

Product	Active Ingredient	Crop	Global Toxicity Rankings		
			WHO	EPA	PAN
Captan	Captan	Beans, potatoes	U (unlikely to be hazardous)	Class IV (practically nontoxic)	Bad actor; acute toxicity; carcinogen
Fitoraz	Propineb + Cymoxanil	Beans, potatoes	Class III (slightly hazardous)	Class III (slightly toxic)	Bad actor; developmental or reproductive toxin
Acrobat	Dimethomorph	Potatoes	U (unlikely to be hazardous)	Class III (slightly toxic)	Slight acute toxicity; potential ground water contaminant
Benomil	Benomyl	Beans	U (unlikely to be hazardous)	Class IV (practically nontoxic)	Bad actor; slight acute toxicity; possible carcinogen; developmental or reproductive toxin; suspected endocrine disruptor

Product	Active Ingredient	Crop	Global Toxicity Rankings		
			WHO	EPA	PAN
Malathion	Malathion	Corn	Class III (slightly hazardous)	Class III (slightly toxic)	Bad actor; moderate acute toxicity; possible carcinogen; cholinesterase inhibitor; potential ground water contaminant; suspected endocrine disruptor

4.4.1 Photo Discussion

A slideshow of photos pertaining to pesticide use was shown at the facilitated group discussion and the group was asked to react to and discuss the photos presented. In regards to a photo that showed farmers eating in the field where pesticides were being sprayed, participants said that eating in the field is common practice (as seen in Figure 14). They also mentioned that they do not use precautions when eating

Figure 14: Workers eating lunch in bean field

meals in a field sprayed with Glyphosate, but they do take precaution with other chemicals because they are more hazardous. However, they were not specific with what precautions they actually take more than wearing tall boots, which are common practice to protect against snakes and general irritation from walking in fields with tall brush. Participants identified in conversation that health issues from pesticide exposure include headaches, itchy eyes, itchy skin, vomiting and diarrhea. All participants felt that these symptoms came as a result from applying Carbofuran, Cypermethrin and Captan. They reported that Captan particularly caused symptoms of diarrhea and vomiting.

Another photo showed an IPM technique of using yellow plastic sticky traps to reduce the population of insects in crops; particularly beans (see Figure 15 for an example). Farmers revealed that 14.7% of attendees said they had learned this IPM method but did not use it on their crops. They said that they knew that the traps were meant to control white worm, but there was not a problem with white worm in the potato

Figure 15: Example of an IPM method of plastic yellow sticky traps. Used with permission of IPM CRSP, 2011.

crop in their sites.

Participants expressed interest in learning other IPM methods, like the traps shown in another photo, and felt they would use that technology more because moths were a problem when storing potatoes. 100% of participants responded that they lost potato crop due to this problem for the last three years and did not know how to control it. Participants also mentioned that the presences of insects that eat potato leaves are not as common in their area as insects eat the leaves of beans and tomato. In order to combat these pests farmers apply Cipermetrina and Lorsban.

A final photo showed the presence of late blight (*phytophthora infestans)* in potatoes resulting from humid conditions. Farmers stated that they mainly use Ridomil to combat this problem, along with Mancozeb, Fitoraz, Curzate, Acrobat and Volcan.

In regards to beans, farmers signaled that the presence of insects that perforate the leaves in both summer and winter. To combat this problem they use Cipermetrina.

Figure16: Farmer picking blackberries

Only 5 of the 34 farmers grow blackberry, four of whom signal that they produce blackberry for market sale (one of which is shown in Figure 16). They have two main problems, one with white worm and another with mold, but do not treat either illness because they do not know how. The group expressed interest in introducing the naranjilla plant to more fields.

4.5 Key Informant Interviews

From the facilitated group discussion, household interviews and observation, agrochemical stores and health facilities were selected as sites to interview key informants. They were able to add a layer of depth to the statements made by community members by documenting amounts of pesticides sold and amounts of persons seeking medical help from pesticide poisoning.

4.3.1 Pesticide stores

I carried out interviews with owners or employees in each of the three pesticide stores that sold products from one of the large pesticide manufacturers in Ecuador. There were four pesticide shops in the town of Chillanes, where farmers

Figure 17: Inside of Quimagro, an agricultural store in Chillanes

in Bola de Oro shop (one pictured in Figure 17). One store refused to cooperate with the interviewers, so our findings come from the owner or highest-ranking employee available at the other three locations.

On the whole, pesticide sellers did not hold all desired qualifications to make recommendations and sell pesticides. Only one of three stores had an employee with a university degree in agronomy. One had a technical degree in agronomy, and one had no degree past high school. Two of the three sellers attended trainings offered by agrochemical companies once a year, but none actually grew their own crops for home consumption or market sale. None of the pesticide stores sold all of the protective gear recommended by INIAP staff when spraying pesticides.

4.3.2 Healthcare providers

At the three health centers interviewed providers reported an increase in patients suffering from pesticide poisoning in recent years both in Bola de Oro and in the nearby town of Chillanes, due to pesticide introduction into the community six-years prior and farmers not protecting themselves properly. Both public and private practitioners expressed belief that many more farmers suffer from pesticide poisoning but do not seek medical attention either because they are not aware of the source of their poisoning or they do not have the means to visit a doctor. Thus, they speculate that a much higher number of people than officially documented suffer from short and long term pesticide poisoning.

Private health care providers stated that public medical centers and institutions do not disseminate enough educational materials for farmers to become cognizant of the negative health effects of pesticides and proper methods of protection. Public health care providers blamed lack of government funds and the difficulty in reaching farmers in rural localities for insufficient education on pesticide use and protection on the part of the government. IPM CRSP and INIAP could play a vital role in changing these statistics through pesticide safety trainings and explaining the health advantages of using IPM methods over pesticides.

Each of the methodologies described above revealed a piece of agricultural and pest management practices in Bola de Oro and helped create a more holistic picture of the gendered roles in the community as well as pesticide use. They provide a better understanding of details that may prove important for IPM adoption for both men and women of the region.

Discussion

5.1 Decision-making

From my field research I found that in terms of pesticide use, the men decide 77% of the time what illness or pest plants are suffering from and how it should be addressed. In this location, the man generally decides where to store the chemicals and is in charge of preparing the chemicals and spraying the field. However, because women are in charge of arranging and cleaning the house, they have some input on where to store chemicals. Pesticides are often stored on a cross beam on the outer wall of the house and sometimes in a multi-purpose room within the house. Chemical sprayers are stored this way as well. One woman created little bags to hang the pesticides in and attached them to the laundry line (seen in Figure 18). Two families kept pesticides in the same space as small animals, like chicken, guinea pig or rabbits (as seen in Figure 19). Two families kept their pesticides in the house, but on the opposite side of the house from the kitchen. Due to women's influence in arranging the household, if they are trained in pesticide safety and the dangers of keeping pesticides in the house or kitchen,

Figure 18: Woman showing how she hangs pesticides from her laundry line

they may be able to change the storage location of chemicals which could prove important in combating long-term, consistant exposure to fumes and contamination via skin contact.

All of the three pesticide stores interviewed stated that they generally work with men when selling pesticides, but occasionally women accompany them and ask questions. This indicates that women may not be as informed about pesticides as men, but are still involved in the pest management process.

