

# **Gendered Relationships in Rural Advisory Services: a Pakistani Case Study**

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## **Declaration of Original Authorship**

I hereby confirm that the following written document is my own work and the use of all materials from other sources has been properly and fully acknowledged

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## Thesis Abstract

As populations increase, so do the challenges in feeding the world. Rural Advisory Services (RAS) contribute positively to food security by ensuring rural populations have access to vital knowledge, increasing yields and rural incomes. However, national and local RAS systems are complex, multifaceted, and comprised of a multitude of stakeholders with differing aims and agendas. More importantly, women around the world access them less frequently than men, for historical socio-cultural reasons. Recent attempts to improve the poor female access to agricultural information by multilateral organisations, operating outside national RAS systems, have been well-intended but largely ineffectual, overlooking progressive approaches that focus on gender transformative change. Most observers agree that more focused research on RAS and stakeholders would improve the balance of gender access to agricultural information.

This thesis addresses the domain by firstly developing a novel approach for qualitatively and quantitatively understanding the complexity of national and local RAS systems in Pakistan through its stakeholders' perceptions. This is a key first step to evaluate the system's dynamism prior to any impact research on RAS initiatives. These findings exposed key differences between local and national perceptions of a RAS system, and demonstrated the value of an accessible methodology to measure and understand RAS and an external initiative's impacts.

Secondly, the thesis examines agricultural information access in a district with and without Plantwise, the agricultural extension initiative launched by CABI in Pakistan in 2011, to assess and understand the initiative's impacts through farmers' and extension workers' perspectives. Results highlighted the need to refine the integration of gendered perceptions and utilisation of socio-economic factors at the institutional and organisational level to better assess and improve initiatives' impacts on the ground.

In the next chapter, the thesis studies the frequency of use and preference of agricultural information sources of a quantitatively significant sample of men and women in farm households in the Punjab province of Pakistan. In the first instance, the study identified interesting gender differences regarding use and preference for agricultural information sources in relation to age and literacy. Women hardly use sources for agricultural information, and value interpersonal communication from informal sources, compared to men's official sources' preference. Age and literacy affect differences between women more than it does between men, particularly for convenient locations to access information. The focus and outcomes regarding gender intersecting with age and literacy in agricultural information access imply the need for more refined socioeconomic models, discerning and interrelating gender and other social dimensions beyond the standard of male-headed households. This

study's findings also add to the growing body of evidence on gendered information access, highlighting the need to investigate deeper socio-cultural issues, discerning and interrelating gender and other social dimensions beyond the standard of male-headed households.

This aspect is explored in the final chapter, where male and female farmers' perceptions are compared with a sample of extension workers' perceptions in order to identify culturally acceptable gender-responsive schemes in Pakistan. The study highlights the importance of trials and assessments of female-led lead farmer approaches as potential transformative knowledge pathways, because of their blend of formal and informal interactions – both systems favoured by female smallholders. Results also showed that improving awareness of the importance of gender equality of access to information to male extension workers, and the continued training of female extension agents for field activities where possible, are important elements to improve equality of access to agricultural information and are able to create transformative change.

This thesis highlights important foci for the gender debate in rural advisory services. On the one hand it is vital to analyse individual perceptions and behaviours to understand the types of initiatives that should be considered and implemented to achieve better gender equality. On the other, it is crucial to contextualise individual behaviours with a higher-level understanding of the organisational, socio-cultural and institutional milieu that drives RAS in a country. Gender-sensitive research must attempt to investigate both aspects in the future. Better yet, these high level and individual perceptions should be linked and researched through social network and agricultural innovation system analyses in order to provide further evidence of the importance of focused gender-aware activities and their impact on food security.

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## **Abbreviations / Acronyms**

AKIS – Agricultural Knowledge and Information System  
AKS – Agricultural Knowledge System  
CABI – CAB International  
CIMMYT – International Maize and Wheat Improvement Centre  
DfID – Department for International Development (UK Aid)  
FAO – (United Nations) Food and Agriculture Organisation  
FFS – Farmer Field Schools  
GAD – Gender and Development  
GFRAS – Global Forum on Rural Advisory Services  
GRAP – Gender Reform Action Plan  
GT-EAFS – Gender Transformative Extension and Advisory Facilitation System  
ICT – Information and Communication Technologies  
IFAD – International Fund for Agricultural Development  
IFPRI – International Food and Policy Research Institute  
IPM – Integrated Pest Management  
LFPR – Labour Force Participation Rate  
MNFSR – Ministry of National Food Security and Research  
NARS – National Agricultural Research System  
NGO – Non-Government Organisation  
PDAI – Provincial Directorate of Agricultural Information  
PDAR – Provincial Directorate of Agricultural Research  
PDEAR – Provincial Directorate of Extension and Adaptive Research  
PW – Plantwise  
RAS – Rural Advisory Services  
SDG – Sustainable Development Goal  
SSA – Sub-Saharan Africa  
T&V – Training and Visit  
UNESCO – United Nations  
UNWCW – United Nations World Conference on Women  
USAID – United States Agency for International Development  
WAD – Women and Development  
WID – Women in Development

## Thesis Structure

This thesis is composed of four separate papers, each included in a separate chapter. Chapters two, four and five have already been published in the peer reviewed literature, while chapter three is currently under review.

The chapters are entitled:

- *An approach to understand rural advisory services in a decentralised setting.* This chapter was published in MDPI's Open Access Journal: "Social Sciences" in March 2019. It has garnered over 1500 views and over 480 downloads since its publication
- *Analysing support towards inclusive and integrated rural advisory systems.* This chapter has been submitted to the Journal of International Development in June 2019, and is currently under editorial review.
- *Gender differences in use and preference of agricultural information sources in Pakistan.* This chapter was published open access in the Journal of Agricultural Education and Extension in June 2018, has 1,600 views, and is in the top quarter of all research outputs scored by Taylor and Francis' metric system.
- *Identifying gender-responsive approaches in rural advisory services that contribute to the institutionalisation of gender in Pakistan.* This chapter was published open access in the Journal of Agricultural Education and Extension in April 2019. The paper has been viewed over 500 times since its release, and is already in the top quarter of all research outputs scored by Taylor and Francis' metric system, having been mentioned by a news outlet (Eureka! News) and an agricultural development blog.

The four chapters are preceded by a general introduction, and followed by a concluding statement. The introduction outlines (a) the study's problem statement; (b) a detailed account and academic literature review of gendered information access research in agriculture, and rural advisory services systems; (c) a focus on Pakistan; and (d) a brief overview of the study area, the research objectives and questions to be addressed by each chapter in the ensuing thesis. The conclusions and recommendations draw together reflections and conclusions from the preceding four chapters in an attempt to direct future studies.

# 1. Introduction

## 1.1 Problem Statement: Rural Advisory Services And Gender

*“We cannot fulfil one hundred percent of the world’s potential by excluding fifty percent of the world’s people. The evidence is clear: equality for women means progress for all”*

*Ban Ki Moon, Ex-Secretary General, United Nations, 2014*

As global populations and food consumption are projected to rise (Cleland and Machiyama 2017), food security challenges become increasingly important (Osborn, Cutter and Ullah 2015). Smallholder agriculture is an important sector to prioritise when addressing food security as up to 500 million smallholder farms supply food to over 2 billion people in Africa and Asia (IFAD 2013). Yet major issues need resolving: geographically isolated smallholder farmers are, unlike large-scale commercial enterprises, less embedded in the national knowledge and information infrastructure. This reduces their access to safe, up-to-date and effective agricultural information. Rural advisory services (RAS) have been developed to provide information and support to these rural populations on a range of different social, economic and environmental subjects (definition adapted from GFRAS 2016; Leeuwis and van den Ban 2004; Peterman et al 2011).

From its eighteenth-century roots as a Scottish Society of Improvers to its current multi-sectoral, multi-stakeholder national and regional partnerships, RAS have evolved into a variety of different systems influenced by history, geography and philosophy (Jones and Garforth 1997). In many post-colonial nations for example, RAS went from supporting export crops traditionally favoured by colonising countries, to focusing on serving large populations of smallholder agriculture in order to substantially increase better quality subsistence food production (Anderson et al 2006). This self-enforced national development engendered new challenges centred around the evolution of innovation diffusion processes and the communication services that support them, as well as a growing awareness of its impacts on society. This change also served to show how badly understood these networks and systems originally were. Indeed, in the mid to late twentieth Century, decision makers’ simplistic assumptions surrounding rural communities’ access to, and need for, knowledge, as well as their poor grasp of sociological theories describing knowledge transfer and technology adoption, often compounded the issues rather than resolved them in the years following decolonisation (Jones and Garforth 1997). This resulted in an increase rather than a reduction in unequal rural knowledge access and opportunities, especially from a gendered perspective (Lamontagne-Godwin et al 2018).

Gender inequality is not a new concept: inequality between the sexes has been present at least since the patriarchal rule of law during the agricultural revolution rose across a variety of professional and social spheres through national, religious and tribal socio-cultural contexts (Harari 2014). This imbalance is reflected in farming pursuits, where women farmers struggle to achieve equal representation, access to information and resources as male farmers (Carter and Weigel 2011; Doss 2001; Jafry and Sulaiman 2013; Johnson et al 2016; Lamontagne-Godwin 2018; Puskur 2013; Ragasa et al 2013; Samee et al 2015). This situation is common across the world despite evidence that agricultural productivity increases when women receive the same level of advisory services as men (Beintema and Stads 2010).

However, whilst gendered research and development activities – intending to redress this imbalance – are routinely conducted in the field, the underlying socio-cultural, systemic institutional processes that maintains the inequalities between men and women are usually not considered, even if there exists a wealth of analytical techniques and sociological resources to investigate them (Johnson et al 2016). Indeed, while many international and national stakeholders have been responding to gender inequality in rural areas, their development efforts often focus on simpler gender mainstreaming approaches (Doss 2001; Quisumbing 2003; Rao and Kelleher 2005; Schilling, Froese & Naujoks 2018), choosing to promote one-dimensional approaches and overlooking transformative empowerment processes that come from in-depth ethnological research (Agarwal 2000; Gurung and Biggs 2008; Hambly-Odame and Sarapura 2009; Mukhopadhyay 2014). These politically conservative, simplistic and results-oriented gender activities which do not consider inherent complexities of gender roles, and stereotype women as passive victims of men (Mohanty 1991) are often more popular than progressive gender responsive approaches that focus on long-term, sustainable, transformative change (Sweetman 2013). To this day, for all the positivity exuded on the world stage, humanity's efforts to redress this gender imbalance are hugely underwhelming (World Bank, FAO and IFAD 2008).

Clearly, reflecting on gendered relationships in rural advisory services is important in order to amount to societal change and equality between genders. In order to achieve this, studies must consider many social, biological and economic factors to understand the basis for equal access to effective agricultural knowledge. The following section investigates each of these factors in more detail.

## 1.2 Gender And Development

### 1.2.1 Definition of “gender”

The term ‘gender’ is defined as “*the fact or condition of belonging to or identifying with a particular gender*” (Oxford Dictionary 2018). Men and women have different roles in biological and societal domains according to their gender. Whereas the biological status of gender can more broadly be defined by the term ‘sex’ (the division between male and female on the basis of their reproductive functions), the societal aspects of gender need a more astute definition in order for the reader to understand the themes this study delves into. ‘Gender-assigned roles’, or ‘socially constructed differences between men and women’ demonstrate the accurate representations of accountabilities each gender has according to the economic activities they perform, or are expected to perform, the resources they have access to, and the decision-making authority they possess (World Bank Gender 2019). In the following thesis, the term ‘gender’ will exclusively be defined as the societal differences between women and men, not biological ones. It also excludes the term ‘youth’ (although age is a factor that the thesis chooses to factor into certain analyses) as well as any other describing the broader range of identities than the binary male/female definition.

### 1.2.2 Gender Inequality

Since the agricultural revolution forced humans to adopt sedentary lifestyles, the rise of patriarchal rule of law and its consequences on gender inequality across a variety of professional and social domains through national, religious and tribal socio-cultural contexts are important to consider (Harari 2014). However, the more restricted definition and interpretation of gender-assigned roles in relation to the biological status of gender is actually fairly recent. Throughout the ages until the eighteenth Century, gender roles and sexuality were fluid notions (Laqueur 1990). However, women and men’s physical differences became more important in our society’s definition of gender roles after the medical proof of sexual dimorphism between genders in the early twentieth Century (Haines, Deaux and Lofaro 2016). In a society increasingly defined by an urbanised, industrialised and growing middle class came the demand for equality of women, challenging the “domestic ideal” idealised by this middle-class ideology (the suffragettes for example). The activists were typically classed as feminists, which branched into liberal feminism, that seeks equal rights for women via political and civil channels, cultural feminism that recovers lost female voices from the past; and separatist feminism which establishes female-only spaces and fora where women can determine their own values and beliefs (Laqueur 1990).

These gender-based theories have permeated into many professional and popular domains to reflect one alienable fact in our society: women have consistently been excluded from local, national and global conversations. This is despite studies' findings that show the importance of women's equality in the global economy: were women to have equal access to information and productive resources as their male counterparts, agricultural yields for example could increase by twenty to thirty percent and total output in developing countries could increase by up to four percent: this would reduce proportions of undernourished people by twelve to seventeen percent (GFRAS 2013).

### *1.2.3 Gender On The International Stage*

In the last 50 years, gender equality has increasingly been addressed on the international development stage, and has evolved immeasurably since. The current Gender and Development (GAD) approaches – initially promoted at the UN Fourth World Conference on Women in Beijing in 1995 (Sweetman 2013; UNWCW 1995) – focus on progressive gender-responsive approaches that emphasise transformative change. Unfortunately, these methods are not as popular as earlier, more politically conservative, Women in Development (WID) concepts developed in the 1970s (Sweetman 2013). WID notions, although far more results-oriented, have been criticised for promoting simplistic women's empowerment activities outside of a country's formal and informal norms that do not consider gender roles' inherent complexities in the household and in the community (Mohanty 1991). This naïve interpretation that disregards household power relations clumsily challenges the current patriarchal status quo in many rural households and can actually increase the risk of sexual/physical violence on women (Kabeer 2010; Sweetman 2013). Moreover, if formal and informal norms are not considered, the sustainability of simplistic activities will not be achieved and the surrounding legal and socio-cultural context will not be affected.

The consideration and inequality of gender roles in professional and social settings is currently extremely relevant and topical: it has been globally and publicly exposed in recent times, for example through the global '#metoo' movement (Me Too 2019), and the gender pay gap outrages in the United Kingdom (Topping, Barr and Duncan 2018). These scandals reflect current trends in all rungs of society: women and girls form two thirds of the 1.4 billion poor and two thirds of the 800 million illiterate people (UNICEF 2011). Ten of the 100 richest people in the world are women (Forbes 2019), and only 22 women are in parliamentary roles for every 100 men across the globe (Gupta et al 2015). None therefore can doubt the importance of gender equality in the global arena: indeed, it features in the Sustainable Development Goals, specifically targeting gender equality for women and girls (Osborn, Cutter and Ullah 2015).

### 1.3 Gender And Agriculture

Agriculture is one of the oldest, most influential and dynamic activities on the planet. It employs approximately 1.3 billion humans (or close to 40 percent of the global workforce) on 570 million farms on six of the world's seven continents (World Bank FAO and IFAD 2008). Women are actively involved: 43 percent of the agricultural workforce in developing countries is female, ranging from 20 percent in South America to over 50 percent in Africa and Asia (FAO 2011). Even in this popular domain, women face a world full of inequality, particularly around the subjects of land ownership, access to credit, high quality inputs, insurance, education and rural advisory services (Cohen and Lemma 2011; Manfre et al 2013; Meinzen-Dick et al 2011; Ragasa et al 2013) despite their significant and culturally specialised input in agricultural activities (Doss 2002; FAO 2011; World Bank, FAO and IFAD 2008) and their potential to improve agricultural productivity (Beintema and Stads 2010; Doss 2011; FAO 2011; Pardey et al 2006). Assumptions about women's work in agriculture being less important are erroneous: for example, simplistic views about men and women's crops persist and provide an inaccurate picture of household agricultural labour (Guendel 2009; Quisumbing and McClafferty 2007) even as recent research regularly disproves this one-dimensional commercial/subsistence crop perspective (Lamontagne-Godwin et al 2017; Orr et al 2015). Indeed, the division of agricultural labour according to gender is not only split according to physical differences between sexes, but also according to socially constructed gender roles within the communities themselves, farming systems, and other factors across geographic, historical and cultural contexts. For example, cash crops have been known to be taken care of by women as well as men, and certain crops can be identified as both a cash and subsistence crop (Orr et al 2015; Raney et al 2011). A more nuanced view suggests men and women work on the same crops, but on different aspects of the agricultural value chain. Division of labour in sub-Saharan Africa for example shows men are usually responsible for the preliminary physical labour such as land clearing and land preparation, whilst women will concentrate on maintenance (such as weeding) and processing post-harvest crops (Kasante et al 2001). Elsewhere, Asian women will also work on planting and cultivating (Quisumbing and McClafferty 2007).

Clearly, both gender roles in agriculture are different, but no less important (Doss 2011) and gender inequality, particularly surrounding knowledge, is an issue worth exploring further. However, firstly, the study shall focus on the importance of rural advisory services systems for smallholder food security, and their links to third sector initiatives.

## 1.4 Understanding Rural Advisory Services

Firstly, it is important to note the context with which RAS are being discussed: indeed, RAS deal with a range of issues associated with agricultural production and natural resource management. This thesis is focusing on knowledge transfer surrounding the management of insects, diseases and weeds in agricultural production.