Figure 19: Women showing that they store pesticides in a crate in the chicken coop

5.2 Women's Contributions and Roles

During the survey 81% of respondents answered that men sprayed the pesticides, but upon further observation it became clear that women engage in this activity as well. Some women, like Transito, a married mother of two grown children, even have their own sprayer. She showed me her and her husband's individual sprayers during observation. Transito, however, indicated in the interview that her husband was in charge of pest management and sprayed

pesticides. Furthermore, in the survey men were more likely to report that men and women undertook productive labors and decision-making jointly. The lack of credit women gave themselves for productive work coincides with the perception in the community that they are not farmers, but rather supporters of their husband's farming activities.

Women not only devalue their contribution to farm work, but men are blind to women's work as well. This sentiment was reflected by the participation of farmers in the facilitated group discussion. INIAP and I made it clear to the community leaders and coordinators that women's participation was imperative for the group discussion to provide an accurate assessment of both men and women's participation in agriculture. However, only 10 women attended the discussion in comparison to 24 men. When asked why more women did not attend, one farmer responded, "If they were here then who would be taking care of the children?" This statement displays women's key role in reproductive activities, and signals expected gender roles applying to women and domestic tasks. It also implies that women are not viewed as farmers and thus do not need to attend training sessions.

5.3 Reproductive vs. Productive Labor

It was found that reproductive labors, generally undertaken by women, give them a different knowledge of pesticides and their effects than men's. With few exceptions, women reported and were observed to be in charge of reproductive labors such as cooking, cleaning, washing clothes and caretaking of

children. I observed that all family members work in the field (as depicted in Figure 20). It was also clear that if the children are not old enough to help, they follow their mother or primary caretaker during their tasks for the day. Figure 21 shows two children playing alongside workers preparing pesticides to be sprayed while their mother ties beanstalks. Thus, as the mother works in the field while crops are being sprayed, even if she is not spraying the chemicals, the children are exposed to the chemical being sprayed as well as the mother.

Figure 20: Family tying bean stalks while pesticides are being sprayed

During unstructured interviews and observation it was also noted that women were responsible for taking care of the sick and small animals. In these roles women reported noticing some crop, environmental and human health changed that they attributed to the use of chemicals because their seed stocks and plots have not changed so they do not serve as variables. Men did not report

on these changes. As well, all four women who participated in household observation mentioned that the taste and texture of their food has changed since the introduction of pesticides in their community six years earlier. One woman said, *"las patatas han perdido su sabor--son templadas ahora a causa de los productos químicos. Las patatas orgánicas son más ricas"* (the potatoes have lost their flavor—they are bland now because of the chemicals. The organic potatoes taste better). Some women who had their own herb garden close to the house, like Norma and her mother, stressed that they did not use chemicals on their food for household consumption if at all possible because it tasted better and was better for people to eat.

Figure 21: Children playing in field while pesticides are being prepared

However, community members also note that they use chemicals nonetheless because they cannot sell organic potatoes, tomatoes and other crops in the local market because they have imperfections and are not as big or as colorful as those grown with chemicals. These market factors should be taken into account by IPM CRSP because they may deter use of IPM. Factors such as

these also reinforce the importance of continuing the interdisciplinary research IPM CRSP incorporates into its sites, because in this situation the social context of what crops will sell well in the market may outweigh the actual scientific evidence that IPM is more cost-effective or better for health.

While women were the ones primarily responsible for reproductive tasks, there was one case where a man was in charge of reproductive activities because his wife migrated to a nearby town to work as a nurse. Ilbay was aware of negative health effects of pesticides because of his wife's knowledge from her job, and his education where he earned a technical degree in

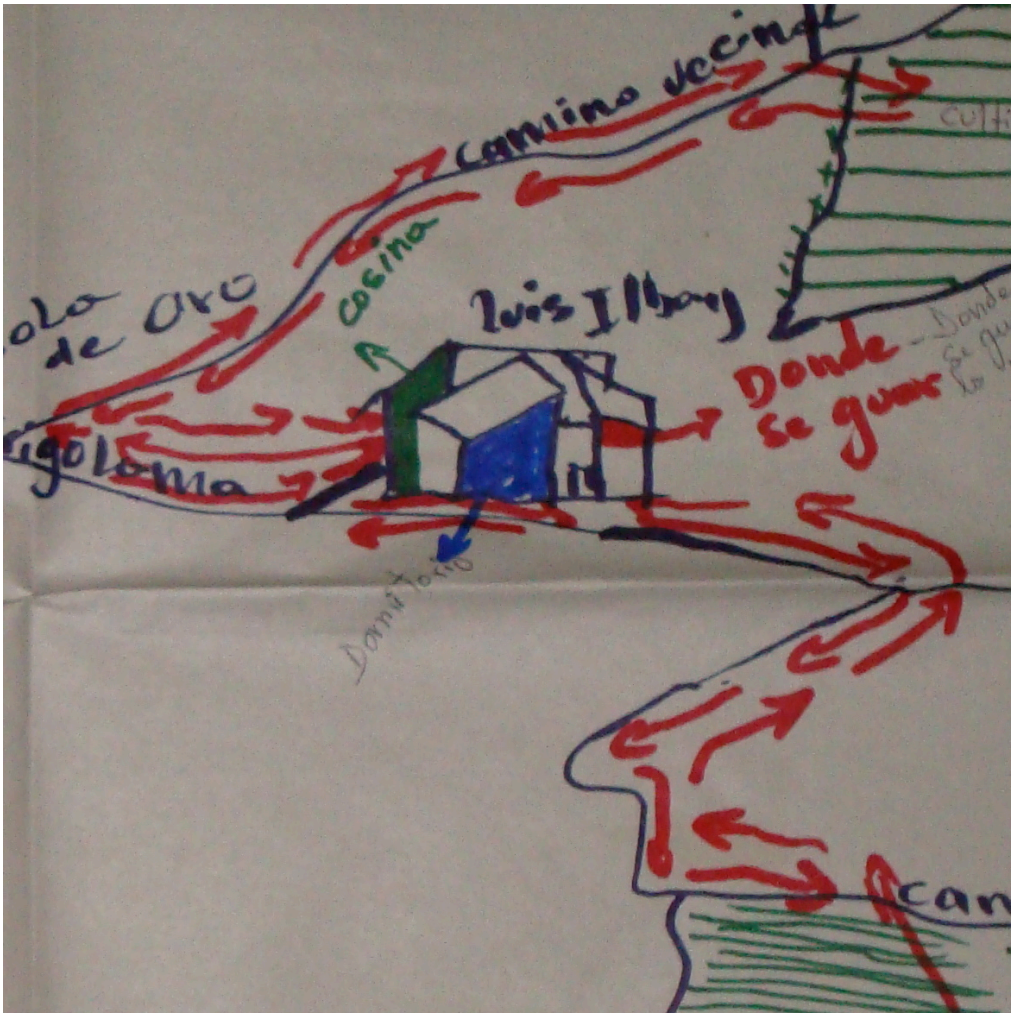


Figure 22: Close up of Ilbay's map of the path of the pesticide

agronomy. A close-up of the map he drew following the path of the pesticide (Figure 22) shows the pesticide in red marker coming to their home, out to the field and back to the kitchen through the crops they produce and eat. He, like the women observed, brought his children to the field while he worked and expressed learning more about human health complications from pesticides from his role as caretaker and family cook. Ilbay indicated that it was difficult for him sometimes to balance work in the field and take care of the children simultaneously. He also mentioned that men in the community playfully joke with him about doing women's work, which shows he is the exception and that the community generally abides by traditional gender roles. However, despite these difficulties he recognized that it was important for his wife to pursue nursing because he supports her aspirations, and her job brought in more income than farming alone. This income has contributed to their family being able to afford two beds, a television and a toilet. The vast majority of other families in the community do not have such amenities.