While industrial food systems involving major commercial farms continually develop comprehensive innovations to reduce pest, disease and weed impacts amongst others, they represent only a small proportion of food systems in lower income countries. Up to 500 million smallholder farms supply food to over 2 billion people in Africa and Asia (IFAD 2013). They are usually located in isolated rural areas, and unlike large scale commercial enterprises, are not embedded in sophisticated knowledge systems that inform them of the latest knowledge and innovations. Therefore, any serious national efforts to reduce pests, disease and weeds' impacts must consider communication with smallholder agriculture. National administrations around the world have championed the use of public RAS which enable the implementation of an effective agricultural knowledge exchange system at local and national levels. RAS have traditionally conducted communication activities through field visits; organised group meetings; demonstration plots and increasingly the use of information communication technologies using mass media communications.

However, it is clear that the set of institutional and organisational actors that compose RAS systems at both national and local levels has evolved dramatically in the last few decades (Rivera 2011). What was traditionally a public organisational activity around the world now regularly includes the private sector, civil society and community-led enterprise (Sutherland et al 2013). In order to provide a more comprehensive picture of the knowledge pathways that undoubtedly improves service quality, studies of RAS systems need to consider a variety of local and national stakeholders due to country systems' heterogeneity (Schrempf et al 2013). This will also help future studies understand the bigger picture when focusing on socio-cultural issues in the household and in the community, such as gendered access to agricultural information. Studies of knowledge systems – Rölíng's (1992) definition of a "Knowledge System" is *"the articulated set of actors, networks and/or organizations, expected or managed to work synergistically to support knowledge processes which improve the correspondence between knowledge and environment, and/or the control provided through technology use in a given domain of human activity"* – began to take shape during the development of the National Agricultural Research Systems (NARS). This system was soon dismissed by social scientists who rejected the model's linear concepts of knowledge generation exchange and utilisation (Rölíng 1992). Studies

focused on the Agricultural Knowledge System (AKS) and the Agricultural Knowledge and Information System (AKIS) which were more progressive, focusing more on the interactions between constantly evolving stakeholders, and understanding that, far from being passive recipients of information, farmers are integrated into the knowledge sharing network (Rolins and Engel 1991). Agricultural innovation systems (Spielman et al 2009) and systems' multi-level perspectives that focus on strategic and long-term change in society (Rotmans et al 2001) are further evidence of academic research into knowledge systems and their capacity for societal change. However, it is clear that an in-depth comparative analysis of an agricultural system at a national and local level would be compelling and improve socio-economic knowledge of agricultural information exchange.

### **1.5 Rural Advisory Services And The Third Sector**

In the face of constant administrative evolution, RAS must strive to ensure a fair and equal access to knowledge (Rivera and Alex 2004) amidst the presence of many different knowledge exchange systems in place in any one nation. The third sector for example has been present in countries' profiles since the anti-slavery movement in the late eighteenth century (Jones and Garforth 1997), although the term Non-Government Organisations (NGOs) only appeared in 1945 in the United Nations charter (Article 71 of Chapter 10). NGOs were originally developed to focus on the sustainable humanitarian and developmental aspect of globalisation, yet their rise is seen by some either as an ideological tool to combat the capitalistic interests that have structured binding free trade agreements, or as a direct consequence of the restructuring of the welfare state in low- and middle-income nations (Jones and Garforth 1997). The third sector has previously been accused of promoting a system akin to the imperialistic model of the colonial era, as NGOs sometimes act within a neoliberal paradigm rather than with altruistic notions (Putin 2007; Shivji 2007), a criticism that strikes at the heart of the impartiality of the third sector. In Pakistan for example, "Save the Children" charity was threatened with closure due to their "anti-state activities", as quoted by the interior minister Chaudhry Nisar in 2015 (Boone 2015). Initiatives in the past have also been shown to suffer from tunnel vision, concentrating on specific issues to the detriment of the wider situation (Matthews 1997), or simply fail over time, actually increasing inequalities instead of reducing them (Pfeiffer 2003). Third sector RAS initiatives are mostly contained within larger development packages that also focus on social and economic issues tied to rural affairs. Multilateral organisations (FAO, World Bank...), specific research and development institutes (International Maize and Wheat Improvement Center, or Centre for Agricultural Biosciences) and multilateral donors (DFID, USAID...) have been responsible for the development of some multi-national RAS activities in recent times, such as the

Training and Visit (T&V) (Hussain, Byerlee and Heisey 1994), Farmer Field Schools (FFS) (Davis et al 2012), and Plantwise (PW) among others (Lamontagne-Godwin et al 2017).

In the 1960s, the T&V extension system was developed to increase farmer access to information, promote adoption of new technologies and update the materials used for field extension (Hanyani-Miambo 2002). Although many nations adopted the model with dedication, the programme's impacts were reduced due to outdated and simplistic assumptions regarding farmer homogeneity and knowledge transfer and/or exchange (Rogers, 2003). Moreover, agents and technical staff were not attending meetings, supervision was lax, contact farmers did not disseminate information to other farmers, and senior management's interest in the programme was merely reflecting their desire to obtain more resources (Moore 1984). Despite some innovative processes to tackle these challenges (Bagchee 1994; Roberts 1989; World Bank 1990) the programme ultimately failed as its basic understanding of knowledge exchange disregarded innovation diffusion theories, and only served to highlight inherent systemic weaknesses in the RAS system (Howell 1982a and b; Howell 1983; Moore 1984). The programme also represented poor value for money, and a lack of policymakers' support to link researchers with extension workers (Feder 2006; Roberts 1989), particularly in Sub-Saharan Africa (SSA).

Farmer Field Schools were developed in the late 1980s as an informal holistic Integrated Pest Management (IPM) course designed to reduce the abuse of pesticides for environmental and human health, as well as reducing pest and disease resistance to chemicals. The programme grew to 87 countries worldwide, discussing a multitude of crops and approaches, with an estimated 10 and 20 million farmers having graduated (Braun et al 2006). Contrary to the T&V system, the FFS approach did take account of its impacts on the ground, showing a reduction in the use of pesticides and an increase in farmer knowledge and productivity. It has also helped RAS staff build trust with farmers through prolonged exposure and letting farmers discover and gain confidence to learn in order to come up with locally-adapted recommendations (Schmidt, Stiefel and Hurlimann 1997). Crucially they dealt with financial constraints and improved human resources in extension, built local institutions to ensure the continuation and sustainability of the programme, and created a sense of ownership and community (Braun and Duveskog 2008). FFS, regularly perceived as a knowledge exchange technology in international development today (and very different to its original purpose), should not be seen as the silver bullet (Praneetvatakul and Waibel 2003), particularly for achieving country application of a recommendation against a newly identified pest (Braun and Jiggins 2005).

Plantwise, a global programme led by CABI is designed to increase food security in over 30 countries (Wright et al 2016). Working in close partnership with a variety of national and international stakeholders, the programme enables national and local plant health systems to provide farmers with the knowledge they need to ‘lose less and feed more’, strengthening capacity and resilience. The programme establishes and supports sustainable networks of plant clinics run by existing agricultural extension agents or “plant doctors”, where farmers can find practical science-based plant health advice for any crop and any problem. The plant clinic network is supported by an online knowledge platform, the Knowledge Bank (Leach and Hobbs 2013), a gateway to actionable plant health information, including diagnostic resources, analytical tools, pest management advice and front-line pest data for effective local, national and regional vigilance. These two unique resources are part of the “Plantwise approach”, designed to strengthen a country’s RAS system through a sustainable knowledge and coordination system. So far, over 100,000 Pakistani farmers have visited plant clinics, and the programme has trained over 1,000 extension agents. Recent independent impact assessments in Pakistan have been favourable, and encompass a range of different methods to justify the programme’s success and impact on the ground based on evaluation field question matrices that interview a wide range of representatives in the PW programme approach (Evidence on Demand 2015).

Much like many RAS initiatives around the world, large multinational extension programmes such as the T&V and FFS have historically focused on men, unwittingly reinforcing local and national extension systems’ ability to disregard women completely in the search of instant results (Davis et al 2012; Due 1997), although there have been signs recently that gendered learning and transformative change is beginning to take hold in the FFS approach (Najjar et al 2013). In Plantwise, gender and agricultural information access impacts were also not clear, particularly in Pakistan: indeed, at the clinic level, gender inequalities in agricultural information access through public rural advisory services were reflected in the data provided by the PW programme in Pakistan. In 133,000 recorded interactions at Pakistani plant clinics since 2012, less than one in ten thousand were with women. Moreover, the majority of extension workers, field assistants and data enumerators trained in PW were men. As stated by the recent evaluation of Pakistan’s PW programme, CABI’s future implementation work clearly needs to be conducted through a finer gender lens, and more efforts need to be made in order to understand the role of PW in individual and institutional changes regarding gender (Evidence on Demand 2015).

Appropriate pathways for real women empowerment should include the role of international initiatives when it comes to promoting transformative change and the institutionalisation of gender (Cornwall 2016). On the one hand, the promotion of opportunities for improved information access and gender equality awareness based on evolving initiatives such as FFS and PW are as important for the short as the long term. However, development institutions should be looking to promote gender equality and ultimately women's empowerment less through results-orientated pathways focused on specific goals, but rather by strengthening the organisational and administrative capacity of women's rights organisations in countries of interests, and letting them set their own agendas (Mukhopadhyay 2014).

### **1.6 Agricultural Information Access And Gender**

Strong gender disparities exist when considering the access to agricultural information through rural advisory services and the adoption of new technologies: male farmers consistently report better access to rural advisory services and adopt fertilisers, improved varieties, and other technologies promoted by extension providers at higher rates (Puskur 2013; Ragasa et al 2013; Swanson and Davis 2015).

In theory, a farmer should be able to obtain the information in a useable and understandable format (e.g. through the radio in local language, through print media or pictorially for farmers who have lower levels of education) from an easily accessible location (e.g. village hall, place of worship, radio, internet) irrespective of gender. However, farmers' access and ability to travel, purchase and implement extension providers' recommendations depends heavily on the social, economic and physical resources they have at their disposal (Tsegaye, Druza and Hailemariam 2018). These resources are themselves influenced by the prevailing socio-cultural context that affects a gender's access to education, interactions with the opposite sex, access and use of technologies, and many other aspects – even their ability to travel (Rao and Kelleher 2003). Women in agriculture therefore find it harder to adopt new technologies or practices even when they are able to access extension, as they tend to control fewer resources than their male counterparts (Tsegaye, Druza and Hailemariam 2018).

Unfortunately, traditional approaches to extension, field visits from extension officers and training workshops for example, reinforce this imbalance in many countries when designing and carrying out activities by adopting gender-neutral stances – approaches suitable for and applicable to both male and female genders (Mudege et al 2015). Consequently, rural communication efforts that cover technical content and field innovations continually favour men over women's needs (Mudege et al 2016) and lead to male farmers' positive reinforcement whilst leaving the women behind, relying

solely on intra-household communication (Lamontagne-Godwin et al 2017; Puskur 2013; Ragasa et al 2013; Swanson and Davis 2015). Societal gender roles and their benefits or restrictions are shaped by the cultures and classes that surround them. These roles determine how individuals interact formally and informally with one another, and lie at the heart of the institutionalised interaction between RAS professional and farmers of different genders. The individual and institutional socio-cultural norms that themselves shape men and women's roles, restrictions, and their position in agricultural communities must therefore be understood and considered when focusing on gendered inequalities (Kingiri 2013).

Recent studies have indeed focused on gender and agricultural information: Kabeer (2010) concentrates on the importance of women and men in field technology trials, while Mudege et al (2015) focus almost exclusively on gender norms in the household. Other studies consider gender in relation to the actual tools used to improve innovation: information communication technologies (ICT), such as radio, television and mobile phones (smartphone with internet access and the simpler modular mobile phone with SMS capabilities) are of particular interest as they are revolutionising knowledge exchange in the twenty-first century for youth (Mburu 2013), but could also result in limited substantive gender transformative change due to women's continued illiteracy and lack of opportunity to access ICTs due to household chores (Mtega 2012). Ali et al (2011) considers the importance of education and mass media to improve gender-equal access to the communication tools themselves.

A number of information access studies focus on specific variables surrounding information access, such as age and literacy in farmers (Lawal, Alabi and Oladele 2017; Mbo'o-Tchouawou, and Colverson 2014; Mtega, Ngoepe and Dube 2016). Moreover, while extension workers perceptions have been studied on a number of subjects such as knowledge of sustainable agricultural practices (Tiraieyari et al 2013), climate change (Obasi et al 2014), agricultural policies (Kinyanjui et al 2000), use of ICTs in extension service delivery (Ajayi, Alabi and Akinsola 2013), and the importance of computers in extension activities (Rad Hashemi and Chizari 2014), the impact of devolution (Saeed et al 2006) and staff development opportunities (Moradi et al 2011), few studies consider the importance of the norms that dictate the (largely male) extension worker population's interactions with women in rural areas. In general, the paucity of adequate literature and its resulting systemic change and impact on the ground reflects the serious need to engage with and understand the underlying issues that surround gendered agricultural information access, particularly from a supplier of information's point of view. Significant progress will only be achieved at a local scale when underlying effects causing

inequalities between men and women in access to agricultural knowledge are understood, relating to recent studies such as Olajide (2011) and Tandi Lwoga, Stilwell, and Ngulube (2011) and considered when designing knowledge transfer initiatives.

### 1.7 Transformative Change And Gender

As described earlier, patriarchy has had many impacts on a culture's institutional processes, defined as a "*relatively stable set[s] of mutually agreed rules and norms which are being created and reproduced by people, while they also, once in place, govern social life*" (Grønning 2008). This definition includes legislative edicts, policies that support them, organisations that implement them and also social conventions and traditions, and may take very different structures according to the country, region or sector they subscribe to, affecting formal and informal individual interactions between genders as well as within organisational systems (Rao and Kelleher 2005). Transformative change research (the study of underlying individual or systemic institutional processes that govern individual and systems' interactions) analyses formal institutional processes that frame gender inequality in countries – such as laws and policies governing access to resources and legal protection – and links them to informal individual beliefs or perceptions formed in part by traditional socio-cultural norms (Rao and Kelleher 2003; Rao and Kelleher 2005) in order to highlight where change could occur. This research helps to justify the development of targeted and progressive gender responsive schemes that enable the institutionalisation of gender – the process whereby gendered social practices become sufficiently regular and continuous to be described as institutions (adapted from Turner, Abercrombie and Hill, 2014). Research into transformative change have focused as much on the theoretical processes that frame institutional processes as on the resulting policies that restrict or enhance gender institutionalisation.

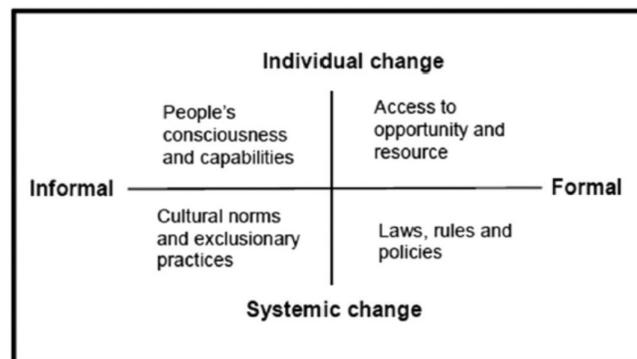


Figure 1: Gender at work (Rao and Kelleher 2005)

Notional transformative change has been well supported by recent literature: formal institutional processes that frame gender inequality in countries, such as laws and policies governing access to resources, are linked to informal perceptions formed in part by traditional socio-cultural norms and individual beliefs (Rao and Kelleher 2003; Rao and Kelleher 2005). Other studies support this notion through specific examples: a simple policy measure such as the provision of loans specifically for women might help women manage their poverty better, but this does not qualify as transformative. The institutionalisation of gender focuses rather on a shift in consciousness, changing normative beliefs and restrictive cultural and social norms that limit women's ability to access these loans in the first place (Cornwall 2016). This should be driven at the cultural systemic level, engaging and exposing groups to new ideas and realities. It should also focus on engaging with the agents of change on the ground – in most cases in RAS, the extension workers themselves, as long-term ethnographic studies demonstrate the positive effect these agents have on a shift in consciousness and normative change (Kabeer 2010; Khan 2014; Sholkamy 2011).

Research by Farnworth and Colverson (2015) through the Gender-Transformative Extension and Advisory Facilitation system (GT-EAFS) shows that specific gender transformative approaches, developed through a thorough understanding of male and female perspectives on the ground, can be of benefit to gender equality, systematically identifying, integrating and scaling up proven positive women empowerment approaches. The development and promotion of these activities leads to a gradual socio-cultural change from the ground up. This in turn aims to move beyond individual self-improvement, transforming the power dynamics and structures that serve to reinforce gendered inequalities (Hillenbrand et al 2013). A review of the effectiveness of new approaches targeting women in extension does much to highlight potential avenues of research and development in knowledge pathways (Mbo'o-Tchouawou and Colverson 2014) and its impact on gender equality in the long term.

For all the theoretical and practical activities surrounding the institutionalisation of gender, many would agree that the final goal is still well beyond reach for a variety of reasons: the drive behind a women's empowerment has been lost amidst the furore of results-orientated activities in the early part of the twenty-first century. Indeed, international development's efforts provides development professionals with a stark warning surrounding gender-specific methodologies and practices, such as the use of simplistic metrics used to determine success or the ability to achieve a measurable outcome (Cornwall 2016). To this day, for all the positivity exuded at international events, research and development professionals can confidently state that the international development community's

efforts to redress this gender imbalance in agriculture are hugely underwhelming (Seguino and Grown 2006; World Bank, FAO and IFAD 2008).

## **1.8 A Focus On Pakistan**

Of all the countries in the world, rarely has one evoked such conflicting views as Pakistan. On the one hand, it is a world of complex ethnicities and social networks defined by years of political strife. On the other, it is a world fusing unique Urdu culture and philosophies, Islamic and Ottoman traditions, ancient British colonial rule, and of course quasi-legendary cricket matches. Pakistan, the “Land of the Pure” is a relatively new country although its land has been inhabited for at least 8,000 years. Its population now stands at 191 million people, the sixth most populous country in the world (Index Mundi). While its climate is not strictly conducive to agriculture – the country gets less than 600 mm of rain a year on average (Salma, Shah and Rehman 2012) – its natural and artificial river systems based on the Indus are its saving grace, and have made Pakistan the agricultural powerhouse it is today. They are located in the most populous and richest province in Pakistan: the Punjab (the ‘Land of the 5 rivers’). It is in its capital, Lahore, in the shadow of its awe-inspiring Badshahi mosque, that the author attempts to understand the process in which a nation’s agricultural information infrastructure functions and evolves in thought and practice to enable millions of households to make informed decisions on the state of their land.

### *1.8.1 RAS in Pakistan*

Public RAS in Pakistan have been present since the country’s founding in 1947, and are currently governed by provinces and districts after the 2010 devolution (eighteenth amendment) devolved much of the federal Ministry of National Food Security and Research’s functions to them (Mengal et al 2014; Shahbaz and Atta 2014). The Provincial Directorate of Extension and Adaptive Research (PDEAR), the Provincial Directorate of Agricultural Research (PDAR), Provincial Directorate of Pest Warning & Quality Control of Pesticides (PDPW), and Provincial Directorate of Agricultural Information (PDAI) are particularly relevant departments in the devolved state. Between them, they transmit modern crop technologies, disseminate information and agricultural techniques to growers, ascertain growers’ problems, and monitor pest developments and disseminate information through print media to enhance agricultural productivity (Lamontagne-Godwin et al 2018). While the public sector is the major developer of RAS in Pakistan, the private sector is also very active, having gained appeal in the 1980s after privatisation initiatives were developed to provide alternatives to perceived failings in public services during the green revolution in the 1970s (Davidson, Ahmad and Ali 2001). The private sector model concentrated on providing comprehensive plant protection packages to the

needs of large commercial farmers (Davidson, Ahmad and Ali 2001) and also grew its smallholder agriculture market by influencing farmers to join free advisory services that included field demonstrations and face to face contact with private extension officers (Khooharo et al 2008; Zhou 2009). The equal access to services has also been highlighted as an issue, as poor smallholder farmers are excluded from private services (Ali et al 2011; Khooharo 2008; Riaz 2010). NGOs are also active RAS stakeholders, particularly through the large consortia such as the Better Cotton Initiative implemented through World Wildlife Fund-Pakistan, or Agha Khan's Rural Support Programme. While some large-scale NGOs have developed some interesting and potentially impactful RAS activities, it is hard to understand their gender impacts. Locally-run NGOs are also numerous on the ground, but it is very hard to get an accurate understanding of their current activities and funding models.

### *1.8.2 Pakistan And Gender*

Agriculture accounts for over a fifth of Pakistan's Gross Domestic Product, up to 70 percent of total household income (Siddique et al 2009), and employs just under half of the country's total population. Three quarters of this workforce are women although much of their work is not counted as an economic activity in the household (Samee et al 2015) much to the country's detriment (Jamali 2009). Men are normally responsible for crop production, crop protection, output marketing, water management, herding, and transporting harvested crops. Women are however also extremely busy (Nosheen et al 2008): they supply food to men in fields, help male members in crop production, water fetching, collection of fuel wood, management of livestock, and child care. They hoe the field in preparation for the crop, and at the time of crop harvest. Moreover, the female labour force actively participates in harvesting of wheat, cotton, fruits and vegetables. In spite of their many roles and responsibilities in agriculture, women have minimal role in decision-making(;). They do not have access to adequate resources and they face constraints due to cultural, traditional and sociological factors, and own less than three percent of the land they work on (Amin et al 2009; Jamali 2009; Samee et al 2015). In the Punjab, 93 percent of women do not own land, despite 50 percent working in the field (Samee et al 2015). Amin et al (2009) study the participation of women in post-harvest activities in 384 farm families from eight villages in district Faisalabad, Punjab. Their results showed that monetary activities, like market selling and taking the crop to the mill, was conducted by men, whilst women mainly ensured the cleaning of store rooms, storing of inputs and other agri-products and preparation of pickle or marmalade.

Pakistani women in rural households have limited access to many resources, including agricultural knowledge (Samee et al 2015). Increasing this information access is very challenging: women farmers face a shortage of information sources to consult (Hassan, Ali, and Ahmad 2007; Sadaf, Asif, and Muhammad 2006), the sources they consult are perceived as poor in quality (Sadaf, Asif, and Muhammad 2006), and three quarters of employed women are illiterate, twice as much as employed men. For example, over 80 percent of women interviewed stated they never accessed 8 of the 9 sources of information investigated in Hassan, Ali and Ahmad (2007) dual-gender study. Indeed, both studies (Hassan, Ali and Ahmad 2007; Sadaf, Asif and Muhammad 2006) found the main information source for women to be through face-to-face contact in the community (either with the male head of household, female relatives or female neighbours), suggesting that women primarily have mediated, rather than direct, contact with expert sources.

Institutionally, women's rights in Pakistan have been governed by three legal documents, the Muslim Personal Law of Sharia in 1948 (Application Act 1948), the Pakistan Charter of Women's rights in 1954 and the Constitution of 1956 (Pakistani Constitution 1956) that give women representation in legislative assemblies, the right to own property and vote. Pakistan was also a signing (non-binding) member at the 1975 Mexico Conference on gender equality (World conference on women 1975), a signatory to the Convention on the Elimination of all forms of Discrimination Against Women, and a Ministry for Women Development have been initiated in 1989.

There are encouraging signs in the labour market: Pakistan's women Labour Force Participation Rate (LFPR - the proportion of the labour force in the working-age population) increased by ten percent between 1990 and 2011 while males LFPR has declined by two percent, largely due to overseas migration, and the Punjab province has the highest female LFPR (29 percent) in 2011 (CEIC 2017). Moreover, women's unemployment rate has dropped from 16 percent in 1991 to fewer than nine percent in 2011, although still higher than the six percent national average, possibly a sign of women's continued immersion in household's unpaid workforce.

Representation of women in the public sector is nevertheless extremely low (less than five percent, and less than one percent for senior, decision-making, level), and only concentrated in certain fields such as health and education (Chauhan 2014). Indeed, no women are members of the executive committees, apart from in human health. On average, seven percent of middle management, six percent of senior management and one percent of the executive levels are women, based on Thirteenth Census of Federal Government Civil Servants in 2006 (Chauhan 2014). In agriculture, it is extremely low: only three percent of the 259 middle, senior and executive level decision makers in provincial

departments are women, and none are present at an executive level. At the federal level, 15 women are in the executive wing of the Ministry of National Food Security and Research (MNFSR) (Chauhan 2014). An inquiry report on the status of women employment in public sector organisations states “Pakistan is characterised by a virtual absence of women at effective policy making and administrative levels” (Chauhan 2014). The Gender Reform Action Plan (GRAP), developed in 2005, pushed through an ambitious plan to have ten percent of women in superior levels of civil servant departments, and half of new vacant posts to be filled by women (Chauhan 2014). Unfortunately, none of the actions have ever been backed up by comprehensive policies, and those that do pass the vote are generally ignored (Chauhan 2014). More recently, the “Punjab Women Empowerment Package 2014” was launched on International Women’s Day. The package is aimed to advance the status of women in the province through safeguards, legislative action and increased representation in government institutions. However, some critics state that the package as simply being another one that will not be implemented, much like the previous one, and in any case would only target privileged and educated women, forgetting the poorer women in society, and does not consider high maternal mortality and literacy rate (Naqvi 2014).

Although Chauhan (2014) states that gender equality activities run by Western agencies have been viewed as a nuisance and a box-ticking exercise to guarantee further funds, there are signs that Pakistan’s administration have recently started to mirror the international development community’s focus on gender inequality. Among a host of in-depth reviews, such as ‘Pakistan 2010’, ‘Human Development and Poverty Reduction Strategy, and the ‘Commission of Inquiry for Women’, gender sensitivity activities began being included in various federal projects across the country. Moreover, women are increasingly being posted in top military and political positions (ambassadorships in London and army generals), and culminated in the 2002 National policy for Development and Empowerment of Women.

### **1.9 Study Area**

Pakistan was chosen as the country of study for a variety of reasons. It has an active public RAS system and a dynamic Plantwise programme. The author, through the CABI centre located in Islamabad, would also be able to reach many key officials and have access to important RAS networks. For these reasons, Pakistan was the country of focus for this thesis.

The study locations are the districts of Bahawalpur and Jhang (see map in Figure 2 p27) in the province of Punjab. The locations in Punjab were chosen for a variety of reasons. They are geographically close, the main cities in both districts separated by 220 kilometres, facilitating on-the-

ground research. The author was located in Multan, a geographically strategic location which gave him and associated enumerators the opportunity to travel to Bahawalpur and Jhang district easily. The road network is well maintained and would allow day trips as well as longer stays in the area when needed.

More importantly however, the two locations are socio-economically and agro-climatically similar. They therefore both depend on the cultivation of the same key crops, such as cotton, sugarcane and wheat and have a similar incidence of food poverty in farming households (31% and 35% respectively (Qureshi and Arif 2001). Moreover, at the household level, the two districts have similar family sizes and population and gender illiteracy percentages (Amjad, Arif and Usman 2008). Bahawalpur's population is 700,000 whilst Jhang's is 400,000. Considering the different size of the district (Bahawalpur is 24,800 km<sup>2</sup>, whilst Jhang is 8,900 km<sup>2</sup>), Jhang has a higher population density (300 vs 180 people/km<sup>2</sup>) (Index mundi, 2016).

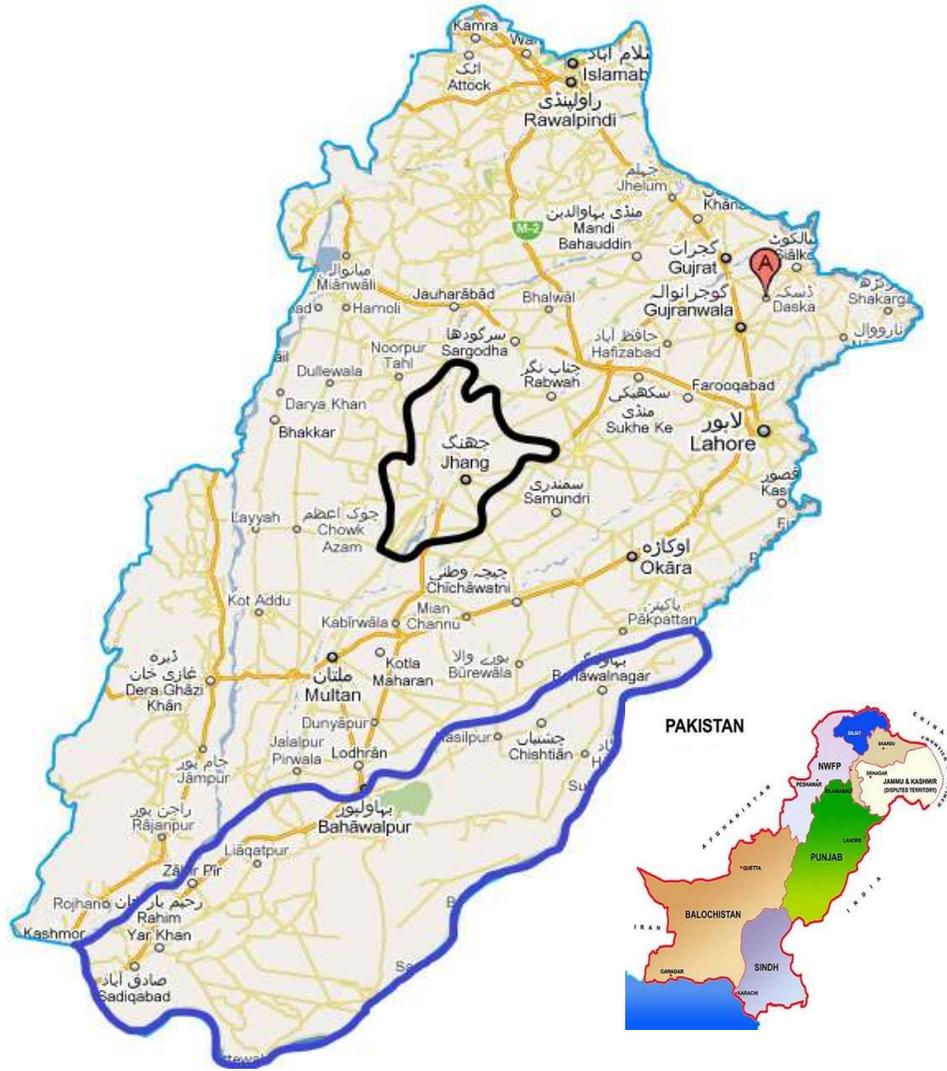
From an academic perspective, Jhang and Bahawalpur were selected because of their relationship to the Plantwise programme. For the research undertaken in this thesis, it was important to select a location with solid links to the programme as a test site – in this case Bahawalpur district, which has had the PW programme instigated since 2012 – as well as a control site, with the complete absence of the programme. The author selected the Jhang district, one of the few districts with no programme initiated at the time of the research, with similar agro-climatic and socio-economic variables with which to compare with the test site.

### **1.1 Study Aim And Objectives**

A review of the literature in the preceding sections confirms the lack of empirical knowledge on RAS systems according to local and national perceptions, clear gender-related impacts of an international development initiative in Pakistan, gender-specific variables' effects on different stakeholders' perceptions of agricultural information access, and the analysis of interactions and perceptions in a RAS field initiative to understand its effect on the institutionalisation of gender in a patriarchal country.

From a theoretical perspective, the approaches researched and undertaken in this thesis provide a template for future holistic research on gendered interactions in rural advisory services. These findings also aim to facilitate the continuation of a discussion about individuals and organisations in an evolving environment. In practical terms, this thesis outlines potential solutions to address specific

gender issues identified in the research, whilst also delineating future research areas that could build upon the findings in this thesis.



*Figure 2: Detailed map of Pakistan’s Punjab province. Bahawalpur and Jhang district highlighted; inset: map of Pakistan highlighting the country’s provinces*

The thesis focuses on three main objectives: firstly, it attempts to develop a clear and concise method to map and understand structure, influence and interest in rural advisory services at the national and local level in order to provide a clear picture of a country’s national RAS structure, highlighting knowledge or institutional gaps and perception differences between actors in different parts of the system. Secondly, the thesis suggests an approach to understand the impacts of an agricultural

development programme on gendered perceptions of agricultural information access and organisational sustainability and integration. The study finally proposes to investigate and characterise gendered perceptions of agricultural information access in order to investigate and identify culturally acceptable gender-responsive schemes to further the case for gender institutionalisation in a specific setting.

As mentioned earlier in the introduction, transformative change of socio-cultural gender norms not only take a long time to embed and evolve, they are also extremely complex to measure and evaluate. While this thesis positions certain aspects of its research to identify evidence of socio-cultural change at the institutional and systemic level, the possibility of change over the time of the programme is extremely unlikely. This thesis should be considered as part of a wider, longer term effort to improve the situation of women in Pakistan.

## **1.2 Research Questions**

This collection of four papers (presented as four chapters) seeks to address the research objectives and their research questions in the following four chapters. Details of methods and further literature reviews are provided in each chapter.

In chapter two, the thesis develops a novel method to characterise a country's RAS system in order to highlight differences in perceptions of institutional and organisational functions according to stakeholders, thus enabling the reader an interpretation of a RAS system. It attempts to answer the following questions: How are national agricultural knowledge systems organised? What multisectoral interactions are present in the country's crop health advisory system?

In chapter three, the thesis looks outwards, assessing the role that international RAS initiatives have, if any, in the institutionalisation of gendered agricultural information access. It does so by focusing on a newly developed field activity called a plant clinic, developed by CABI's Plantwise initiative. By analysing the programme's influences across the knowledge value chain, the thesis enables the reader to understand how external RAS initiatives contribute to institutional and organisational change across the knowledge system. The chapter attempts to answer the following question: has the PW approach contributed to a change of institutional and individual perceptions of public provincial RAS systems? What potential successes and failures do these perceptions highlight? Can these results offer theoretical insights into gender-responsive agricultural information access initiatives? Does their attempted systematic integration at the federal level and their activities on the ground allow them the agency to institutionalise gender through targeted extension initiatives?

Chapter four focuses on the individual gendered effects in a RAS system, highlighting the differences between male and female smallholder perceptions of agricultural information access, and suggesting novel ways of creating a more equal access to information enables the reader to understand the basis for change at the practical level. The study focuses on the following research questions: at the individual level, what socio-economic variables affect gendered agricultural information access for male and female smallholders? How can access be improved through targeted extension initiatives in the short-term? How do these variables reflect a nation's gendered socio-cultural norms, and what can we expect in the long-term?

Finally, in chapter five, the thesis focuses on perceptions in order to provide a comprehensive understanding of the national socio-cultural context from systemic and individual perspectives in the formal and informal sectors, and comparing extension workers' perspectives to that of male and female farmers. From a systems' perspective, how do local and federal stakeholders' perceptions differ, and how are these influenced by normative gendered socio-cultural biases? What comparisons can the thesis make between smallholder farmers' gendered perceptions of information access and those of other actors in the RAS knowledge system? Can their analysis realistically result in a better understanding and clear way forward to achieve long term change in the institutionalisation of gender and a shift of consciousness and socio-cultural norms in gendered agricultural information access?

The final chapter summarises the work that has been conducted and attempts to highlight future avenues of research and the broader focus of women empowerment in international development.