Migration of a spouse for work was found in only one other family in the community. Margarita's husband works in construction in Ecuador's capital, Quito, while crops grow; he returns to Bola de Oro for planting and harvest time. When he is not home Margarita is in charge of maintaining the crops and taking care of their five daughters and newborn son. Men's migration, according to Bola de Oro community members, is more common in indigenous villages but is becoming more frequent in mestizo communities as well. They indicate that a

spouse will migrate to obtain better wages to support the family as it becomes harder to sell crops in the market; competition is stiffer now that people can now grow more using chemical inputs. If this trend continues, women may become even more involved in farming and decision-making. Such new responsibilities may make women's role in development and research programs all the more critical.

5.4 Pesticide Safety

Men and women in Bola de Oro are not well educated on how to protect themselves from pesticide poisoning and the effects of such intoxication, which is a problem because some chemicals commonly used on multiple crops are toxic to varying degrees. Carbofuran, for example, is used as an all-purpose pesticide of sorts. This particular pesticide is ranked as highly toxic by WHO, restricted in Northern countries due to its ease of absorption and toxicity level and has been associated with health problems such as dermal rashes, cancers and neurological disorders (Dale 2003). For an insecticide popularly used on field crops, Carbofuran is one of the most acutely toxic to humans. In 2009, the U.S. EPA revoked a permission to have small residues of Carbofuran in food and would not allow its re-registration because of the adverse effects on humans, the environment and it not meeting safety standards. It is also extremely hazardous to the environment and wildlife. The granular form of Carbofuran was banned in 1994 due over a million birds dying from ingesting the insecticide because it looked like birdseed. Furthermore, Furadan, another name for Carbofuran,

ingestion was linked to the death of 75 lions on the Masai Mara Reserve in Kenya in 2008 (Environmental News Service 2009).

Additionally, Chlorpyrifos, commonly referred to by its trade name Lorsban in Bola de Oro, was identified in the moderately toxic class II by the EPA. It is associated with asthma, delays in mental and motor development of children exposed in the womb. Chlorpyrifos is also extremely toxic to amphibians and fish (US Geological Survey 2007). Chlorpyrifos and Malathion have been proven to increase the odds of children developing attention deficit hyperactivity disorder (ADHD) up to 55%-72% and can affect a human's system simply from inhalation of fumes in the air while living in an area where it is sprayed (Brooks 2010). Malathion can result in malaoxon when metabolized in the human body, which is much more toxic than malathion itself. It is suggested that chronic exposure to low levels of malathion can impair memory and cause cancer, but such findings have not been explicitly proven.

As found in the survey, on average men could name 2.1 and women could name 1.5 pieces out of 6 pieces of protective gear that INIAP technicians indicated should be used when spraying pesticides (ventilated mask, tall waterproof boots, impermeable clothing, waterproof hat, goggles, long waterproof gloves). Tall waterproof boots were the most common piece of protective clothing named, but respondents indicated that such footwear was the norm when spraying pesticides and when not spraying pesticides, as they are commonly worn in the field while working to protect against irritation from tall grass, weeds

and crops. This, therefore, did not indicate that farmers were wearing this equipment because they were concerned with pesticide safety, but because it was habit.

Six women and three men could not name any form of protective gear that should be used when spraying pesticides. Only one person named all six recommended articles of protection. None of the pesticide stores, however, interviewed in the nearby town where community members of Bola de Oro purchase pesticides sold the six forms of protective gear recommended. Interestingly enough, one store in Chillanes displayed a poster (seen in Figure 23) of a person spraying pesticides. The text encourages patrons to use a protective kit of goggles, gloves and mask when spraying chemicals that they could get for free

Figure 23: Poster warning patrons to use protective equipment when spraying chemicals

Figure 24: Local man with his spray pack and typical work clothing

when they purchase a certain product. However, the store only carried gloves and goggles, and said they did not actually offer that deal. Furthermore, the figure on the poster is not wearing his mask on his face, is wearing short sleeves instead of long and has his pants tucked into his boots. All of these actions would not actually help a person be protected because their skin is exposed, the mask cannot help if it is worn on the chest rather than over the mouth and pants should be worn outside of boots so that if they are soaked with chemicals they can drain out, not simply accumulate in the boot. Due to the difficulty in obtaining all of the appropriate forms of protection, their cost and perhaps inaccurate methods of protection being depicted, farmers in Bola de Oro often go without protective measures when spraying.

Even when participants could name articles of protection, gloves and masks being named most frequently, there was sometimes a discrepancy

between the material of the protective equipment used and the material that is actually meant to protect. Figure 24 shows a local man walking home from spraying his crops wearing his spray pack, boots, long clothing and a hat. He said that this was protective clothing, but his hat and clothes were cotton, not waterproof or water resistant as suggested by INIAP.

This indicates that even when protective clothing is used it may not be of the intended material for protection. For example, several respondents answered that masks should be worn when spraying pesticides, but would describe thin surgical masks rather than the appropriate ventilated mask. Farmers were made aware of some protection procedures by INIAP, but felt such measures are too cumbersome or not important enough to protect them. Some studies confirm these findings and attribute this perception to Latin machismo, noting that pesticide-related illness is associated with weakness that is not desirable

Figure 25: Man mixing pesticides without protective clothing, other than tall boots

in a man (Sherwood, Crissman et al. 2002; Dale 2003).

No matter the amount of gear participants knew of, all of the participants in the facilitated group discussion responded that they did not use protective measures other than boots at any point when interacting with pesticides because it was too hot, suffocating and they could not see well when using a visor. Most of all, though, the farmers stated it was habit in the community not to use protective gear (as seen in Figure 25 showing a community member mixing pesticides before spraying without gloves, hat, mask, eye protection, long sleeves or waterproof clothing). This indicates that people have not been using protective gear when spraying pesticides over a prolonged period of time. Habitual exposure may lead to negative human and environmental effects that are not immediately noticeable by farmers.

The nearest manual about pesticides, intoxication effects and safety is located in the hospital in Chillanes, a 30-minute drive by truck from Bola de Oro. The hospital reported caring for at least 10 victims of pesticide intoxication over the past year (2009-2010), and a private doctor also reported seeing 10 different patients with pesticide intoxication. Both the private and public facility noted that they believe a large number of people in the community suffer from pesticide intoxication but recuperate on their own rather than visit the doctor due to lack of money, transportation or the belief that their symptoms will disappear in a few days or weeks.

In terms of pesticide exposure, community members generally understood that direct ingestion is bad, but negative health effects deriving from fume inhalation and absorption through the skin are not well understood or seen as a cause for concern (Figure 26 shows Lorena, age 4, walking behind a hired worker while he sprays pesticides on their field; her mother is out of the frame but is nearby carrying wood to build a fence). For example, several respondents answered that they keep pesticides where children cannot reach or drink them because that would be bad for their health; however, they did not mention any concerns for children playing in the field while pesticides are sprayed. Angelica responded that they keep pesticides *"en un rincón donde no alcancen los niños y lejos de los alimentos y preferible fuera de la casa"* (in a corner where the children cannot reach and far from the food and preferably outside the house). Even those who noted their concern for the

Figure 26: Child playing in the field while her Mother carries wood and a hired worker sprays pesticides

detrimental repercussions of pesticide use were primarily concerned with direct ingestion of pesticides by children, but no mention was made of the effects of absorbing pesticides through skin contact with sprayed plants or the inhalation of fumes. Furthermore, their practices had not significantly changed on account of this belief.