### **1.3 Research Methods**

#### *1.12.1 Quantitative vs qualitative approaches*

A mixed-methods approach was envisaged for the delivery of the thesis results, engaging with qualitative and quantitative approaches in various stages of the research. Both have their advantages and their limitations in social science research. Quantitative research and the data collected, through fixed questionnaires with a set number of participants for example, are very useful to uncover trends, and can be done quickly and accurately through a rigid and structured methodology. Data can be thoroughly analysed using simple or sophisticated statistical tests, providing the researcher with great initial facts about socio-cultural phenomena. However, the limitation of quantitative research is its constraint in relating its findings to the socio-cultural context. This is a qualitative approach's strength: through participant interviews or observations, the researcher will get a richer and more contextualised understanding of specific socio-cultural phenomena. Clearly, the mixed methods

approach attempts to portray a fuller picture than a single-method approach, and the thesis attempts this strategy where possible.

While a mixed method approach was favoured initially for each research pathway in this thesis, it wasn't always possible to conduct both quantitative and qualitative activities for logistical and practical reasons.

The thesis draws on quantitative approach activities such as questionnaire surveys in chapter three, four and five, and content analyses in chapter two and five. Qualitative approaches such as interviews were conducted in chapter two, and focus groups in chapter two and three.

In chapter two, the approach considers content analyses to systematically record communication patterns and trends quantitatively, while it also uses multi-level focus groups to gather reflective opinions on the trends seen in the quantitative research. Local focus groups are also conducted in local district offices while the national workshop that enabled the researcher to gather both quantitative and qualitative data was conducted in a hotel conference hall for logistical ease. The exercises that extracted quantitative results were explained in the same manner by the researcher in order to minimise bias, and scoring procedures were identical between all workshop exercises. Interviews which gathered qualifying statements were informal focus on particular themes.

In chapter three, the research strategy utilises identical questionnaire surveys between two populations, which enables a direct comparison between sets of results. A content analysis was also attempted to analyse trends that were drawn out by five-point Likert scale questionnaires. This quantitative data was recognised as useful, yet a more thorough qualitative assessment of the data collected would provide a richer and more thorough analysis of the present situation. This was unfortunately not possible for practical and logistical reasons.

In chapter four, the research strategy again utilises identical questionnaire surveys between two populations (in this case men and women in male-headed households), which enables a direct comparison between sets of results. It was unfortunately not possible to conduct qualitative research exercises, such as focus groups, or face to face interviews, to delve into the quantitative data results, for practical and logistical reasons. Clearly certain results in this chapter would benefit from further qualitative research.

In the fifth and final chapter, again, the research strategy again utilises identical questionnaire surveys between two populations, although it also utilises content analyses to systematically analyse communication and perception trends. While this provides some interesting analyses and results, the

research strategy would benefit from further qualitative research exercises, such as focus groups, or face to face interviews to provide some context to the quantitative trends identified. Again however, this was unfortunately not possible for practical and logistical reasons.

### *1.12.2 Positionality*

It is important to position this research from an ethical and ideological context. More specifically, the researcher's position in relation to the Plantwise programme as well as his bias as a western scientist, researching a theme in a country with different historical and socio-cultural norms.

As a researcher working for CABI (at least during the initial stages of the research) and delivering a thesis funded by the Plantwise programme, positionality must be clearly explained. CABI values academic procedures, analyses and results above all else. As a research institute with high academic outputs, CABI continues to have a strong desire to fund unbiased and fundamentally well researched academic studies, and this researcher has been given the freedom to investigate, understand and evaluate RAS and the Plantwise programme from a gendered perspective in Pakistan.

Secondly, it is important to consider the positionality of a British male researcher investigating gender norms in a country with very different socio-cultural norms. Clearly Pakistan and the United Kingdom have close and complex historical ties, and the researcher has been extremely aware of the sensitivities during his multiple visits to the country. From a gendered perspective, every research activity conducted in the field was carried out in a way to minimise bias and with a view to attain the highest ethical standards. For example, interviews and interactions with women in rural locations were conducted by a professional female enumerator from the region. Moreover, the researcher's presence during the interviews was continually re-evaluated to consider academic bias, ethical guidance, and most importantly the safety of the enumerator and the participant. Therefore, many times it was advised that the researcher should not accompany the enumerator onto household premises. Local workshops were held in convenient locations, usually district offices during quiet times, designed to put the participants at ease. However, this was not always possible as certain research activities were conducted during wheat harvest quotas, which meant many participants (farmers and extension workers) would not be available. The national workshop was held in a central (convenient) comfortable location.

The researcher sincerely hopes that this positionality statement convinces the reader of his honesty and that he has attempted to stay clear of any ideological or academic conflicts of interests.

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## 2. An Approach To Understand Rural Advisory Services In A Decentralised Setting

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### Abstract

As populations increase, so do the challenges in feeding the world. Rural Advisory Services (RAS) contribute positively to food security by ensuring rural populations have access to vital knowledge increasing yields and rural incomes. For historical reasons however, national RAS have often developed into complex networks of stakeholders which can confuse, and even in some cases provide conflicting advice. In order to improve internal and external knowledge of an advisory service, this article investigates the benefits and limitations of an approach that combines qualitative and quantitative stakeholder perception activities at a local and national level. Local and national workshops were held using focus group and open fora techniques in order to portray and visualise a crop health advisory system in Pakistan, a dynamic and complex case study. The approach manages to expose key differences between local and national perceptions of a crop health RAS: whilst both local and national workshop participants decidedly agree on the importance of local (provincial and district level) extension departments, local perceptions clearly identified the strength and value of private sector and community level interactions. At the national workshop, interpretations of ground level activities were vague, yet their mentions of microcredit initiatives, large scale Non-Government Organisation activities and semi-autonomous institutions demonstrate knowledge at a different scale. This approach demonstrates the value of an accessible methodology to measure and understand RAS. Whilst this approach is a key component in assessing the system's dynamism prior to any future development initiative, it needs to refine its integration of gendered perceptions.

**Keywords:** rural advisory services; crop health; methodology; stakeholder perceptions; Pakistan

## **Introduction**

As global populations are projected to rise (Cleland and Machiyama 2017), the challenge of feeding the world takes centre stage (Sustainable Development Goals 2017). It is incumbent on the international community to focus on much narrower objectives to achieve this daunting target. For example, crop losses due to pests, diseases and weeds, whose effects have been shown to reduce agricultural productivity by up to 40% worldwide (Oerke 2006; War et al 2016), is an issue that causes many food insecurity challenges. While industrial food systems involving major commercial farms continually develop comprehensive innovations to reduce pest, disease and weed impacts, they represent only a small proportion of food systems in lower income countries. Up to 500 million smallholder farms supply food to over 2 billion people in Africa and Asia (International Fund for Agricultural Development 2013). They are usually located in isolated rural areas, and unlike large scale commercial enterprises, are not embedded in sophisticated knowledge systems that inform them of the latest knowledge and innovations. Therefore, any serious national efforts to reduce pests, disease and weeds' impacts must take communication with smallholder agriculture into consideration.

Rural advisory services (RAS) provide information and support to rural populations on a range of different social, economic and environmental subjects (adapted from Global Forum of Rural Advisory Services 2016; Leeuwis and van den Ban 2004; Peterman et al 2011), including how to reduce crop losses and consequently increase household income. These services are carried out through field visits; organised group meetings; demonstration plots and increasingly the use of information communication technologies using mass media communications. In the context of crop health, the extension worker is crucial in the information delivery pathway (Rivera 2011). Indeed, advisory services are sometimes solely defined by the presence of agricultural extension agents, and are usually considered the main, or only, pathway to information for the majority of rural households (Anaeto et al 2012). Traditionally designed to provide information on plant health management (Jones and Garforth 1997), the role of the agricultural extension officer is nevertheless evolving.

Agricultural information needs have increased in complexity recently because of a greater awareness by the farmer of the range of issues to consider, and an increase in communications channels to utilise (Rossi et al 2012). For example, farmers around the world want to know for their location where to get the best seeds or the latest varieties; which agricultural inputs to use; what the weather forecast is for the next few weeks; what are the diseases and pests affecting their crops; and where should they sell their products for the best price. Each question may require inputs from, and be supplied by, different sets of institutional actors that have access to the relevant information, and may use different

communication channels. The traditional role of the extension officer may not be able to satisfy these evolving and complex demands in the field at present. Moreover, agricultural extension officers are increasingly being used for other field related activities, such as census-taking or human health campaigns (Anaeto et al 2012), which can further add to their demanding roles, and can reduce morale (Rivera 2011).

Therefore, to cope with farmers' complex needs and within a climate of reduced public expenditures in RAS, the set of institutional and organisational actors that compose RAS at both national and local levels has evolved dramatically in the last few decades (Rivera 2011). What was traditionally a public organisational activity around the world now regularly includes the private sector, civil society and community-led enterprise (Sutherland et al 2013). In order to provide a more comprehensive picture of the knowledge pathways that undoubtedly improves service quality, studies of RAS systems need to consider a variety of local and national stakeholders due to country systems' heterogeneity (Schrempf et al 2013). Moreover, analyses must consider the interactions between these stakeholders, to identify gaps and opportunities to improve efficiency (Spielman et al 2009).

This paper aims to visualise, quantify and analyse multisectoral interactions between various layers of administrations, agencies and institutions in the crop health advisory system in a decentralised nation model. In doing so, the paper suggests a novel approach to represent local and national perceptions of a rural advisory service. This approach (built upon Fanzo et al 2015; Kania et al 2014) can enable analyses to understand intuitive and counter-intuitive complexities of decentralisation in different knowledge systems, both federally and locally.

In order to test this approach, it was important to use a decentralised country (at least regarding crop health) with a strong network of local and federal actors already in place. The following section outlines the rationale behind using Pakistan as a test country, not only due to its decentralised status, strong crop health system, but also its present status in CABI's Plantwise programme ([www.plantwise.org](http://www.plantwise.org)). This initiative is focused on the development of a touchpoint mechanism to increase farmer knowledge, but is supported by its activities centred around its sustainable integration into crop health RAS (Danielsen and Matsiko 2016). Testing the approach according to its enterprise would make an interesting case study.

Institutionally and economically, using Pakistan as a case study would offer some interesting insights. Firstly, agriculture accounts for 21% of the Gross Domestic Product (GDP) and raises 80% of the country's total export earnings. In Punjab alone, 68 million people are located in a rural setting and engaged in some form of rural activity, and RAS are a vital component of the country's economic,

social and political well-being (FAO 2015a). Secondly, with a newly reorganised extension system due to the 18th Constitutional Amendment passed by the Parliament in 2010, organisational procedures and mandates are occasionally unclear (Khan 2015). The federal Ministry of National Food Security and Research (MNFSR) remains the primary agricultural authority in the land for plant health activities, and the social science, extension and marketing wing of the Pakistan Agricultural Research Council (PARC) oversees public rural advisory services. Provinces and districts are given increased autonomy to plan, develop and execute their own crop health projects (Ali et al 2011; Shahbaz and Atta 2014) and perform monitoring, detection and communications activities (Department of Agricultural Extension Punjab 2016). Thirdly and finally, discussions between and within public, private and non-governmental stakeholders on the collaborative approaches to knowledge delivery have traditionally been identified as a weak spot in the country's past activities in agriculture (Chauhan 2014; Davidson et al 2001; Looney 1999). Indeed, whilst RAS are a public sector activity that engage with many different actors, access to agricultural information is low, and even more so for women in rural households (Chauhan 2014; Hassan et al 2007; Lamontagne-Godwin et al 2018). An analysis of local and national perceptions of Pakistan's crop health advisory services system would allow Pakistani decision makers to understand how local or national actors visualise RAS, it would also underline strengths, weaknesses and key interactions in their decentralised economy.

The approach conducts this pilot through the lens of the Plantwise programme (Plantwise 2015). Since 2011, this initiative has focused on improving the exchange of knowledge between extension agents and farmers on crop pests, diseases and weeds in over 30 countries. It focuses on training local extension officers to hold weekly field clinics called 'plant clinics'. These are set up in convenient locations for farmers to bring affected samples of their crop and receive symptom-based diagnoses and recommendations on how to prevent, monitor and control the problem. This in turn helps public rural advisory services focus their research and development efforts on topical problems (Finegold et al 2015), critique their own strengths and deficiencies (Mur et al 2015), and ensures extension workers get more inclusive access to farmers with crop health problems (Lamontagne-Godwin et al 2017). In Pakistan, Plantwise has registered over 100,000 queries from farmers in its 500+ clinics since 2011, and has buy-in from federal and provincial (Sindh and Punjab) authorities. Its wide-ranging activities on targeted crop health problems and overall systems' development is particularly important considering the administrative and political calls for change in this sector (Ul-Haq et al 2014). However, as with any programme, the question of the programme's long-term sustainability remains. From a practical perspective, this study's results can help Plantwise better understand a

country's perception of the crop health advisory services, its integration into the perceived system, and thereby increase the likelihood of programme sustainability in the federal echelons of the country. It can also serve as a vital lesson for other country programmes (and possibly other external initiatives) at various stages of their national integration and sustainability journeys. Moreover, utilising Plantwise as a case study helps the approach focus on the subtle differences between local and national perceptions of the crop health RAS.

The paper firstly discusses the combination and justification of the methodologies used in this approach. The study then focuses on the results obtained at local and national workshops, and analyses sectoral responses. Finally, the authors discuss the use of this novel approach to not only highlight key points pertaining to decentralisation in theory and in Pakistan, but also to identify an initiative's place and durability in a system.

## **Methods**

The study was conducted over the period of June 2014 to June 2015 in the Punjab province of Pakistan. It used desk reviews and informal discussions with key individuals lasting between 30 and 60 min to identify and invite key stakeholders to workshops in July and October 2015 in Jhang and Bahawalpur districts. These districts were selected for the study because of their comparable agroclimatic, economic, agricultural and infrastructural profiles.

Jhang and Bahawalpur districts were chosen for a variety of reasons. The two districts are part of a wider study on the gendered impact of the Plantwise programme ([www.plantwise.org](http://www.plantwise.org)) at the institutional and individual level, Jhang being the control site and Bahawalpur the test site (Lamontagne-Godwin et al 2018). Bahawalpur was chosen specifically because it is the oldest running Plantwise programme district in Pakistan, and gives the wider study the best chance to understand the programme's integration in Pakistani RAS.

Both districts have a similar population size, density, and proportion of urban to rural population (Pakistan Bureau of Statistics 2019). From a socio-economic perspective, both districts have a similar incidence of food poverty in farming households (31% and 35% respectively (Qureshi and Arif 2001)), and at the household level, have similar family sizes, and percentage of illiteracy (Amjad et al 2008).

Local focus groups were composed of public sector staff, while the national workshop had a wide range of stakeholders present (Table 1). Unfortunately, organisations chose to invite male participants for the national workshop and many female agricultural officers were in the field during wheat quota

inspections for the local focus group discussions. The authors did not achieve the attempted gender balance in the study. Two women, an agricultural extension agent working for the Provincial Directorate of Extension and Adaptive Research (PDEAR), and an assistant district director for the Provincial Directorate of Pest Warning (PDPW), attended the Jhang local workshop, meaning that results cannot disaggregate the data quantitatively, but attempt a qualitative assessment.

Background information	National workshop		Local workshop	
	Total	Total	Districts	
			Jhang	Bahawalpur
<b>Number of respondents</b>	<b>25</b>	19	10	9
Number of men	25	17	8	9
Number of women	0	2	2	0
Number of groups	1	7	3	4
Number of all male groups	1	6	2	4
Number of all female groups	0	1	1	0
Number of high-level decision makers	19	5	4	1
Number of middle level workers	6	11	4	7
Number of low-level workers	0	3	2	1
Number of post graduate education holders	25	12	6	6
Number of graduate education holders	0	4	2	2
Number of diploma holders	0	3	2	1
Number of different departments represented	19	5	3	2
Median years of experience in extension	N/A	13.5	16	11
Average years of experience in extension	N/A	14	16	12

*Table 1: Composition of national and local workshop participants*

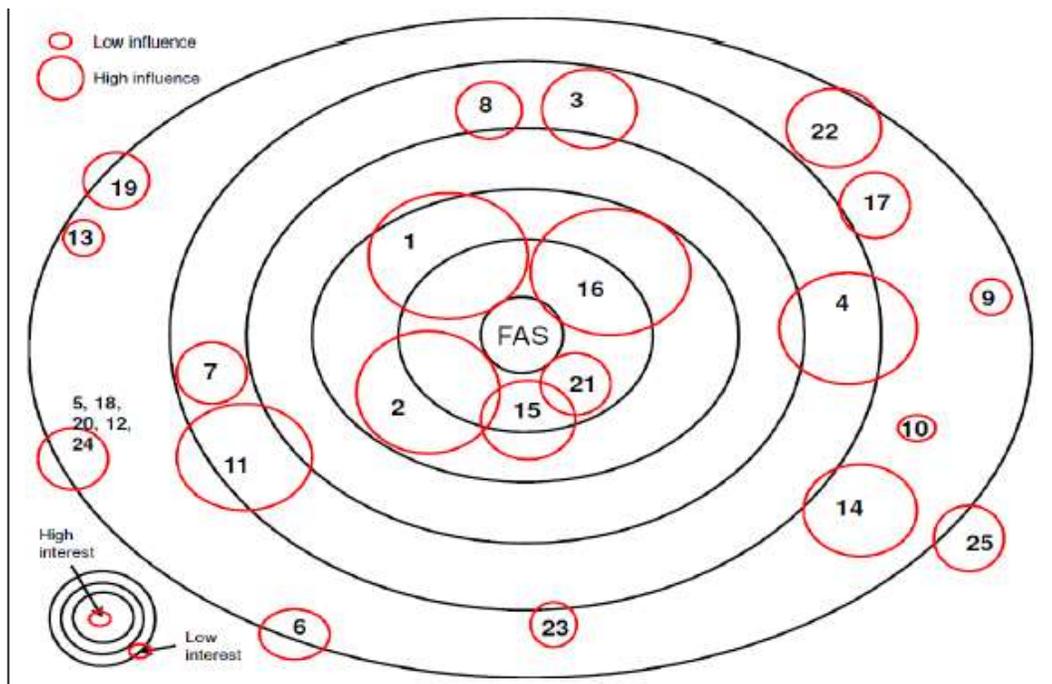
In order to be comparable, local and national activities followed the same process. Focus groups workshops were held in the executive district offices in both Jhang and Bahawalpur. They lasted approximately 3 hours each. The session was divided into three sections: (a) identify key stakeholders and their roles in the rural advisory services related to crop health; (b) identify their interests and influences in the system; and (c) map stakeholders according to the strength and nature of their linkages. The activities were demonstrated and discussed beforehand to ensure that each individual had a clear understanding of what was expected. Data were recorded through the use of paper graphs, similar to Figures 1 and 2, interaction matrices, and English-speaking rapporteurs were asked to describe the results of focus group activity to ensure clarity. Summary sessions, explaining what had been discussed, and clarifying specific points, were conducted at the end of every section to improve

the trustworthiness and reliability of the data. In both the local and national focus group discussions, participants worked in groups before bringing the discussion to debate. Overall, the perception was that the exercises were very useful: many individuals actually mentioned the need to perform these studies internally in the future to understand and improve their own activities in other domains.

The study considers the bias inherent in these workshops held under the CABI banner, thereby possibly distorting participants' view of CABI's position in RAS. Though the mention of CABI was inevitable during the initial workshop introductions, any CABI activity was not mentioned thereafter in order to minimise overrepresentation of CABI and the Plantwise programme. Mentions of CABI should however not solely be seen as bias. CABI-Pakistan is considered an integral part of the country's research and extension services development, interacting with public, semi-autonomous and academic institutions for the last 60 years on a wide range of biological topics, including biological control and integrated pest management (Beg and Khan 1982; Rehman et al 2014).

The approach firstly attempts to disentangle this network of stakeholders according to their interactions, a concept akin to the Agricultural Innovation System (AIS) (Atari et al 2009; Ingram 2008; Klerkx et al 2006; Manderson et al 2007) that focuses on the interdependence between actors, considered irrelevant if studied individually (Freeman 1987; Klerkx et al 2010; Lundvall 1992; Nelson and Nelson 2002). This enables studies to unravel physical structures into systemic and dynamic processes, understand practices and behaviours that create change, and deliver knowledge in a local and national setting (Carvalho et al 2015; D'Allura et al 2012).

The approach also adapts essential network visualisation techniques (Newcombe 2003) and enables decision makers to gauge a system's capacity to innovate and progress (FAO et al 2015). They focus on actors' relative influence and interest in decision making activities in the innovation system (Mayers and Vermeulen 2005) to graphically visualise a ranking mechanism given to each participant (Bourne and Walker 2005; Brugha and Varvasovszky 2000; Labarthe 2009; Lindenberg and Crosby 1981;).



National stakeholders' interests and influences in the RASIS

#	Actors identified	Acronym
1	Provincial Directorate General of Extension & Adaptive Research	PDEAR
2	Provincial Directorate General of Pest Warning & Quality Control	PDPW
3	Provincial Directorate General of Agriculture Information	PDAI
4	Provincial Directorate General of Agriculture Research	PDAR
5	Provincial Directorate General of On-farm Water Management	PDWM
6	Federal Seed Certification & Registration Department	FSC
7	Universities/colleges	Uni
8	Pakistan Agriculture Research Council	PARC
9	NGOs/INGOs, CSOs, Donors, Non-profits	NGO/CSO
10	Crop Diseases Research Institute	CDRI
11	CABI/Plantwise	CABI/PW
12	Space & Upper space Atmosphere Research Corporation	SRC
13	Federal Department of Plant Protection	FDPP
14	Private sector	PS
15	Ministry of National Food Security & Research	MNFSR
16	Provincial agriculture departments	PAD
17	Punjab Seed corporation	PSC
18	Provincial Directorate General of Agriculture Economics & Marketing	PDAEM
19	Diagnostic laboratories	DL
20	Provincial Directorate of Crop Reporting Services	PDCRS
21	Farmers/Provincial Farmer Organizations	FOs
22	Print & Electronic Media	Media
23	Pakistan Horticulture Development & Export Company	PHDEC
24	National Animal & Plant Inspection Services	NAPIS
25	Pakistan Central Cotton Committee	PCCC

Figure 1: National influence and interest mapping.

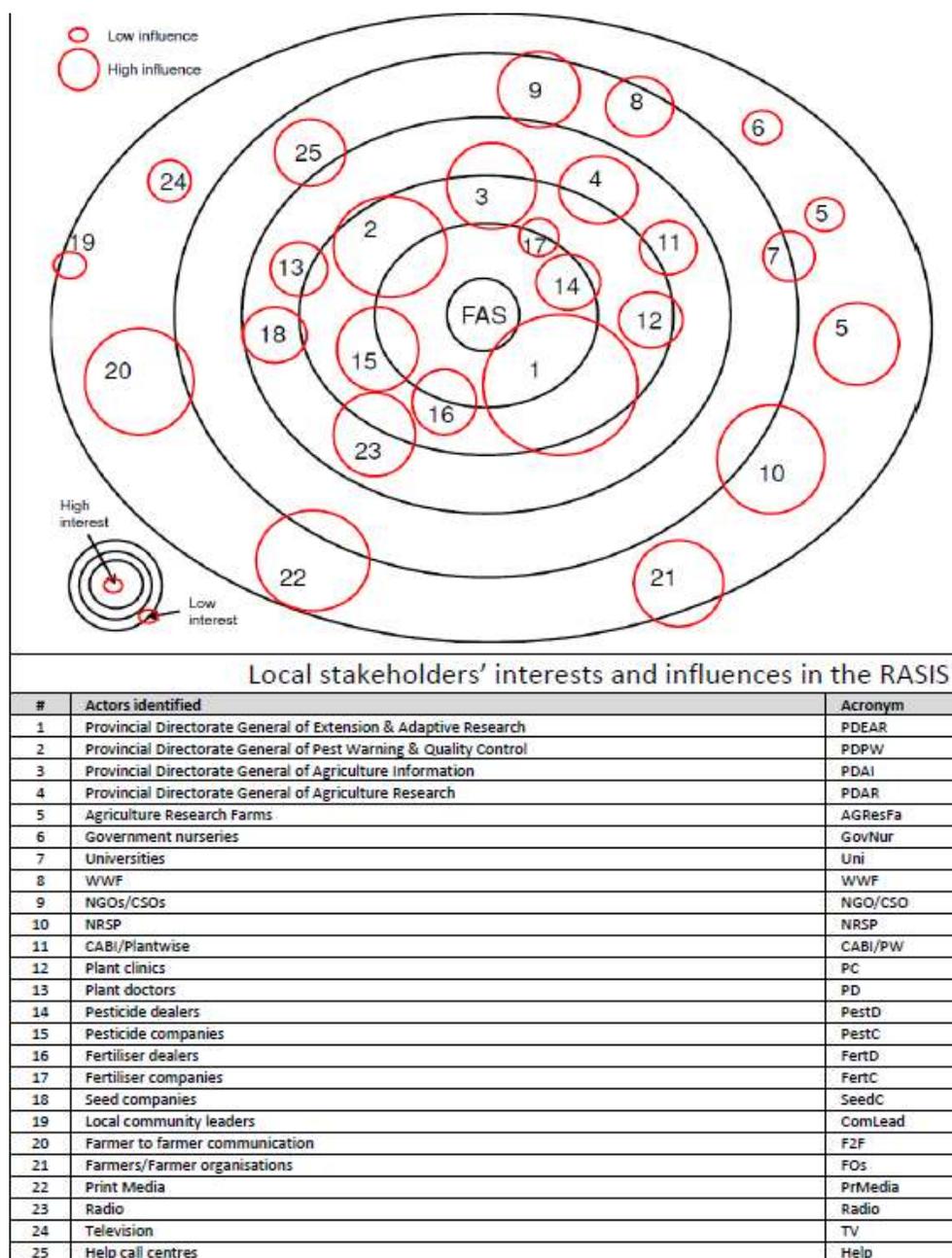


Figure 2: Local influence and interest mapping.

They also establish linkage strengths: a weak-ranked interaction was defined as an interaction that is irregular and on an ad-hoc basis, for example between individuals of the two actors, intermediate interactions defined as official and regular meetings between defined individuals, and a strong interaction was described as a situation where different stakeholders pursue specific activities, such as

local or national programmes, that build and strengthen the rural advisory service innovation system. Participants were told intermediately ranked interactions are official and regular meetings between defined individuals, and a strongly ranked interaction is defined by stakeholders pursuing specific activities, such as local or national programmes, that build and strengthen their own activities in the knowledge system. Interactions between stakeholder sectors were scored and mapped, although scores should not be compared between national and local workshops, as the number of groups in the workshops differed.

Data were collated onto Microsoft excel in Pakistan, and cleaned and analysed in the SPSS™ statistical package in the UK. Due to the categorical nature of the dependent and independent variables, the study used cross-tabulated descriptive statistics and binomial Z tests, applied for two independent population proportions (null hypothesis stating no difference between proportion of national responses and the proportions of local responses) correlated with a 5% margin of error.

## **Results**

Both national and local workshop participants listed 25 considerably different stakeholders involved in crop health advisory services (Table 2). National workshop participants focused on high level institutions, using ‘broad-brush’ terms for the majority of stakeholders in other sectors, and only occasionally delved into the detail. They mentioned the importance of semi-autonomous bodies. Local focus groups cited specific individual units, and infrequently broadened the scope. ‘Provincial agricultural departments’ and ‘diagnostic laboratories’ in the national workshop, and ‘plant doctors’ and ‘plant clinics’ in the local workshops were deemed ambiguous terms as they fulfil various roles, and categorised as ‘other’.

Categorisation of sector	National workshop		Local workshop	
	Name of stakeholder	Number	Name of stakeholder	Number
Public services	<i>FDPP; FSC; MNFSR; PARC; CDRI; PDEAR; PDAR; PDPW; PDAI; PDWM; PDAEM; PDCRS; NAPIS</i>	13	<i>PDEAR; PDAR; PDPW; PDAI; Agricultural Research Farms; Government Nurseries</i>	6
Semi-autonomous bodies	<i>PSC; PCCC; SRC</i>	3		0
Private sector	<i>Private sector; PHDEC</i>	2	<i>Pesticide companies/dealers; Fertiliser companies/dealers; Seed Companies</i>	5
Non-governmental	<i>NGO/CSO; CABI/Plantwise</i>	2	<i>NGO/CSO; WWF; CABI; NRSP</i>	4
Community led	<i>Farmer organisations</i>	1	<i>Community Leader; Farmer to farmer; farmer organisations</i>	3
Academic	<i>Universities</i>	1	<i>Universities</i>	1
Media	<i>Print and electronic media</i>	1	<i>Radio; television; Print media; Help call centres</i>	4
Other	<i>Diagnostic Laboratories; Provincial agriculture departments</i>	2	<i>Plant Clinics; Plant Doctors</i>	2

*Provincial directorate General of Extension and Adaptive Research – PDEAR; Provincial directorate General of Pest Warning & Quality Control of Pesticides – PDPW; Provincial directorate General of Agriculture Information – PDAI; Provincial directorate General of Agriculture Research – PDAR; Provincial directorate General of On-Farm Management – PDWM; Federal Seed Certification & Registration Department – FSC; Pakistan Agricultural Research Council – PARC; Non-Government organisation/Civil Society organisations – NGO/CSO; Crop Disease Research Institutes – CDRI; Space & Upper Space Atmosphere Research Cooperation – SRC; Federal Department of Plant Protection – FDPP; Ministry of National Food Security & Research – MNFSR; Punjab Seed Corporation – PSC; Provincial Directorate General of Agriculture Economics & Marketing – PDAEM; Provincial Directorate of Crop Reporting Services – PDCRS; Pakistan Horticulture Development & Export Company – PHDEC; National Animal & Plant Inspection Services – NAPIS; Pakistan Central Cotton Committee - PCCC*

**Table 2.** Composition of national and local workshop organisations.

Stakeholder relationships and their interests/influences provide insights into stakeholders' roles and investments in the innovation system through an intuitive visual representation. The influence/interest (Figures 1 and 2 above) and interaction mapping exercises provided by the different focus groups portray a picture of perceptions of RAS in the Punjab province of Pakistan from a national (Figure 3) and local perspective (Figure 4).

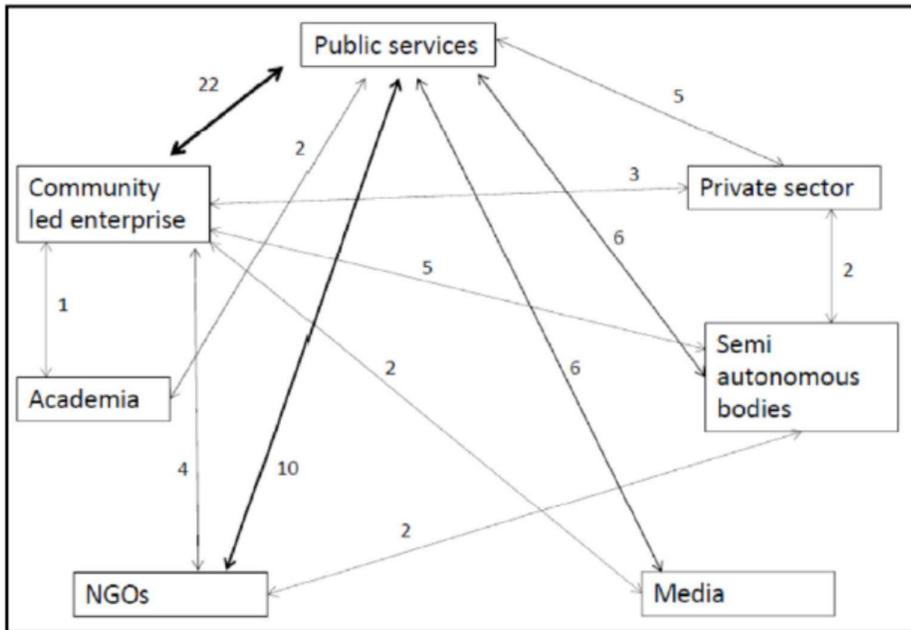


Figure 3: National interactions between sectors with associated scores

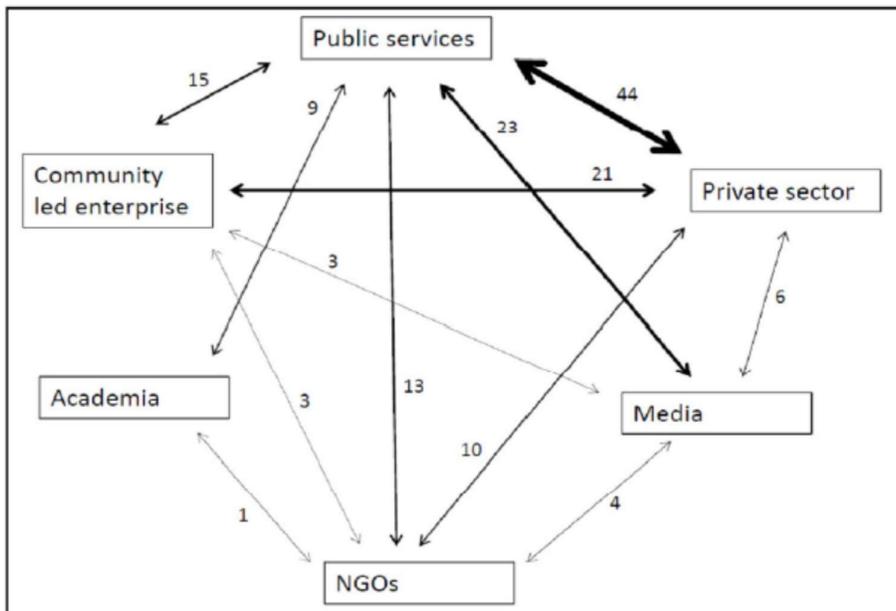


Figure 4. Local interactions between sectors with associated scores

### *Public Sector*

Public actors mentioned were different in both exercises: in the national workshop, six of the 13 public stakeholders functioned at a national level; the remaining seven were provincial (Table 2). In the local workshops, all public stakeholders were part of the provincial administration (agricultural research farms and government nurseries are linked to provincial headquarters). The perception of provincial administrations' preponderance in crop health advisory services is statistically significant ( $Z = 2.01$ ;  $p < 0.050$ ). Both sets of participants ranked provincial departments as highly influential and interested in crop health advisory services: PDEAR was perceived by all as the most influential and interested actor, with PDPW, the Provincial Directorate for Agricultural Information (PDAI) and the Provincial Directorate for Agricultural Research (PDAR) decreasing in interest and influence accordingly. Agricultural research farms and government nurseries were perceived as weak. Federal actors, such as the Ministry of National Food Security and Research (MNFSR), were seen as highly interested but of limited influence, or to have both little interest and influence, like PARC (Figures 1 and 2).

In both workshop settings, public sector interactions comprise a healthy proportion of all interactions in crop health advisory services (73% in the national workshop and 68% in the local one). In the national workshop, public services are mainly linked to community-led enterprise and Non-Governmental Organisations (NGOs) (Figure 3), whilst in the local workshop, the private sector and the media are its two biggest linkages (Figure 4). Moreover, in both workshops, PDEAR and PDPW are the highest interacting members of the public services (interacting internally with other members, as well as externally), with the Federal Department of Plant Protection (FDPP\_ and PDAI also perceived to have a healthy interaction with surrounding stakeholders. PDAR, government nurseries and agricultural research farms were seen to be fairly disconnected at a local level (Figure 4). Indeed, in spite of a plethora of research stations (63 currently in operation), contacts between public research and extension departments remain scant. Extension services in Pakistan remain "traditional, using old extension methods, top-down and technology-driven approaches and hardly any female field extension staff are employed. Public extension suffers from a lack of in-service training, mobility means, scant career development opportunities, and grossly inadequate operational funds" (Participant X7, national workshop). Moreover, "the link between PARC, provincial extension and provincial research institutes is strengthening, but there is still a frustrating and recognised communication gap between these institutions and non-public sector stakeholders" (Participant X8, national workshop).