Community members also did not express explicit concerns about exposure to the family through the household. Parguay told me that his wife washes the clothes he wears when spraying pesticides together with the rest of the families clothes. The same washing basin is used to wash hands, arms and faces after spraying pesticides, working or to clean up in general. Figure 27 shows a typical wash basin near Margarita's house with all of the family's clothes mixed together in a bucket waiting to be washed, and all hung side by side. Pesticides hang in a bag off of the side of the house, show in the left

Figure 27: Washing area near a house

foreground. Using the same water and surface for multiple purposes allows for pesticide residues to be transferred onto clothing or skin of other family members via the household.

In terms of other matters regarding pesticides, respondents were not concerned with the leftover containers of pesticides, with 62% burning the containers and 35% leaving them in the field wherever the container was emptied. During one day of observation a woman picked up an empty pesticide container that was lying near the edge of her field by the river, ran some water through it and then used it to drink directly from the river. She also used it to give water to her baby that she carried on her back as she worked. This was the same woman who indicated in her map that pesticides pass by their water supply area, contaminate the crop, the soil and then the water (close-up of her map shown in Figure 29, the path of the pesticide marked in red). Actions

Figure 28: Empty pesticide container found lying in a farmer's field near the stream

such as these prove that even though people may be aware of the negative health or environmental effects of pesticides, they do not always take measures to protect themselves due to necessity, habit or other reasons.

Furthermore, the amount of saturation of pesticides into the landscape was not of concern. During the survey the most frequent responses to the question "what do you do with leftover pesticides?" were *"repiten hasta que se acabe"* (repeat spraying until they are finished) or *"bota en el terreno"* (dump them on the ground). Some community members did indicate that the water, land and trees were being contaminated with pesticides, but did not make a direct correlation on how exactly this contamination occurred.

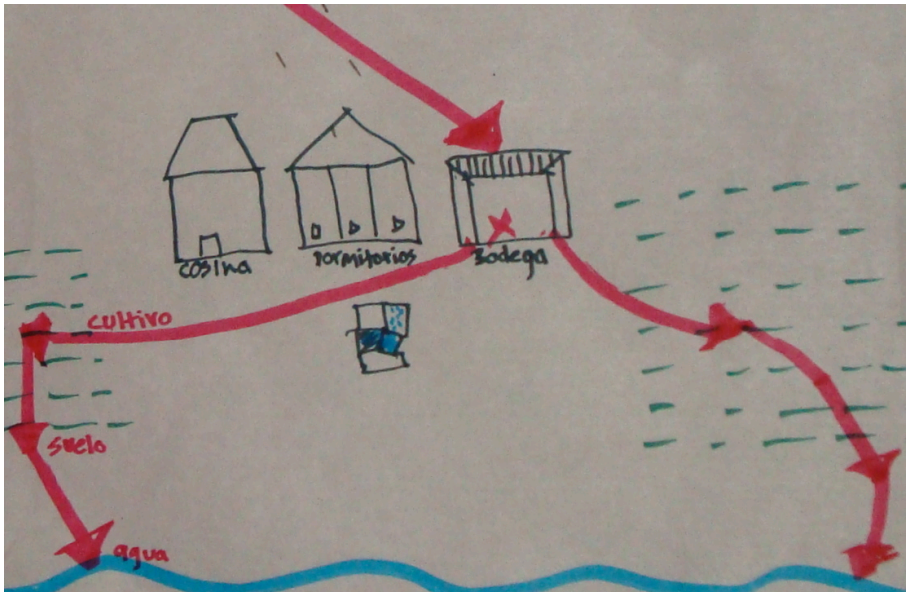


Figure 29: Woman's map showing pesticides contaminating the soil and water

5.5 Pesticides and Health

The majority of respondents noted that chemicals were bad for health, but rarely reported using protection or getting sick from the chemicals. Health

concerns arising from pesticide use noted by the community during the facilitated group discussion included *calambres* (cramps)*, mareos* (diarrhea), *nauseas* (nausea), *intoxicaciones* (intoxication), *vomitos* (vomiting), *duele la cabeza* (headaches) and cancer. Women were more aware of the negative health effects on children and loss of taste effects due to pesticide usage but men were more aware of the actual symptoms of intoxication as many of them reported feeling the effects after spraying chemicals. Neither gender mentioned the health effects of pesticides from long-term, small-dose exposure, and focused almost exclusively on the act of spraying or directly ingesting the pesticide as negative for human health. Thus it would seem that either pesticides have not been used in the community for a long enough period of time for members to recognize the long-term effects of pesticides, they are not educated on the long-term effects and/or they are more concerned with the short term because they do not think in a long-term perspective.

However, even with such human health concerns 69% of respondents felt that pesticides were good for the health of the crop. Some perceived advantages to using pesticides included better production, easy to use, easy to acquire, cheap cost and effective control of pests and illnesses. These economic and ease factors outweighed the human health problems associated with pesticides.

Teresa, a 63 year old grandmother of three, and Gloria both noted in our conversations that birth complications have risen in the last six years. One of Margarita's daughters is deaf, and she mentioned that no one in her family has

ever been deaf. Gloria, like many others in the community, suspects it may be because she sprayed the family field with pesticides during pregnancy but is not sure. Teresa, however, staunchly believes that her generation is stronger and more resilient to illness because they did not use chemicals in the field or contaminate the food they ate. In response to a photo I showed her of a baby with sores on his skin (Figure 30). She told me that *"pueden ser por efectos del agua contaminada con químicos"* (it could be from chemically contaminated water). She continued with *"somos mas fuertes, los viejos, porque no usamos los químicos en los cultivos… Los químicos son bastante malignos para la salud y para los que fumigan"* (we are stronger, the old people, because we did not use chemicals on our crops… Chemicals are quite evil for health and for those who spray).

6. Reflection and Lessons

As a suburban, middle-class, white, Western woman working with mestizo women and men in rural, economically impoverished, South America, there is clearly a gap between observer and observed. My research and subsequent writing is tinted by my personal worldview and the education I received to prepare me for this fieldwork. This paper does not claim to portray a full documentary of the entire community of Bola de Oro in these few pages. My knowledge and view of the world is just as situated in my identity and daily tasks as the farmers I worked with. However, it is my goal to provide a snapshot of rural life in Bola de Oro, which aids in proving the necessity of locally-focused, case-based research when working in development projects which aim to aid impoverished communities in addressing their needs and priorities, not what we, as Western

Figure 30: Morning light on the surrounding mountains

academics, determine is best for them.

As my first time doing field research, using my second language and traveling abroad by myself for the first time, I learned a lot personally and academically. Every day I woke up I was amazed at the beauty of my surroundings (see Figure 30), calmed by the sound of nature only interrupted two or three times daily by automotive buzz that is so common where I come from and warmed by the welcoming embrace extended from strangers with whom I share little in common. I've always enjoyed traveling, but to begin to become a part of a community, even in the smallest way for a short time, is a personal experience of growth, cultural awareness and humanity that has forever changed me.