In the women's group, PDAR and PDEAR were considered most interested and influential, whilst private fertiliser dealers and companies were seen as interested but with little influence. The link between the private and the public sector was perceived as strong, similarly to men's groups. The female group believed the provincial extension departments shared their information well with multiple sectors, but recognised that the pest warning and quality control departments need to be more aligned and communicative with other stakeholders in the RAS, particularly the extension department. The female group's beliefs and perceptions were not different to the three other male groups.

### *Private Sector*

In the national workshop, the 'private sector' was perceived to have influence but little interest. The linkages within the private sector are strong, particularly at the national level (as fertiliser and pesticides can be produced by the same company). Their links with other sectors of the RAS were weak, representing approximately 15% of all interactions in the system (the "private sector needs to be more open to collaborating with other sectors, particularly the NGO sector and academia" Participant X9, National workshop). This is in contrast to perceptions of local workshop participants, who identified the five private sector services (Table 2) as interested but largely without influence (excluding pesticide companies who were seen as influential) (Figure 2). The private sector is perceived to interact strongly with four of the five other sectors, a statistically different difference to the national workshop perceptions ( $Z = 5.49; p \ll 0.05$ ). In the women's group, the private sector had the largest number of links with other sectors. Indeed, in three of the four local focus groups discussions, the link between agricultural extension and the private sector was highlighted as crucial ("the coordination and information sharing linkages need to be cemented in order for the state to have a much stronger regulatory process and improve the quality and safety of pesticides and fertiliser") (Participant X2, local workshop). However, participants believed the collaboration is held back by the fundamental differences in their approach, one focused on social wellbeing, the other on profits ("I don't believe the agrodealers themselves are geared towards profits, the capitalist approach of growth does not help to serve the farmers in the long term, only profits in the short term" (Participant X3, local workshop). The private sector's role in the system has its advantages, yet there are many issues that need to be tackled at the policy level. For example, micro-finance is unregulated, and farmers are confused about its potential use: "it is not easy for small farmers to get credit due to different and often illogical collateral requirements" (Participant X7, national workshop). Moreover, whilst the private sector has been very active for years in the sale of various farm inputs like seed, fertilizer, pesticides, herbicides and farm machinery, their prices are often too high for the average smallholder

to profit from their offers. Additionally, “companies work only with their own contracted farmers or those who have informally agreed to follow their instructions in crop production, and the programmes exclude farmers who do not join their extension activities” (Participant X4, local workshop). The motives behind extension support by the private companies are either to obtain good quality raw materials from growers, and/or to enhance the sale of companies’ products. Whilst this is not a problem, as farmers also benefit by gaining technical knowledge and skills and enjoying satisfaction of a guaranteed market for their harvest at reasonable prices, the “system is still largely in favour of the major companies” (Participant X10, national workshop).

Semi-autonomous bodies were thought to have little influence and interest but had good links with community level enterprise and public services such as PARC and NARC. In the local workshop, no semi-autonomous bodies were selected.

#### *Non-Government Organisations*

National participants perceived ‘NGOs and CSOs’ to have little interest and influence. CABI was mentioned separately and was seen to have moderate influence and interest. Over half of civil society’s links are with the public sector (the second strongest in the entire exercise), and is seen to be connected to community led enterprise and semi-autonomous bodies. However, these are weak. This is corroborated by individual statements: NGOs, “need to be more open and collaborative with the public sector, and understand the private sector’s role in the system” (Participant X6, national workshop). A lot of the NGOs’ aims “are not aligned with government short-term and long-term strategies” (Participant X6, national workshop) though NGOs and universities are “increasingly discussing diagnostic and publication support for complicated plant health issues, seed and pesticide testing with plant protection departments, and soil and water testing laboratories at the district level” (Participant X7, national workshop). The NGO sector “does work well with community-led enterprise, particularly farmer organisations, but there is not enough knowledge coming out of this interaction for the government to use as evidence to push for reform.” (Participant X6, national workshop).

In contrast with the national workshop, local workshop participants listed three specific actors. These were perceived to have moderate interest (CABI perceived to have the highest interest) and influence (apart from the National Rural Support Programme NRSP which has high influence), although it was acknowledged that “NGOs are more focused on the short term compared to other sectors” (Participant X4, local workshop). This sector was better connected than the national workshop perceived (although not statistically significant), as they account for almost a quarter of all interactions. In the

case of farmer organisations for example, they are developing better links with the private sector, from a chemical and crop selling perspective, although they need more support from the government.

### *Community Level Enterprise*

National workshop participants defined community level activities with one term: ‘farmer/farmer organisations’ compared to a more detailed assessment by local workshop participants, who coined three separate terms (Table 2). Whereas national participants viewed farmer/farmer organisations as highly interested but not influential (Figure 1), local participants viewed them as highly influential and less interested (Figure 2). In the national workshop, community-led enterprise interactions are linked to every other stakeholder group (Figure 3), compared to the local workshops, where community-led enterprise interactions maintain a strong connection with the private and public sectors, but surprisingly weak elsewhere (Figure 4). The difference in interaction totals between both workshops is statistically significant ( $Z = 4.04; p << 0.05$ ). It was stated farmers “mostly interact with each other for best practice information sharing on crop health” (Participant X1, local workshop) and to get benefits from each other experiences. Farmers mainly interact with institutions such as PDEAR and the private sector “which provide technical assistance to the farmers and also input for their crops” (Participant X1, local workshop). Farmer organizations have their own manifesto and rules but mostly lack human resources and an understanding of political and administrative frameworks, so they are heavily reliant on PDEAR and the private sector for their crop health and procurement issues: “Although farmers are a crucial community for the success of this nation, they rely almost exclusively on PDEAR and the private sector for availability of high-quality agricultural inputs, vocational training for smallholder producers, agricultural financing, and access to technology” (Participant X2, local workshop).

### *Media*

National workshop participants labelled media simply through ‘print/electronic media’, whereas local workshop participants defined media through four terms: ‘radio’, ‘print’, ‘television’ and ‘help call centres’ (Table 2). Both workshops agree that media may not have much interest in rural advisory services, but have moderate influence (apart from television which has low influence).

There is a mild significant difference ( $Z = 2.12; p < 0.05$ ) between national and local perception of interactions of the media with other sectors in the plant health system as local workshops perceived media to be better connected than national participants. Both workshops agree however that there is a strong interaction with public services (Figures 1 and 2).

### *Academic*

Both sets of workshops agreed that the academic sector, defined by the term ‘Universities’, had low influence and interest in the RAS system, and weak interactions with different sectors. In both workshops, the most important interaction is with the public sector (PDPW in the national workshop and PDAR in the local workshop).

## **Discussion**

This section initially focuses on the approach’s ability to highlight key issues in Pakistan as well as on decentralisation processes in general. The discussion then investigates how this approach helps development activities understand their integration into a national or local system.

### **Highlighting Decentralisation Issues**

This approach highlights key decentralisation issues internationally and within Pakistan, such as the strength of sub-federal public services in ensuring RAS: both national and local partners recognised the importance of provincial over federal authorities to carry out specific RAS activities (Mengal et al 2014). The perception of the preservation of a top down approach is also representative. In Pakistan, weak/confusing federal direction and communication to provincial administrations, seldom involving local representatives, further fuels the perception of top-down decision-making decentralisation was keen to remove (Abbas et al 2009; Gill and Mushtaq 1998; Luqman et al 2007). This is important to consider in light of the deficiency of advisory services in smallholder agriculture in Pakistan (Abbas et al 2009; Burton et al 2012; Davidson et al 2001; Davidson and Ahmad 2002), the increased administrative bureaucracy, and local staff’s lack of clarity and low morale in their extension roles (Shahbaz et al 2011). In Pakistan, effective and efficient decentralisation as a tool in the governance of natural resources and information flow will only be fully realised when there is engagement with local communities and administrations about local issues (Nagrah et al 2016; Wahid et al 2017). This statement has been taken to heart by some, notably Farmer Services Centres (FSCs). These were developed to engage with local communities in the Khyber Pakhtunkhwa province (Intikhab 2014; Shah et al 2016) and are fulfilling vital common services, even if there is still room for improvement (Khan et al 2017; Shah et al 2016).

The study also highlights a lack of understanding of roles in crop health advisory services, demonstrated by the over-simplification of certain sectors’ identities. For example, local workshop participants dissected the actors in the private sector, distinguishing between companies and individuals; they even separated actors according to industry, highlighting seeds, agrochemicals and

fertilisers. National level participants on the other hand, grouped privately owned/run services simply as ‘the private sector’, and did the same in the NGO and media sectors. This may be for two reasons: firstly, an increased awareness of public sector constraints at the local level due to decentralisation and the importance to address these by collaboration with other sectors, particularly with the private sector (Riaz 2010). Indeed, public services have been running crop health RAS since Pakistan’s independence. That is, until the successful privatisation of agricultural input supplies in the 1970s during the green revolution (Riaz 2010), which went on to dominate private sector extension activities, offering comprehensive plant protection packages that in some cases cut out the need for the public sector (Davidson et al 2001). This situation had its advantages (Khooharo et al 2008; Zhou 2009) and limitations (Ali et al 2011; Davidson et al 2001; Khooharo 2008; Riaz 2010).

At the national level, whilst an awareness of sectoral collaboration is not present in the results (as demonstrated by the national workshop’s simplistic grouping of ‘private sector’), the situation is nuanced: indeed, certain participants did acknowledge their lack of knowledge openly in the group sessions, especially on the topic of the private and NGO sectors. However, their knowledge focuses on complex national rural challenges, broaching the subjects of semi-autonomous bodies, or microfinance, whose regulatory processes are usually overseen and discussed at the federal level (Hussein 2009).

Secondly, this over simplification could be representative of a wider perception problem in Pakistan’s institutional governance and communication in multi-sectoral domains. A recent national innovation system study states robust national/local technology exchanges, downstream diffusion, and entrepreneurship activities are all vital in order to build and maintain strong collaborations in diverse sectors in Pakistani innovation systems (Ul-Haq et al 2014). In crop health, certain national level institutions are equipped to deal with this challenge: The National Agricultural Research Council (NARC) for example set up local and national commercial initiatives to bridge the gaps and deal with the deficiencies in innovation diffusion, such as the semi-autonomous ‘Pakistan Horticulture Development and Export Company’. Whilst these initiatives are important to the overall federal strategy, they focus almost exclusively on national level issues. This is aptly demonstrated by their absence in local discussions, and pertinently highlights communication and governance issues mentioned above.

These two issues reveal the ambiguity that exists in integrating collaborative approaches most effectively, particularly between local and national settings in the majority of knowledge systems around the world. The insights gleaned from this study are especially important considering current

innovation network research and its effect on knowledge (Esparcia 2014) and entrepreneurship (Autio et al 2014). Indeed, focusing the attention of theoretical, managerial and policy implications of innovation on a particular domain, crop health, could lead to a change in many national public administrations' simplistic perceptions of different sectoral activities in the future.

### **Highlighting an Initiative's Position and Durability in a System**

The Plantwise programme is focused on developing three main themes in collaboration with federal and provincial authorities at the national and local levels: the field based plant clinic, which gives crop health advice to individual farmers, the online knowledge platforms—namely the open access Knowledge Bank ([www.plantwise.org/knowledgebank](http://www.plantwise.org/knowledgebank)) and Plantwise Online Management System ([www.plantwise.org/POMS](http://www.plantwise.org/POMS))—and a holistic Plant Health Systems approach, dedicated to improving communication between key sectors in crop health services. The responsibility for the implementation of clinics is usually held at the provincial level due to its field activities, although national partners are generally kept aware of current status. Both online platforms serve both the local and national levels as they register clinic query results for local and national level enquiries; they also provide open access crop health information on continental and national issues. Finally, the plant health system approach also deals with both local and national partners, as it attempts to foster a general collaborative approach on crop health.

This methodology could be useful for local and national governance programmes to understand and integrate activities more efficiently. For Plantwise, this approach can help programme implementation teams understand local and national actors' goals, influences and interests, enabling stronger and clearer linkages. It would also allow a wider use of comprehensive knowledge platforms such as the Knowledge Bank. The methodology's results are vital for programmes to acknowledge their places in the local and national system in order to continually integrate themselves.

### **Recommendations for Rural Advisory Services**

A cohesive understanding of relationships and roles in crop health advisory services is vital to enable the international, national and local community of actors to design and maintain efficient systems. Indeed, a fragmented understanding and subsequent implementation of stakeholder activities in crop health are limiting the country's ability to provide a service deemed acceptable under global and national pathways to development. Differences highlighted throughout the study were traced back to a lack of awareness and understanding by national participants of the capacity, needs and collaborations of advisory services at the local level. National interests should for example analyse local participants' positive perceptions of the private sector, having been in contact with representatives, including

agrodealers, far more often. Knowledge created and implementation activities run locally by NGOs and farmer organisations could also be the subject of a more targeted awareness campaign by the public and private sectors as well. Crop health actors involved in rural advisory services in Pakistan could potentially be well served by investigating perceptions of stakeholders who are located at the other end of knowledge value chain, the end users. In essence, an improved understanding of ground level partnerships for policy strategizing at the federal level needs to be combined effectively with a clear understanding of provincial administrations roles in planning and budgeting responsibilities in order to streamline advisory services.

### **Approach Considerations**

The approach used to investigate the difference in perceptions between local and national stakeholders in the crop health advisory services of Pakistan is innovative in its combination of methodologies, adapting readily available and accessible quantitative tools with low cost qualitative assessment activities. Their use in comparing local and national settings is experimental and subject to the devolution climate in many low-and-middle-income countries. The analysis can be repeated, and their interpretation compared to previous results using the same methodologies (a very similar set of stakeholders would need to be invited in order to reduce bias, or improve replicability of experiment), giving the approach a pragmatic use for development initiative to measure their impact. Finally, this tool was used on a decentralised model. Other models could also compare to test the validity of the method in the future. Moreover, the model is based on perceptions of interested stakeholders, which can sometimes emphasise bias. In order to link to other known approaches in agricultural innovation system debate, more in-depth tools should incorporate national and local social network analyses. Moreover, this approach was keen to investigate perceptions through a gender lens. Unfortunately, it was not possible to conduct such a test. Further efforts with this approach should attempt to incorporate these standards, as Kingiri (2013) does with AIS.

### **Conclusions**

The theoretical construct of a RAS system in the academic literature unfortunately does not translate into practice often enough: whilst it is the scientific community's responsibility to describe and analyse the current RAS outlook, it should also look to build better descriptive and analytical systems that are accessible and available to the non-academic community. This study attempted to develop and test an approach to analyse and understand national and local perceptions of a crop health advisory service system that can be replicated in many different settings, including other countries and other rural advisory knowledge systems. The authors consider this approach an important contribution to

the literature as it enables participants to have a detailed yet pragmatic understanding of a knowledge system, analyses perception differences that are usually the basis for political conflicts and power struggles, and forces individuals to reconsider their assumptions on systemic processes. It also gives initiatives, such as Plantwise, an opportunity to analyse the status of their national and local efforts to improve crop health advisory services. Finally, whilst this study could not accommodate gender-disaggregated results, the authors believe it is vital to integrate these types of socio-economic factors in order to get a more comprehensive understanding of RAS.

### **Author Contributions**

Julien Godwin was the main researcher and writer for this study. Dr Peter Dorward and Dr Sarah Cardey supported the development of the study's thought processes, whilst Irshad Ali helped during the national workshop, and Naeem Aslam helped throughout, in particular for the local workshops in Jhang and Bahawalpur.

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### 3. Analysing Support Towards Inclusive And Integrated Rural Advisory Systems

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#### Abstract

Public Rural Advisory Services (RAS) have adapted to different socio-economic scenarios in politically diverse countries with the help of the third sector supporting dedicated RAS programmes. The Plantwise (PW) programme, led by CABI and designed to increase food security in over 30 countries, is a good example of a public/NGO partnership, although recent evaluations have questioned its impacts on gendered agricultural information access. This study aims to investigate Plantwise's gender impacts from an individual and institutional viewpoint, interviewing smallholder farmers and extension staff involved in, and outside of, the Plantwise programme in Bahawalpur and Jhang district in the Punjab province of Pakistan. This serves to highlight their impacts on systemic processes which ultimately have the potential to contribute to gender-transformative change, and a more efficient and sustainable RAS. Results show differences between extension workers in a PW district and a non-PW district, and between plant doctors and non-plant doctors in a PW district, though none were significant from a gendered perspective. There were interesting findings highlighting the plant clinic's capacity as an agent of change, but the low turnout of women at clinics did not reinforce the clinics' capacity for change from a female perspective. Information from systemic, male, and female-specific analyses are important to consider for PW from a practical perspective, such as the importance of spiritual locations. This study into the Pakistani PW initiative also offers an opportunity to contribute to the growing body of academic literature on the individual and institutional impacts of international development programmes, helping to understand wider aspects of international development involvement in RAS. From a practical perspective, this study also enables PW and other international development initiatives to better understand and interpret stakeholders' perceptions, highlighting the importance of design and investment in participatory

approaches to enable longer term impacts, especially focused on gender. It will also help the PW programme assess and understand implementation challenges in order to attain impact on the ground and be a driver of positive change in the country.