My time researching and living in Ecuador was not all roses and butterflies, though. I was extremely uncomfortable in the beginning. I doubted my Spanish, I felt like I was doing everything wrong and not collecting important findings, I was confused and I felt like I had no idea what I was doing and no idea how anyone ever thought I could do this. "I'm just not a go-with-the-flow person and the community members do not plan. Or they do plan, but then they forget about the plan and are not there when I show up for observation!" I would cry to my fiancé during short and intermittent phone conversations.

During my first observation I broke down in tears because I did not have the words to explain any differently what I wanted to learn from them and even though they agreed to host me they did not understand what I wanted and told

me I should go somewhere else. There was no malice from the family, they just did not understand what I wanted, and I did not understand what they did not understand.

Also, I got sick, very sick. I was sweating, exhausted and repeatedly getting ill without a bathroom or doctor for miles. I just wanted to go sleep in a comfortable, warm bed but I did not have cell phone service or a way to communicate to INIAP that I needed to be picked up. When we returned to Guaranda the last thing I wanted to do was go to the hospital because I heard horror stories about "Third World" hospitals before I left the United States. The INIAP technicians I worked with forced me (luckily) to go to the hospital. I cried and heard the doctor say to a nurse that could not have even been my age, "Oh great, a crying *gringa*, guess you will have to practice your English" in a sullen tone, not knowing I understood every word he said.

What I learned from these experiences, though, was that I had to believe in myself and others more. Yes, sometimes I would show up for a planned observation and the person would not be there, but sure enough if I just walked down the road a mile or two there was a neighbor who would love my help. I just needed to be a bit more

Figure 31: The beautiful patchwork quilt of mountains. Used with permission of Andrew Puhl, 2011.

flexible and reflexive in the moment. Sure, the first family I met with had trouble understanding my Spanish, but that was because they primarily spoke Quechua, an indigenous language, so we both spoke Spanish with different accents and broken sentences at times. I needed to not take their confusion personally and doubt myself, but rather understand that they felt very similar to how I felt.

While I was sick in the community, in the middle of feeling miserable, I also began to feel like a family member as Flor took care of me, made me herbal tea and encouraged me to rest. I was fortunate to experience what survey results indicated, that taking care of the ill is a woman's job. And of course it is scary to be in a hospital at all, much less in a foreign country, but I was not helping myself by crying and not speaking Spanish. Once the doctor knew I spoke Spanish he directed his questions to me in a kind and respectful manner, he was just trying to do his job and figure out why I was ill. Once I stopped being so scared and unsure of myself, I realized that acquaintances and helpful hands were all around me and that I should

Figure 32: Feeling like part of the family

probably be more scared walking alone on some streets in my own country than here.

A lot of these lessons are personal, but I learned a great deal about field work and my capacity as a researcher as well. In the beginning I carried many of my personal trepidations into my research. I shied away from speaking, I felt like an intrusion and I felt like I was not finding anything significant. Like personal calls to my fiancé, I often had conversations over Skype with two of my committee members, Dr. Christie and Dr. Hall, and expressed my failure as a researcher. I believe I asked Dr. Christie, “I have no idea how you thought I could do this.” If I did not say it, I know I thought it. But every time we spoke their encouragement lifted me up. I realized that maybe I was not finding groundbreaking, never before documented dynamics about gender and pest management, but that I did not need to. The information I did uncover was serving a purpose, to learn about and inform the IPM CRSP about gender dynamics of pest management in the community.

No one had asked me to find a hidden gem that would forever change development and research programs in their attitudes toward women farmers. Dr. Christie and Dr. Hall helped me to realize that my findings were important and different. I had conducted quality research; I gathered a large amount of data. Through the writing process of this thesis I realized just how much data I had collected, and how interesting it was. It helped me to realize that it takes time, and that each step of the research process is important. No one can know it all

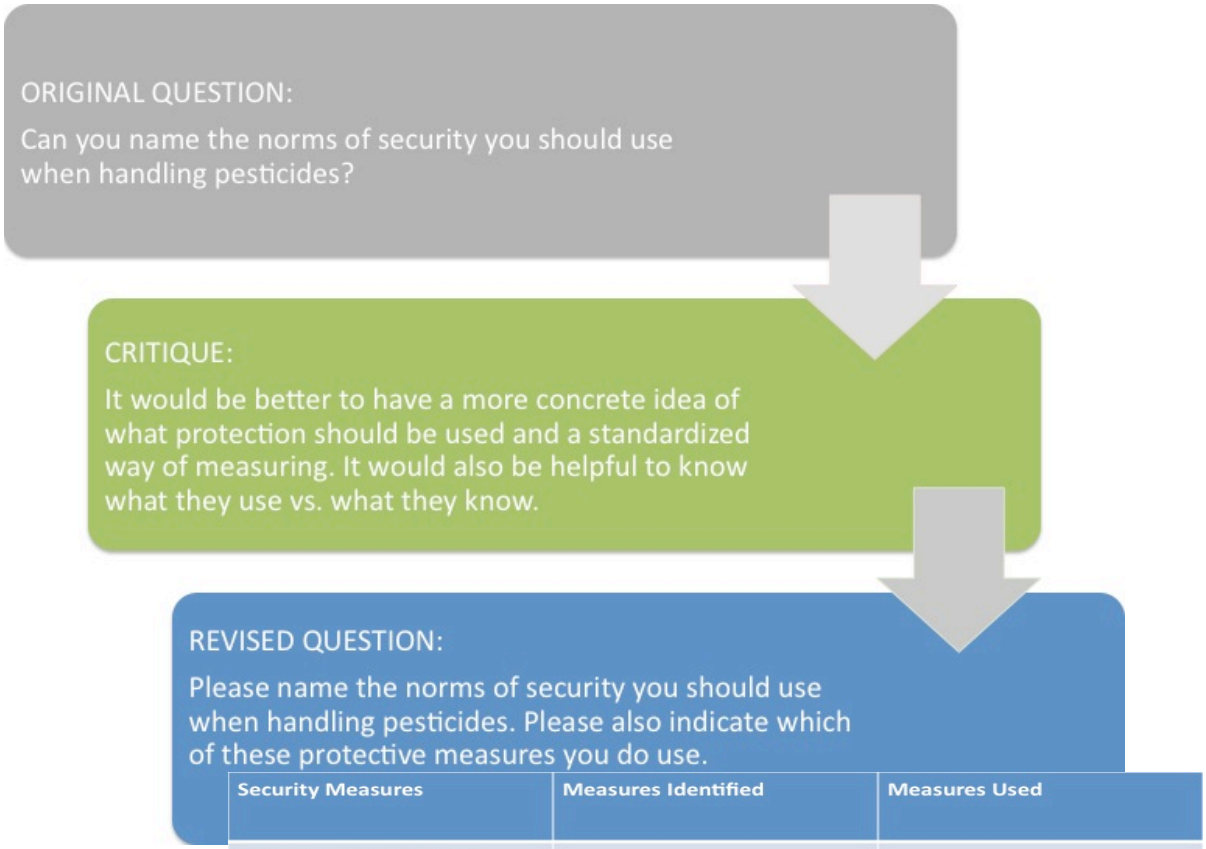
as soon as they conduct field work, there is an extreme amount of contextualization and analysis that comes afterward and it is there that findings are revealed.