**Keywords:** Rural advisory services; non-government organisation; monitoring and evaluation; gender; female farmers; extension worker

## **Introduction**

National administrations around the world have championed the use of public Rural Advisory Services (RAS) – services that provide information and support to rural populations on a range of different social, economic and environmental subjects (adapted from GFRAS 2016; Leeuwis and van den Ban 2004; Peterman et al 2011). These publicly run services have had to adapt to different socio-economic scenarios in many politically diverse countries. In many commonwealth countries for example, rural advisory services have had to adapt from supporting export crops traditionally favoured by colonising countries, to focusing on serving large populations of smallholder agriculture since their independence to increase subsistence food production (Anderson and Feder 2004). In this instance, dedicated RAS programmes were vital to structure and implement specific targets surrounding the diffusion of agricultural innovations and improving agricultural knowledge in society and in the household (Jones and Garforth 1997) and lately, about gender empowerment (Farnworth and Colverson 2015). The majority of these public RAS programmes have historically been supported by external organisations collectively known as “the third sector”.

The Plantwise (PW) programme, led by CABI and designed to increase food security in over 30 countries, is a good example of a public/NGO partnership (Evidence on Demand 2015). Working in close collaboration with a variety of national and international stakeholders, the programme strengthens capacity and resilience of the national and local plant health systems, enabling them to provide farmers with the knowledge they need to ‘lose less and feed more’. It does this primarily through the development of sustainable networks of plant clinics run by existing agricultural extension agents where farmers can find practical science-based plant health advice for any crop and any problem (Majuga et al 2018). The plant clinic network is supported by an online knowledge platform, the Knowledge Bank, a gateway to actionable plant health information, including diagnostic resources, analytical tools, pest management advice and front-line pest data for effective local, national and regional vigilance (Leach and Hobbs 2013). These two resources form the “Plantwise approach” that strengthens a country’s RAS system through a sustainable knowledge and coordination system (Romney et al 2013).

Recent independent impact assessments of the PW programme approach that encompass a range of different methods to justify the programme's success and impact on the ground have generally been favourable (American Institutes for Research 2018; Evidence on Demand 2015). However, impacts surrounding agricultural information access from a gendered perspective were not as convincing. Recent evaluations have described the need for improved gender specific activities (Evidence on Demand 2015), which can be traced back to poor women attendance of clinics and a disproportionate number of male staff trained in the programme. This may not be due to the programme's lack of efforts, but the restrictive and unequal nature of gender norms in a country. In any case, further efforts are needed to understand the role and impact of PW in gender-specific institutional changes (Evidence on Demand, 2015).

This study therefore aims to investigate Plantwise's gender impacts from an individual and institutional viewpoint. It focuses on end-users (male and female farmers) and service providers' individual interactions from a gendered perspective. This serves to highlight their impacts on systemic processes which ultimately have the potential to contribute to gender-transformative change, and a more efficient and sustainable RAS.

This study takes place in Pakistan, a country that has traditionally sought to deal with ethnic and income inequalities rather than gender concerns, a situation that has not been helped by the public sector's gender-blind activities in recent times (Chauhan 2014). Pakistan's lengthy experience with third sector agricultural development programmes makes it an interesting case study. Indeed, since its creation, Pakistan has been supported by the third sector to develop and implement initiatives such as the Village-AID, Rural Works, and the Integrated Rural development Programme before the 1970s, and more recently with the Training and Visit (T&V) programme in the 1980s, and Farmer Field Schools (FFS) in the 1990s (Davidson, Ahmad and Ali 2001). As has been shown in the PW programme evaluation, there is very little evidence of past success regarding the improvement of gender inequalities in agricultural information access. The T&V and FFS programmes which were operational during the rise of the gender debate in the international development community, have rarely managed to provide access to its services to all sections of the populations equally, particularly poor women. FFS do not offer clear results on its gender impact despite the programme running for over 25 years (Davis et al, 2012), whilst the gender bias towards men in project setup and implementation has been exposed in the T&V system (Due, 1997).

Research shows women are indeed deprived overall in socioeconomic terms as they have less opportunity for education, training, extension services and technology as compared to men (Hassan,

Ali and Ahmad 2007; Lamontagne-Godwin et al, 2018). In Pakistan for example, information access between genders is unequal: less than ten percent of women access agricultural information from public sources, compared to 25 percent for men (Lamontagne-Godwin et al 2017; Lamontagne-Godwin et al 2018). This situation is exacerbated by, and indeed a result of, historical patriarchal socio-cultural norms in a country (Harari 2014; Rao and Kelleher 2003), which is particularly the case in Pakistan (Tsegaye, Druza and Hailemariam 2018). Public and NGO-run agricultural approaches have rarely helped the situation, traditionally focusing their efforts on men, largely overlooking women and their roles in the agricultural value chain and home consumption– even if globally they represent over half of the total rural labour workforce in agriculture (Puskur 2013). Indeed, even though the international development community has been aware of the inequality of information access amongst genders for some time (UNWCW 1995), activities to address this situation, usually labelled as ‘gender mainstreaming’ approaches, have not achieved the impact initially hoped for (Moser and Moser 2005). One of the reasons is the international development community’s progressive simplification of a complex socio-cultural issue. In order to be successful and drive opportunities for change at a national and local level, transformative approaches must consider a whole range of historical and contemporary socio-cultural contexts that enable and determine socially acceptable gender roles (Farnworth and Colverson 2015). These roles constantly evolve as they are driven by formal and informal agendas and changing institutions that blend systemic practices and individual consciousness (Rao and Kelleher 2005). Overall, agents of change have to navigate complex and non-linear systems, analysing and understanding them before any opportunity for change can be attempted or even suggested. Unfortunately, whilst transformative aims have more widespread impacts, they usually take longer to achieve and are harder to define and demonstrate. In the context of short-term funding cycles and resulting impact evaluations, most international development projects have not taken the time to invest in and design the types of studies and development initiatives that can achieve these longer terms, harder to measure, yet more fruitful results. Therefore, the proliferation of short-term project-delineated results are completely disconnected from in-depth transformative approaches that prefer to concentrate on ethnological and anthropological techniques (Moser and Moser 2005; Rao and Kelleher 2003), that contribute to real, institutional change. Consequently, many initiatives consider simple quantifiable gender mainstreaming targets, such as increases in numbers of women professionals trained, or reached, as evidence of gender equality impact. As mentioned above, these do not reflect a clear and substantive change in women empowerment.

Contrary to beliefs exposed above, transformative change research has the capacity to analyse these processes through clear and time-sensitive methods. Essentially, transformative research links formal institutional processes to informal individual beliefs or perceptions formed in part by traditional socio-cultural norms in order to highlight where change could occur (Rao and Kelleher 2003; Rao and Kelleher 2005). This can be studied either through laws and policies and their relationship to socio-cultural norms as designed by Rao and Kelleher (2003), or through a more grounded approach that advocates a clear understanding of bottom-up gender transformative approaches (Farnworth and Colverson 2015) which in turn become sufficiently regular and continuous to be described as institutions (adapted from Turner, Abercrombie and Hill, 2014). Indeed, a recent review highlights the importance of gendered approaches and its long-term impacts on gender equality (Mbo'o-Tchouawou and Colverson 2014).

Plantwise in Pakistan was initiated in 2011, and fully operational by 2012. The consortium of partners, that includes the Ministry of National Food Security and Research, and individual Provincial Directorates of Extension in the Punjab, Baluchistan, Gilgit Baltistan and Khyber Pakhtunkhwa, are currently running approximately 900 clinics and have trained over 1,500 staff to run them. They have an active data management system, which contains information on over 100,000 pest and disease diagnoses, an effective content development process, which has contributed to the development of over 130 plant health documents, and a fully functioning Monitoring and Evaluation implementation team. The PW programme is aware of the issues surrounding inclusive agricultural information access, particularly in Pakistan. The programme has indeed focused on gender awareness activities in the last year: for example, they launched five plant clinics run and attended solely by women in Pakistan, from which 377 plant clinic queries were collected, and gender specific recommendations were given (Plantwise 2019). Unfortunately, this study did not take these latest gender specific initiatives into account as the data collection had already been finalised – however the outcomes will be discussed later in the article.

This study attempts to answer the following research questions: has the PW approach contributed to a change of institutional and individual perceptions of public provincial RAS systems? What potential successes and failures do these perceptions highlight? Can these results offer theoretical insights into gender responsive agricultural information access initiatives? The research questions will be answered by an analysis in a PW (test site) and non-PW (control site) district. It will firstly compare smallholder farmers and public extension workers' individual perceptions of gendered agricultural information

access, before then attempting to understand and compare institutional perceptions of public RAS stakeholders.

This study into the Pakistani PW initiative offers an opportunity to contribute to the growing body of academic literature on the individual and institutional impacts of international development programmes, helping to understand wider aspects of international development involvement in RAS. From a practical perspective, this study also enables PW and other international development initiatives to better understand and interpret stakeholders' perceptions, highlighting the importance of design and investment in participatory approaches to enable longer term impacts, especially focused on gender. It will also help the PW programme assess and understand implementation challenges in order to attain impact on the ground and be a driver of positive change in the country.

This article will briefly review the analytical methods used before presenting key results and resulting discussion points.

## **Methods**

Research activities were conducted in the Punjab province of Pakistan between June 2015 and October 2016. Data were collected in Bahawalpur, the first district to establish the PW programme district into its public RAS, and Jhang, a non-PW district. Both districts were chosen due to their similar agro-climatic and economic profiles: Bahawalpur's economy is dictated by the cultivation of crops, such as cotton, sugarcane and wheat, as is Jhang's. Both districts have a similar incidence of food poverty in farming households (31% and 35% respectively (Qureshi and Arif 2001), and have similar family sizes and percentages of illiteracy at the household level (Amjad, Arif and Usman 2008). Bahawalpur's population is 700,000 whilst Jhang's is 400,000.

A socio-economic and behavioural survey was conducted with 401 randomly sampled smallholder farmers (201 women and 200 men) in Bahawalpur's 24-BC union council and Jhang's Kotla Zareef Khan union council. The survey focused on perceptions of information access, source trust, quality of advice and location convenience (Hassan, Ali and Ahmad 2007; Lamontagne-Godwin et al, 2018; Sadaf, Asif and Muhammad 2006). This group was disaggregated by gender in the first instance, and then as user/non-user of plant clinics. Large farm holders of over one hectare were excluded from the sampling to correlate with Plantwise definition of smallholders and to be within the range of the average farm size in Pakistan of 3 hectares (Sial, Iqbal and Sheikh 2012), and a female interviewer was used to interview female participants to minimise biased social interactions.

A second survey of 116 staff, five women and 111 men, from the Provincial Department of Extension and Adaptive Research (PDEAR) in Bahawalpur and Jhang was conducted by face-to-face interviews in the field or in office. Participants, of which 26 actively worked in the PW programme, were asked about their perceptions of rural households' access to information sources. The survey format was identical to the previous farmer survey, making a systematic comparison possible.

A final survey of 111 extension workers involved in different areas of the PW programme was also carried in six plant clinic districts in November 2016. Its aims were to understand extension professionals' perceptions of the PW programme's impacts on individual and systemic RAS activities. In both extension worker surveys, there were not enough female extension interviews to compare responses from male and female respondents. Five-point Likert scales were used in questionnaires to agree, disagree or remain neutral in response to following statements.

Quantitative data analyses were conducted through the IBM<sup>™</sup> SPSS 24 statistics programme. Due to the categorical nature of the dependent and independent variables in some tests, cross tabulated descriptive statistics and binomial Z tests were used with a five percent margin of error. Z-tests support a null hypothesis stating there is no difference between two independent population proportions. In this article, this will support analyses of significant differences in access, trust and quality perceptions to information between male and female farmers in a PW and non-PW district, and PW and non-PW extension workers.

Six further local group exercises with 18 members of the public RAS system were carried out in Jhang and Bahawalpur districts. The aim was to visualise RAS networks and understand the nature of key rural advisory service stakeholders' relationships in the plant health system in a PW and non-PW district. Unfortunately, many of the female district agricultural officers were occupied in the field during wheat harvest quota inspections, although two women – an agricultural extension agent working for PDEAR and an assistant district director for PDPW – did attend one of the Jhang workshop. The groups were firstly asked to visually interpret farmer-focused RAS organisation in their own district, disentangling stakeholder networks according to their interactions, a concept akin to the Agricultural Innovation System (Klerkx, de Grip and Leeuwis 2006; Manderson, Mackay and Palmer 2007) focusing on the actors' interdependence (Klerkx, Aarts, and Leeuwis 2010). Secondly, participants were asked to highlight collaborations, strengths and weaknesses of the identified stakeholders, qualifying their interactions. This enables studies to unravel physical structures into systemic and dynamic processes, understand practices and behaviours that create change, and deliver knowledge in a local and national setting (Carvalho, Carvalho and Nunes 2015). The approach also

adapts essential network visualisation techniques (Lamontagne-Godwin et al 2019a; Newcombe 2003) and enables decision makers to gauge a system's capacity to innovate and progress (Samee et al 2015). The established linkages were ranked according to defined interaction scores: A weak-ranked interaction (dotted lines) was defined as an irregular, ad-hoc interaction. An intermediate interaction was defined through official, regular meetings. Finally, a strong interaction was described specific and regular contact that aim to jointly build and strengthen the rural advisory service innovation system. Interactions between stakeholder sectors were scored and mapped according to pre-defined scores (Lamontagne-Godwin et al 2019).

## Results

The results are separated into two sections. The first focuses on smallholder farmers' perceptions of agricultural information access from a gendered perspective in a PW and non-PW district. The second section concentrates on extension professionals, initially comparing their perceptions to farmers analysed in the first section, before concentrating on the PW programme's impacts on individual and systemic perceptions of the RAS system in their district.

### a. Farmer Perceptions

An analysis of 200 male and 201 female farmers' perceptions of information source range and convenience, frequency of access, and source quality and trust was conducted in a PW and non-PW district. Some interesting differences were identified in Table 1.

#### *Information Source Range*

Overall, there were no significant differences between the variety of sources utilised by both men and women in each district. Indeed, women in a PW district consulted eight sources, compared to eleven sources in a non-PW district ( $z=1.03$ ;  $p=0.29>0.05$ ), while men consulted fourteen sources in both districts ( $z=0$ ;  $p=1>0.05$ ).

#### *Information Access Frequency*

Participants in the non-PW district accessed information significantly more often than their counterparts in a PW district ( $z=5.31$ ;  $p<<0.05$ ). This included results for men, whose access was higher (but not significantly so ( $z=0.89$ ;  $p=0.3>0.05$ )) in the non-PW district than in the PW one, as well as for women ( $z=9.04$ ;  $p<<0.05$ ). Focusing on individual sources, men in the PW district accessed their two main sources of information, PDEAR ( $z=6.48$ ;  $p<<0.05$ ) and agrodealers ( $z=4.41$ ;  $p<<0.05$ ) significantly more often than in the non-PW district. Women in the non-PW district

## Perception Differences In Smallholder Agriculture Information Access

Analysis	PW district	non-PW district	Z test
<b>Range of sources utilised to access agricultural information</b> (analysis based on total number of sources listed as accessed)			
Number of sources male	14	14	z= 0
Number of sources female	8	11	z= -1.03
<b>Frequency of access to agricultural information sources</b> (analyses based on proportion of “rarely”/“sometimes”/“frequently”/“exclusively” perception responses)			
Male total access frequency	19.4%	21.65%	z= -0.89
Male frequency of access to PDEAR	86%	42%	z= <b>6.48**</b>
Male frequency of access to Agrodealers	71%	40%	z= <b>4.48**</b>
Female total access frequency	2.21%	9.53%	z= <b>-9.04**</b>
Female frequency of access to Female neighbour/friends	15%	52%	z= <b>-5.71**</b>
Female frequency of access to Agrodealers	3%	14%	z= <b>-2.89*</b>
Female frequency of access to PDEAR	7%	18%	z= <b>-2.37*</b>
Female frequency of access to PDAI	1%	16%	z= <b>-4.60**</b>
Female frequency of access to Lead female farmers	1%	18%	z= <b>-4.41**</b>
Female frequency of access to Lead male farmers	1%	14%	z= <b>-3.51**</b>
Female frequency of access to Village leader	1%	10%	z= <b>-2.81**</b>
<b>Trust of sources utilised to access agricultural information</b> (analyses based on proportion of “mostly”/“completely” perception responses)			
Male total source trust	44.6%	33.9%	z= <b>2.50**</b>
Female total source trust	52.6%	56.9%	z= -0.64
<b>Quality of advice provided by agricultural information sources</b> (analyses based on proportion of “good”/“very good” perception responses)			
Male total quality of advice	76.4%	78.7%	z= -0.78
Female total quality of advice	89.4%	91.7%	z= -0.42
Female quality of advice of Female neighbours/friends	12%	54%	z= <b>-6.13**</b>
<b>Location convenience</b> (analyses based on proportion of “good” and “very good” perceptions)			
Male convenience of Administrative locations	57.6%	85%	z= <b>-4.94**</b>
Male convenience of Marketplace	69%	89%	z= <b>-3.92**</b>
Male convenience of Field locations	66%	63%	z= 0.44
Male convenience of Domestic locations	45%	52%	z= -0.99
Male convenience of Spiritual locations	23%	29%	z= -0.5
Female convenience of Administrative locations	20.3%	11.5%	z= <b>2.71**</b>
Female convenience of Marketplace	56%	66%	z= -0.99
Female convenience of Field locations	69%	76%	z= -1.21
Female convenience of Domestic locations	56%	53%	z= 0.99
Female convenience of Spiritual locations	100%	97%	z= 0.3

Table 1: Descriptive and analytical statistics of proportion of male and female responses regarding information source range and convenience, frequency of access, and source quality and trust;

\* slightly significant result at  $p < 0.05$ ; \*\* significant result at  $p < 0.05$

accessed information resources more often than women in a PW district, more specifically female neighbours/friends ( $z=5.71$ ;  $p < 0.05$ ), PDAI ( $z=4.60$ ;  $p < 0.05$ ), lead female farmers ( $z=4.41$ ;  $p < 0.05$ ), lead male farmers ( $z=3.51$ ;  $p < 0.05$ ), village leaders ( $z=2.81$ ;  $p=0.004 < 0.05$ ), agrodealers ( $z=2.89$ ;  $p=0.04 < 0.05$ ) and PDEAR ( $z=2.37$ ;  $p=0.02 < 0.05$ ). Women in a PW and non-PW district all

the while still access relatively little information compared to men in both the PW and non-PW districts (two percent and nine percent compared to nineteen and twenty-two percent).