Of course, though, there is always room for improvement. There are certain aspects of my research that I would have enhanced. For example, it would have been advantageous to develop a clearer understanding of the more scientific elements of IPM and pesticides before embarking on my field research. Learning what IPM CRSP had used in similar regions, and what they were planning on using in Bola de Oro would have added more context to framing my research focus so that my research could have been most valuable to the IPM CRSP. Improvements to my methodologies may have yielded more layered and deeper results as well.

I could have improved the survey by testing it in the community for the first few days to find out what questions were appropriate and which ones needed to be changed (Figure 33 provides an example of how I thought through my survey and a proposed revision; to see a full version of my edited survey with reflections see Appendix II). Some of the questions I would dismiss, and some of the questions, like the activity chart, I would keep. Also, it would have been helpful to ask some more direct questions such as “do you read the label on the pesticide container fully before using?”, “do you combine dilute chemicals and if so, what is your method?” and “do you believe that men or women have a more acute sense of pesticide impact on human and environmental health?”. It was also interesting

that I originally sought to use the activity chart embedded in the survey to pertain to the practices and participation dimension, but in the end it was more useful for beliefs and perceptions because in reality parts of it conflicted findings from participant observation.

Figure 33: An example of a revised question from my survey



Security Measures	Measures Identified	Measures Used
Long, waterproof gloves		
Long, waterproof clothing		
Waterproof hat		
Tall, waterproof boots		
Ventilated mask		
Goggles, eye protection		

A more concrete idea of how to analyze the data would have been prudent before implementing the survey, including identifying variables other than gender. A greater number of surveys would have been useful for statistical analysis. Furthermore, a larger number of questions resulting in numerical indicators would have allowed me to perform different types of analysis. In a qualitative survey, it is helpful to have quantitative statistics to support observed or intangible findings.

Participant observation yielded the most data and, in my opinion, the most accurate portrayal of daily life in Bola de Oro. I would only add more of those days to the fieldwork with different households. It would have been helpful to participate in a more intensive language immersion, focusing on technical agricultural terms, and perhaps planned more time to adjust to the new environment and dialect rather than trying to adjust while also gathering data. Driving back and forth into the community each day also took away a large portion of time that could have been spent researching. So, simply living in the community and having better language skills would have created more of those opportunities.

As my first experience doing field research I lacked the seasoning of experience that provides comfort and insight into the best methods of research, like the knowledge of when to ask follow up questions and recognize key points in the moment. For example, after learning that Juan had suffered from pesticide poisoning and asking him if he changed any of his spraying practices after the incident, I should have also gone to his wife and asked if she noticed any

symptoms, if she had changed any aspect of cooking, storing the pesticides or washing and if she had noticed any of the same symptoms in other members of the community. Also, I would go further in cases where people think pesticides are bad for them and ask why they continue to use them. Thus, I feel my inexperience was a factor playing into my lack of follow-up with more in-depth questions in the appropriate moments.

Furthermore, I realize I was a bit blinded to community dynamics by focusing so heavily on women. I did work with men, but using the information I learned I would focus more on men and gender, rather than only women, because the gender categories I brought in to the research were not the same categories with which I left. Women are absolutely important, and I still seek to work with women and toward women's equality in research and development, but to fully understand their constraints it is imperative to understand men's constraints and gender identities as well.

6.1 Concluding Thoughts

Knowledge is linked not only to gender, but more specifically with the tasks and activities associated with men and women. More directly, performing reproductive or productive tasks will result in different knowledge outcomes. Often, such tasks are associated with a specific gender, like women doing the cooking or men doing the plowing. But, as seen when participants take on tasks associated with the opposite gender, knowledge is associated with the tasks completed more than the gender of the person. For example, whoever in the

household is in charge of cooking many have more knowledge about the negative effects of pesticides in foods than the person who does not cook, regardless of gender.

A program like IPM CRSP benefits from capitalizing on the knowledge generally associated with women's tasks, such as cooking, childcare and weeding, by appealing to what women notice about the negative effects of pesticides through their everyday tasks. If researchers and development practitioners only present IPM methods to men farmers because they are the only ones who attend focus groups since women are expected to stay home with the children, the project may not be as successful because those who may buy into IPM are not present to learn about such technologies. Thus women's inclusion in projects should not be treated as a funding institution's requirement, but as an effective strategy for successful implementation. And it is important that programs like IPM succeed given the extensive damage pesticides cause to the environment and human health.

For development projects to be successful it is imperative that research is conducted thoroughly through an interdisciplinary lens. It is naive for any discipline to assume it has the whole answer to any question, much more questions involving the unpredictable elements like human interaction. In order for development programs to impact communities without imposing priorities of developed countries participants must be learned-from rather than talked-at. Cultural values, geographic terrain, agricultural processes, scientific inquiry,

political associations, economic standing and gendered knowledge must all work together to improve the whole rather than only one measurable part of the lives of farmers. The IPM CRSP is different from development projects of which I speak because it is a research program. However, I do feel that their inclusion of researchers from different disciplines such as agricultural economics, entomology and geography is an asset to their program and should be continually encouraged. Furthermore, the IPM CRSP's use of participatory methods of research allow learning to flow in multiple directions, both from the researchers to the community and from the community to the researchers. This is advantageous in creating site-specific, community-informed research and provides an informed base from which development projects can work.

Moreover, no one method of research can gather a holistic understanding of a community. As found in this case study, different methods reveal different lived realities, all of which are important to creating an appropriate project or program aimed at bettering the lives of farmers whether it be through agriculture, health, policy or economics. Farmers are not lab tests that can be measured, calculated and adjusted with a predictable outcome. Even if a project theoretically and scientifically may work, if the people that are targeted do not find a reason to hold stake in the project it most likely will not reach its maximum potential. Therefore it is crucial that the many factors that contribute to the farmer's decision of adoption or non-adoption of a development project, including gender,

be properly researched for the betterment of the people, as well as the success of the project.

Given these conclusions, I have come up with a few recommendations for development projects based off of effective strategies used by the IPM CRSP. I recommend that projects interview equal numbers of men and women in their baseline survey, as they plan to. Researchers should not just strive for equal numbers of men and women, but also document which men and women are part of a household so that they can run analysis regarding discrepancies between answers from single women versus married women, or discrepancies between couples' answers.

Furthermore, I would suggest at least one to four full weeks of participant observation before beginning program activities, to become familiar with the dynamics of the community that are not reflected in closed surveys. Working with partners in country is an obvious advantage to getting to know the community, but even local organizations should spend time observing in the community if they are country-wide rather than based in the particular village before implementing new programs or projects. INIAP's familiarity with the community, and the knowledge of IPM CRSP researchers traveling to Bola de Oro provided me with an immense base of information from which to work, and my study would not have been able to operate without such foreground.

Finally, I would be adamant about including women in trainings and focus groups, and finding ways to include them. Even when I asked repeatedly for

equal numbers men and women in a facilitated group discussion, I failed at this task. Since there are constraints on women's time due to their gendered task expectations, perhaps offering childcare or a time for men separate from the time for women would allow more women to attend. This would open up a space for both men and women to engage with researchers or development workers. Women must be viewed and treated as a resource, an integral part to the IPM program in order for training and awareness to get to the appropriate stakeholders. Gender roles and gendered knowledge must be taken into account for a program such as IPM to have sustainable results.

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Appendices

Appendix A: Survey

*English translation shown in green.

Relaciones de género (Gender Relationships)
Entrevista No. (Interview Number) ____

Nombre del entrevistado (Name of the interviewee)

_____

Sexo (Sex) M F

Provincia (Province) _____
Cantón (Neighborhood) _____
Parroquia (Parish) _____ Comunidad (Community) _____
Fecha de la entrevista (Date of the interview) _____

Módulo 1: Información general (Module 1: General Information)

1. Cuántas personas integran su familia? (How many people are in your family?)

_____

2. Qué edad tiene usted? (How old are you?) _____

3. Sabe leer y escribir? (Can you read and write?) SI (yes) NO (no)

4. Número de hijos que usted tiene? (Number of children you have?)

_____

5. Número de hijos que cuida? (Number of children you care for?)

_____

Módulo 2: Prácticas y participación

(Module 2: Practices and participation)

6. Actividades socio-económicas con el uso de pesticidas (Socio-economic activities regarding pesticide use)	mujeres (women)	hombres (men)	mujeres y hombres (men and women)	Lugar (place)

Actividades productivas (Productive activities)				
Actividades principales pagadas (Principally paid activities)				
1. Roza (clear the field)				
2. Aplicación de herbicida (apply herbicide)				
3. Huachado (make holes)				
4. Fertilización, siembra y tape (fertilize, seed and cover)				
5. Tutoreo (stake, tie up)				
6. Deshierbas (weeding)				
7. Aplicación de herbicida y riego (Applies herbicide and irrigates)				
8. Controles fitosanitarios (controls crop disease)				
9. Cosecha (harvest)				
10. Trilla (separate seeds)				
11. Clasificación (classify)				
Actividades principales no-pagadas (Principally non-paid activities)				
1. Guardar pesticidas (stores pesticides)				
2. Compra de pesticidas (buys pesticides)				
3. Preparación de pesticidas (prepares pesticides)				
Actividades reproductivas (Reproductive activities)				
Trabajo doméstico no-pagado (Domestic, non-paid work)				
1. Acarreo de agua (gathers water)				
2. Acarreo de leña (gathers firewood)				
3. Preparación de alimentos para la familia (Prepares food for family)				
4. Cuidado de niños (childcare)				
5. Cuidado de ancianos (care of elderly)				
6. Limpieza y arreglo de la casa (cleans and picks up the house)				
7. Lavado de ropa (washes clothes)				
Comunidad (Community)				

Trabajo comunitario no-pagado (non-paid community work)				
1. Participación en asambleas, reunions (participates in assemblies, meetings)				

7. Dónde producen los alimentos que se consume la familia? (Where do you produce the food that the family consumes?)

_____

8. Dónde se producen los productos para la venta? (Where do you produce the products for sale?) _____

9. Utiliza pesticidas en los cultivos que sirven para la alimentación de la familia? (Do you use pesticides in the crops that are used for family food?)

SI (yes) NO (no) cuáles? (which ones?)

_____

10. Qué pesticidas se utilizan en los productos que se destinan para la venta? (What pesticides do you use in the products that are going to be sold?)

---

11. Tiempo que dedica a estos trabajos en horas por día (Time dedicated to these jobs in hours per day)

Producción de alimentos para la familia (Producing food for the family)	
Producción de cultivos para la venta (Producing crops to be sold)	

12. Qué hace con los envases vacíos de pesticidas? (What do you do with empty pesticide containers?)

_____

Módulo 3: Creencias y percepciones (Module 3: Beliefs and perceptions)

13. Qué conoce usted sobre el Manejo Integrado de Plagas? (What do you know about Integrated Pest Management?)

_____

_____

14. Cuáles son las ventajas de usar pesticidas? (What are the advantages to using pesticides?)

_____

_____

15. Cuáles son las desventajas de usar pesticidas? (What are the disadvantages to using pesticides?)

_____

_____

16. Dónde guarda los pesticidas? (Where do you store pesticides?)

_____

17. Dónde bota los sobrantes de pesticidas? (Where do you throw out the leftover pesticides?)

_____

18. Usted cree que hay algún problema asociado al uso y almacenamiento de pesticidas? (Do you believe that there is a problem associated with the use and storage of pesticides?)

_____

19. ¿Por qué razones usted utiliza los pesticidas? (For what reasons do you use pesticides?)

Razones (Reasons)	***Está deacuerdo (Agree)***	***No opina (No opinion)***	***No esta deacuerdo (Disagree)***
a. Son buenos para la salud de las personas (They are good for human health)			
b. Son buenos para la salud de los cultivos (They are good for crop health)			
c. Son más efectivo que el Manejo Integrado de Plagas y Enfermedades (They are more effective than Integrated Pest Management)			
d. Dan mejores resultados en producción (They give better production results)			
e. Son más rentables (They are cheaper)			

20. Cree usted que en los productos utilizados para su alimentación existen residuos de pesticidas? (Do you believe that pesticide residues exist in the products you use for food?) SI (yes) NO (no)

21. Qué opinión tiene usted acerca de la presencia de los residuos de los pesticidas en los alimentos? (What is your opinion about the presence of pesticide residues in food?)

_____

Módulo 4: Acceso a bienes (Module 4: Access to assets)

22. Usted se encarga o participa en las aplicaciones de pesticidas? (Are you in charge of or participate in pesticide applications?) SI (yes) NO (no)

23. Si su respuesta es SI, dispone de bombas de fumigar para su uso personal? (If you responses yes, do you have a sprayer for your personal use?) SI (yes) NO (no) y cuándo puede utilizarlas? (and when can you use them)

_____

24. Usted dispone de dinero para la compra de pesticidas? (Do you have money to buy pesticides?) _____

25. Usted tiene acceso al dinero obtenido por la venta de los productos de su finca? (Do you have access to the money gained from the sale of products in your field?) _____

26. De qué actividad productiva de su finca depende de usted? (What productive activity in your field dependens on you?)

_____

Modulo 5: Leyes, políticas e instituciones (Module 5: Laws, policies and institutions)

27. Usted conoce de aspectos legales o leyes que limitan el uso de pesticidas? (Do you know of legal aspects or laws that limit the use of pesticides?)

_____

28. Conoce de algún producto químico que se prohíbe su uso? (Do you know of a chemical product that is prohibited to use?)

_____

29. Conoce usted sobre normas de seguridad que deben tomarse en cuenta para la aplicación de pesticidas? (Do you know security measures that should be taken when applying pesticides?)

_____

_____

30. Estaría usted dispuesta a recibir a una persona del proyecto para visitarla y acompañarla en sus labores diarias por un día y una noche? (Would you be willing to host a person from this project to visit you and accompany you in your daily labors for one day and night?)

SI (yes) NO (no)

Cuando? (When?)

PARA EL ENTREVISTADOR (FOR THE INTERVIEWER)

Usted podría anotar algunas observaciones o conclusiones sobre el entrevistado y su entorno (Please note some observations or conclusions about the interviewee and surroundings)

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Appendix B: Revised Survey

* English translation shown in green. Revisions and thoughts are made in ***red, italic, bold font***. The questions found to be most important to my research are translated into English and highlighted in yellow.

Relaciones de género (Gender Relationships)

It is extremely important to interview equal numbers of men and women, and interview them separately. If you interview them together some people will not tell you the whole truth. If you can interview married pairs that is important to see if there are differences about the perception of pesticides within the household. It is important to interview BOTH men and women because if you only interview women then you only get one side of the story and have nothing to compare to. I found women's knowledge was unique about pesticides only because I compared it to men's and saw the differences between them. Furthermore, if you only focus on one sex it really is not a gender study, but a women's study.

Entrevista No. (Interview Number) ____

Nombre del entrevistado (Name of the interviewee)

_____

Sexo (Sex) M F

Provincia (Province) _____
Cantón (Neighborhood) _____
Parroquia (Parish) _____ Comunidad (Community) _____
Fecha de la entrevista (Date of the interview) _____

Módulo 1: Información general (Module 1: General Information)

This was good baseline information and comfortable questions.

1. Cuántas personas integran su familia? (How many people are in your family?)

_____

2. Qué edad tiene usted? (How old are you?) _____

3. Sabe leer y escribir? (Can you read and write?) SI (yes) NO (no)

It may also be helpful to know how many years of schooling they have had and if they have had any specialized schooling for agriculture.

4. Número de hijos que usted tiene? (Number of children you have?)

_____

5. Número de hijos que cuida? (Number of children you care for?)

_____

It would be useful to add a question asking what crops they grow, how much they yield, how much is used for family food and how much is sold, and then name what pesticide they use on each crop.

Módulo 2: Prácticas y participación

(Module 2: Practices and participation)

I asked the participants to respond who did each task on my list.

It was important to get feedback from the community members in my test surveys and have them list agricultural work that they did in their particular community.

6. Actividades socio-económicas con el uso de pesticidas (Socio-economic activities regarding pesticide use)	mujeres (women)	hombres (men)	mujeres y hombres (men and women)	Lugar (place)
Actividades productivas (Productive activities)				
Actividades principales pagadas (Principally paid activities)				
1. Roza (clear the field)				
2. Aplicación de herbicida (apply herbicide)				
3. Huachado (make holes)				
4. Fertilización, siembra y tape (fertilize, seed and cover)				
5. Tutoreo (stake, tie up)				
6. Deshierbas (weeding)				
7. Aplicación de herbicida y riego (Applies herbicide and irrigates)				
8. Controles fitosanitarios (controls crop disease)				
9. Cosecha (harvest)				
10. Trilla (separate seeds)				
11. Clasificación (classify)				

Actividades principales no-pagadas (Principally non-paid activities)				
12. Guardar pesticidas (stores pesticides)				
13. Compra de pesticidas (buys pesticides)				
14. Preparación de pesticidas (prepares pesticides)				
Actividades reproductivas (Reproductive activities)				
Trabajo doméstico no-pagado (Domestic, non-paid work)				
15. Acarreo de agua (gathers water)				
16. Acarreo de leña (gathers firewood)				
17. Preparación de alimentos para la familia (Prepares food for family)				
18. Cuidado de niños (childcare)				
19. Cuidado de ancianos (care of elderly)				
20. Limpieza y arreglo de la casa (cleans and picks up the house)				
21. Lavado de ropa (washes clothes)				
Comunidad (Community)				
Trabajo comunitario no-pagado (non-paid community work)				
22. Participación en asambleas, reunions (participates in assemblies, meetings)				

7. Dónde producen los alimentos que se consume la familia? (Where do you produce the food that the family consumes?)

_____

If there is a difference in the location of the field that they produce food for home (#7) vs. food for sale (#8), then # 9 and #10 would be important. But if they are the same field then #9 and #10 are irrelevant.

8. Dónde se producen los productos para la venta? (Where do you produce the products for sale?) _____

9. Utiliza pesticidas en los cultivos que sirven para la alimentación de la familia? (Do you use pesticides in the crops that are used for family food?)

SI (yes) NO (no) cuáles? (which ones?)

_____

10. Qué pesticidas se utilizan en los productos que se destinan para la venta? (What pesticides do you use in the products that are going to be sold?)

---

11. Tiempo que dedica a estos trabajos en horas por día (Time dedicated to these jobs in hours per day)

Producción de alimentos para la familia (Producing food for the family)	
Producción de cultivos para la venta (Producing crops to be sold)	

12. Qué hace con los envases vacíos de pesticidas? (What do you do with empty pesticide containers?)

_____

Módulo 3: Creencias y percepciones (Module 3: Beliefs and perceptions)

13. Qué conoce usted sobre el Manejo Integrado de Plagas? (What do you know about Integrated Pest Management?)

_____

_____

14. Cuáles son las ventajas de usar pesticidas? (What are the advantages to using pesticides?)

_____

_____

15. Cuáles son las desventajas de usar pesticidas? (What are the disadvantages to using pesticides?)

_____

_____

#14 and #15 are important for Knowledge, Beliefs and Perceptions

16. Dónde guarda los pesticidas? (Where do you store pesticides?)

_____

17. Dónde bota los sobrantes de pesticidas? (Where do you throw out the leftover pesticides?)

_____

18. Usted cree que hay algún problema asociado al uso y almacenamiento de pesticidas? (Do you believe that there is a problem associated with the use and storage of pesticides?)

_____

19. ¿Por qué razones usted utiliza los pesticidas? (For what reasons do you use pesticides?)

Razones (Reasons)	***Está deacuerdo (Agree)***	***No opina (No opinion)***	***No esta deacuerdo (Disagree)***
a. Son buenos para la salud de las personas (They are good for human health)			
b. Son buenos para la salud de los cultivos (They are good for crop health)			
c. Son más efectivo que el Manejo Integrado de			

Plagas y Enfermedades (They are more effective than Integrated Pest Management)			
d. Dan mejores resultados en producción (They give better production results)			
e. Son más rentables (They are cheaper)			

This helps the researcher to understand why pesticides are being used and was a really great, succinct chart.

I would have also added the question: "Pesticides are less time consuming to use and cut down on work in the field"

20. Cree usted que en los productos utilizados para su alimentación existen residuos de pesticidas? (Do you believe that pesticide residues exist in the products you use for food?) SI (yes) NO (no)

21. Qué opinión tiene usted acerca de la presencia de los residuos de los pesticidas en los alimentos? (What is your opinion about the presence of pesticide residues in food?)

_____

Módulo 4: Acceso a bienes (Module 4: Access to assets)

22. Usted se encarga o participa en las aplicaciones de pesticidas? (Are you in charge of or participate in pesticide applications?) SI (yes) NO (no)

This is good to know in terms of who does what, but should be followed up with participant observation because sometimes women say they do not spray pesticides, but they do.

23. Si su respuesta es SI, dispone de bombas de fumigar para su uso personal? (If you responses yes, do you have a sprayer for your personal use?) SI (yes) NO (no) y cuándo puede utilizarlas? (and when can you use them)

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_____

_____

Write down what they say (ex: gloves, boots, long pants, etc.) and then tally to see if any person says all of the appropriate protection needed. This would have been aided by a chart. For example:

Security Measures	Measures Identified	Measures Used
Long, waterproof gloves		
Long, waterproof clothing		
Waterproof hat		
Tall, waterproof boots		
Ventilated mask		
Goggles, eye protection		

30. Estaría usted dispuesta a recibir a una persona del proyecto para visitarla y acompañarla en sus labores diarias por un día y una noche? (Would you be willing to host a person from this project to visit you and accompany you in your daily labors for one day and night?)

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