#### *Source Trust*

Overall, 53 percent of women in a PW district and 57 percent in the non-PW district (an insignificant difference;  $z=0.64$ ;  $p=0.52>0.05$ ) rated their trust of overall information providers as ‘mostly’ or ‘completely’ trusted. However, men in the PW district trusted information resources significantly more (44% compared to 34%;  $z=2.50$ ;  $p<<0.05$ ) than their non-PW district counterparts, although the only significant difference when comparing individual sources were male neighbours/friends ( $z=2.1$ ;  $p=0.04<0.05$ ). No other individual information sources are perceived as more or less trustworthy by either men or women in both districts. It is interesting that public RAS bodies are not perceived differently in the PW and non-PW district, a point that shall be discussed further below.

#### *Quality Of Advice*

The single significant difference in perceptions of quality of agricultural advice between participants in a PW and non-PW district was women’s perceptions of female neighbours/friends’ quality of advice: women in the non-PW district perceived the advice from female neighbours to be of higher quality than women in the PW district ( $z=2.82$ ;  $p=0.005<<0.05$ ). Again, it is important to note the lack of differences to perceptions of advice quality for public RAS bodies in the PW and non-PW district

#### *Convenience Of Information Access*

Fifty seven percent of men in the PW district and over 80 percent of men in the non-PW district believed administrative locations to be positive (‘good’ or ‘very good’) locations to access information, a significant difference ( $z=4.94$ ;  $p<<0.05$ ). Although the majority of women in both districts still perceived administrative locations to be negative (‘bad’ or ‘very bad’) locations to access information, significantly more women (20.3 percent compared to 11 percent) in the PW district believed administrative offices were positive (‘good’ and ‘very good’) locations to access information ( $z=2.71$ ;  $p<<0.05$ ). There were no significant differences between men and women’s perceptions of access to information in the field and in domestic location, as both genders in both districts found them to be a convenient location. There were no significant differences between women in their perceptions of accessing information in the homestead (53 percent in the non-PW district, and 56 percent in the PW district): both female groups believe that the homestead is a positive location to access information. Men and women in both districts had similar views regarding spiritual locations:

all women in the PW district and 97 percent of women in the non-PW district rated spiritual locations positively. For men, 82 percent in the PW district and 91 percent in the non-PW district rated spiritual locations as “ok” or “good”. Men in the non-PW district believed accessing information in the marketplace was a significantly better option than men in the PW district (89 percent compared to 69 percent;  $z=3.92$ ;  $p<<0.05$ ). However, there were no statistically significant perception differences for women: 56 percent in the PW district and 66 percent in the non-PW district stated the market was mainly “good”.

Clearly these results are extremely important for the future of information access strategies, a point to be revisited in the discussion. The study now focuses specifically on plant clinic use, as opposed to simply looking at PW and non-PW districts.

### **Comparison Between Male Plant Clinic Users And Non-Plant Clinic Users In PW And Non-PW District**

Eleven percent, or 22 of the 201 participants, interviewed in the PW district had accessed information through plant clinics. Twenty-one were men, and one was a woman. All male plant clinic users were household owners, three quarters could read and write, and three were in a leadership position.

Results in Table 2 enable comparison of male plant clinic users ( $n=21$ ) firstly with non-clinic male participants ( $n=179$ ) in both districts, and secondly with male non-plant clinic users ( $n=79$ ) in the same PW district. The study compares their information access frequency, variety of information sources they consult, and their perception of location convenience to access agricultural information.

#### *Male Plant Clinic Users And Non-Plant Clinic Users In Both Districts*

Male plant clinic users do not access a wider variety of sources than non-plant clinic users in both districts ( $z=1.25$ ;  $p=0.2>0.05$ ), but access individual sources such as PDEAR ( $z=3.2$ ;  $p=0.001<<0.05$ ) and agrodealers ( $z=3.2$ ;  $p=0.001<<0.05$ ) significantly more often than non-plant clinic users (table 2). There were no significant differences in plant clinic users and non-plant clinic users’ perception of location convenience for accessing information regarding district, tehsil and village offices, the market, the homestead and spiritual locations. However, non-plant clinic users rated the field as a more convenient location than plant clinic users ( $z=3.68$ ;  $p<<0.05$ ).

Analysis	N(x)	N(y)	Z score	Comments
<u>Comparison in PW and non-PW district</u>				
Total access frequency between plant clinic users (x) and non-plant clinic users (y)	21	179	z=1.25	Male plant clinic users do not access information more often than non-plant clinic users
Access frequency to PDEAR between plant clinic users (x) and non-plant clinic users (y)	21	179	<b>z=3.2**</b>	Male plant clinic users access information more often than male non-plant clinic users
Access frequency to agrodealers between plant clinic users (x) and non-plant clinic users (y)	21	179	<b>z=3.2**</b>	Male plant clinic users access information more often than male non-plant clinic users
Field location convenience between plant clinic users (x) and non-plant clinic users (y)	21	179	<b>z=3.68**</b>	Male non-plant clinic users find the field more convenient than plant clinic users
Variety of information sources between plant clinic users (x) and non-plant clinic users (y) in both districts	21	179	z= 0.42	No significant difference between results
<u>Comparison in PW district</u>				
Total access frequency between plant clinic users (x) and non-plant clinic users (y)	21	79	z=0.99	Male plant clinic users do not access information more often than non-plant clinic users
Access frequency to PDEAR between plant clinic users (x) and non-plant clinic users (y)	21	79	<b>z=2.05*</b>	Male plant clinic users access information more often than male non-plant clinic users
Variety of information source between plant clinic users (x) and non-plant clinic users (y)	21	79	z=0	No significant difference between results
Field location convenience between plant clinic users (x) and non-plant clinic users (y)	21	79	<b>z=3.6**</b>	Male non-plant clinic users find the field more convenient than plant clinic users

*Table 2: Plant clinic users and non-plant clinic users' perceptions of information access in PW and non-PW district*

*\* slightly significant result at  $p < 0.05$ ; \*\* significant result at  $p < < 0.05$*

#### *Male Plant Clinic Users And Non-Plant Clinic Users In A PW District*

The study focuses next on a comparison between male plant clinic users and male non-plant clinic users in the same PW district. Results show that plant clinic users use a single source, PDEAR ( $z=2.05$ ;  $p=0.03 < 0.05$ ), 'frequently' and 'exclusively' significantly more often than non-plant clinic users. No other significant differences are found between male plant clinic users and non-plant clinic users regarding information access frequency, the variety of information sources used or advice quality. Moreover, there is only one significant difference in plant clinic users and non-plant clinic users' perception of location convenience: the field. Male plant clinic users believe the field was an average location to access information, compared to male non-plant clinic users' perceptions that the field is a good location ( $z=3.6$ ;  $p < < 0.05$ ). There are no differences when considering administrative offices, the market, the homestead and spiritual locations.

It is clear from these results that clinic use does not affect users' perceptions of source trust and advice quality. However, results surrounding the frequency of access to PDEAR are particularly interesting to look into more details. There is also a difference in the perception of convenience of the field as a place to access information between male plant clinic users and non-plant clinic users. This may be because non-clinic users do not use clinics because they do not find their location convenient, or it may be possible that plant clinics affect users' perceptions of location convenience.

Having explored farmers' perceptions of information access in a PW and non-PW district, this study focuses now on the service provision; more specifically the direct providers of information, the extension workers working under the public rural advisory service body, PDEAR.

### **b. Extension Worker Perceptions**

One hundred and eleven male extension workers from six different PW districts (Dera Ghazi Khan (DG Khan), Khanewal, Multan, Muzaffar Garh, Pakpattan and Sahiwal) involved in the PW programme were interviewed to understand their views regarding farmer information access. Twenty-six were plant doctors in the PW district, physically attending and giving advice to farmers in their area, while the remaining 85 (of which 40 were in the PW district and 50 were in the non-PW district) were not (table 3).

### **Comparing Plant Doctors And Non-Plant Doctors' Perceptions Of Male Farmers' Information Access**

#### *Comparing Plant Doctors And Non-Plant Doctors' Perceptions In Both Districts*

When comparing perceptions of the 26 male plant doctors to male extension workers who were not involved as plant doctors in both a PW and non-PW district (n=85), plant doctors believe male farmers access information sources significantly more often ( $z=7.94$ ;  $p<<0.05$ ), particularly from agrodealers ( $z=4.37$ ;  $p<<0.05$ ) and radio ( $z=8.38$ ;  $p<<0.05$ ). Interestingly, there are no significant differences regarding PDEAR. Plant doctors also believe male farmers access a wider variety of information sources when compared to non-plant doctors (17 compared to 15) although this difference is not statistically significant ( $z=1.45$ ;  $p=0.14>0.05$ ).

Analysis	N(x)	N(y)	Z score	Comments
In PW and non-PW district				
Perceptions of farmers' overall access frequency between plant doctors (x) and non-plant doctors (y)	26	85	$z=7.94^{**}$	<i>Plant doctors think farmers access information more regularly than non-plant doctors</i>
Perceptions of farmers' access frequency to agrodealers between plant doctors (x) and non-plant doctors (y)	26	85	$z=4.37^{**}$	<i>Plant doctors think farmers access agrodealers information more regularly than non-plant doctors</i>
Perceptions of farmers' access frequency to radio between plant doctors (x) and non-plant doctors (y)	26	85	$z=8.38^{**}$	<i>Plant doctors think farmers access radio information more regularly than non-plant doctors</i>
Perceptions of farmers' variety of information sources between plant doctors (x) and non-plant doctors (y)	26	85	$z=1.45$	<i>No significant difference between results</i>
In PW district				
Perceptions of farmers' access frequency to PDEAR between plant doctors (x) and non-plant doctors (y) in PW district	26	40	$z=6.06^{**}$	<i>Male farmers access more information in general according to plant doctors</i>
Perceptions of farmers' variety of information sources between plant doctors (x) and non-plant doctors (y) in PW district	26	40	$z=1.45$	<i>No significant difference between results</i>

*Table 3: Plant doctors and non-plant doctors' perceptions of farmers information access in PW and non-PW district*

*\* slightly significant result at  $p < 0.05$ ; \*\* significant result at  $p < < 0.05$*

#### *Comparing Plant Doctors And Non-Plant Doctors' perceptions In PW District*

When results from extension workers in a non-PW district are removed from the study, and the 26 male plant doctors are compared to 40 other non-plant doctors in a PW district, results are similar to the previous analysis. Again, plant doctors believe that male farmers utilise information sources significantly more often than non-plant doctors do ( $z=6.06$ ;  $p < < 0.05$ ), although there are no significant differences when the study focuses on individual sources of information. There are no significant differences between the two groups regarding the variety of sources that male farmers access ( $z=1.45$ ;  $p=0.14 > 0.05$ ).

Results suggest that the presence of the PW programme and active participation in plant clinic activities can be linked to a change of perception, particularly surrounding information access frequency. Further qualitative analyses will be needed to better understand these differences in perceptions. In the next section, the study reviews RAS providers' perceptions of the programme's impact on their individual duties and the national and local RAS network.

## Measuring Extension Professionals' Individual Perceptions Of Plantwise Impact On RAS

A survey of male and female extension professionals working for PDEAR and involved in the PW programme was also conducted to understand their perceptions of the PW programme's impacts on ownership, linkages in the RAS system and their personal contact with other professionals and end-users (table 4). The interviews targeted different job positions: 57 field assistants, 49 agricultural officers, four agricultural inspectors and one sales officer. Eighty-five participants ran a regular clinic, twenty assisted in the running of the clinic, three were in charge of entering the data, and three validated the data. An equal gender disaggregation and statistical analysis between two independent populations was not possible for this particular study as only five women were interviewed for 106 men. A qualitative gender disaggregation will however be conducted.

### Individual And Institutional Perceptions Of PW Impacts

Statements	Likert scale n=111 (106 male and 5 female)					
	Gender	Do not agree at all	Do not agree	Neutral	Agree	Agree very much
The programme...						
... has increased contact with external organisations who provide advice	Male female			102 5	4	
... has increased contact with external organisations who produce advice	Male female		1	9	96 5	
... has increased my contact with other extension professionals in my department	Male female			9	97 5	
... has positively changed how the extension departments are accomplishing their duties	Male female			10	96 5	
... has positively changed how extension workers are accomplishing their duties	Male female			11	95 5	
... has increased communication with male extension workers	Male female		1	8	97 5	
... has increased communication with female extension workers	Male female		95 5	10		1
... has increased communication with male farmers	Male female	1		8	98 5	2
... has increased communication with female farmers	Male female	1	4	101 5		
... has increased contact with private extension companies	Male female			11	95 5	
... has increased contact with the academic sector	Male female			10	96 5	

Table 4: Male and female extension worker perceptions of the PW programme

NB: negative statements are available, but have not been inputted for ease of reference. They mirror the positive statements found in the table above

Results show that participants perceived the national and provincial administrations to have strong ownership of PW activities, with staff interviewed demonstrating a clear understanding of the

programme's aims and objectives. Indeed, 91 percent of participants believed plant clinic systems are owned and regulated by public institutions, notably PDEAR, and all participants stated the ultimate plant clinic beneficiaries were rural households. The remaining nine percent believed plant clinics were exclusively run and owned by the PW programme. This could be due to the consideration of non-plant clinic related activities, such as the data management and analytical processes in the Knowledge Bank run by data managers/validators, although there were no significant correlations between these answers and the professional position the participants held, or their role in the PW programme. Moreover, 85 percent of participants involved in the programme agreed that "an extension worker is a plant doctor", rather than "a plant doctor is an extension worker". This suggests that plant doctor designations are an attractive notion to extension workers, and could perhaps mean more to them than the traditional "agricultural extension worker" designation.

A large proportion of participants (89 percent) believed PW had positively changed how official public extension departments and extension workers accomplish their duties. This is certainly true of their capacity to interact with other sectors of RAS networks: 90 percent of participants agreed that PW enabled them to have more opportunities to discuss issues with other stakeholders, such as pesticide dealers, or university researchers, and other extension professionals. Moreover, participants felt the programme enabled a greater interaction with producers of agricultural information, such as research. However, they did not feel the programme helped support better links to other providers of agricultural information. This directly contradicts the above statements about the improved linkages to pesticide dealers.

In the majority of these results, women participants' answers mirrored the perceptions of their male colleagues. However, results of individual interactions from a gendered perspective tell a different story: while 92 percent of all participants believed the programme has contributed towards an increased interactions between fellow male extension workers and male smallholder farmers, 89 percent of men and all six women believed the programme did not increase their interactions with female extension workers. Similarly, 96 percent of men and all six women considered the programme's efforts to increase female farmer contacts as "neutral". The programme has certainly improved, or increased certain interactions at the institutional and individual levels, but has not improved gendered interactions over time. It may be worth considering further analyses as to why this may be the case.

The next section considers the programme's effects on systemic processes, asking key stakeholders to visualise and quality their perception of RAS networks in terms of farmer advisory services.

### **Plantwise Impacts On Perceptions Of Systemic Processes**

Six group exercises were conducted, three in a PW district and three in a non-PW district. The groups were composed of field assistants, agricultural officers, deputy/executive district officers and assistant directors. Only one group (X5) was female.

Results in Table 5 indicate the three groups in the PW district adjudged PDEAR to possess the highest interaction scores in all three network diagrams (interaction scores of 7.5<sub>X1</sub>, 11<sub>X2</sub>, and 14<sub>X3</sub>). Public bodies, such as agricultural research (PDAR) were also well connected, being linked to public, communication and private sector entities (interaction scores of 5.5<sub>X1</sub>, 5<sub>X2</sub>, and 3<sub>X3</sub>) whilst others were less so: The Provincial directorate of Agricultural Information (PDAI) is mentioned only once in the entire exercise. The private sector was perceived to be on the fringes of RAS networks in PW district focus groups (interaction scores of 2.5<sub>X1</sub>, 4.5<sub>X2</sub>, and 7<sub>X3</sub>). Interestingly, two groups mentioned “plant clinics” separately to PDEAR (interaction scores of 3<sub>X2</sub>, and 5<sub>X3</sub>) that have strong and medium linkages with other stakeholders, especially PDEAR. This relationship is based on “knowledge sharing, cooperation, collaboration and feedback mechanisms”. Plant clinics were also seen to interact with NGO programmes, such as WWF, the private sector through pesticide dealers, and with community-based services – through farmer meetings for example.

In the three non-PW district groups, interaction scores show a different story. The private sector stakeholders were more prevalent, leading the interaction scores (interaction scores 27.5<sub>X4</sub>, 10<sub>X5</sub> and 3.5<sub>X6</sub>) in two of the three groups. Indeed, its representation was shown by multiple stakeholders: pesticide dealers, fertiliser dealers and seed companies. They shared the principal role in the system, and interacted with, PDEAR (interaction scores 12<sub>X4</sub>, 9<sub>X5</sub> and 4<sub>X6</sub>), which itself interacted regularly with other public sector bodies through regular plant health information sharing. PDAR and PDPP were also perceived to have an important place in the network.

It seems there is a more equal share of responsibilities in the non-PW district compared to perceptions of participants in the PW district. Indeed, it seems that the PW programme might be influencing perceptions of public extension services’ capacity, visualising a more public service centric model, away from the trends of increasingly privatised extension models in the Punjab province of Pakistan. Although these visualisations are interesting to interpret, it is hard to accurately gauge a difference in systematic organisation purely through small group exercises, although these might be useful initially to highlight potential differences.

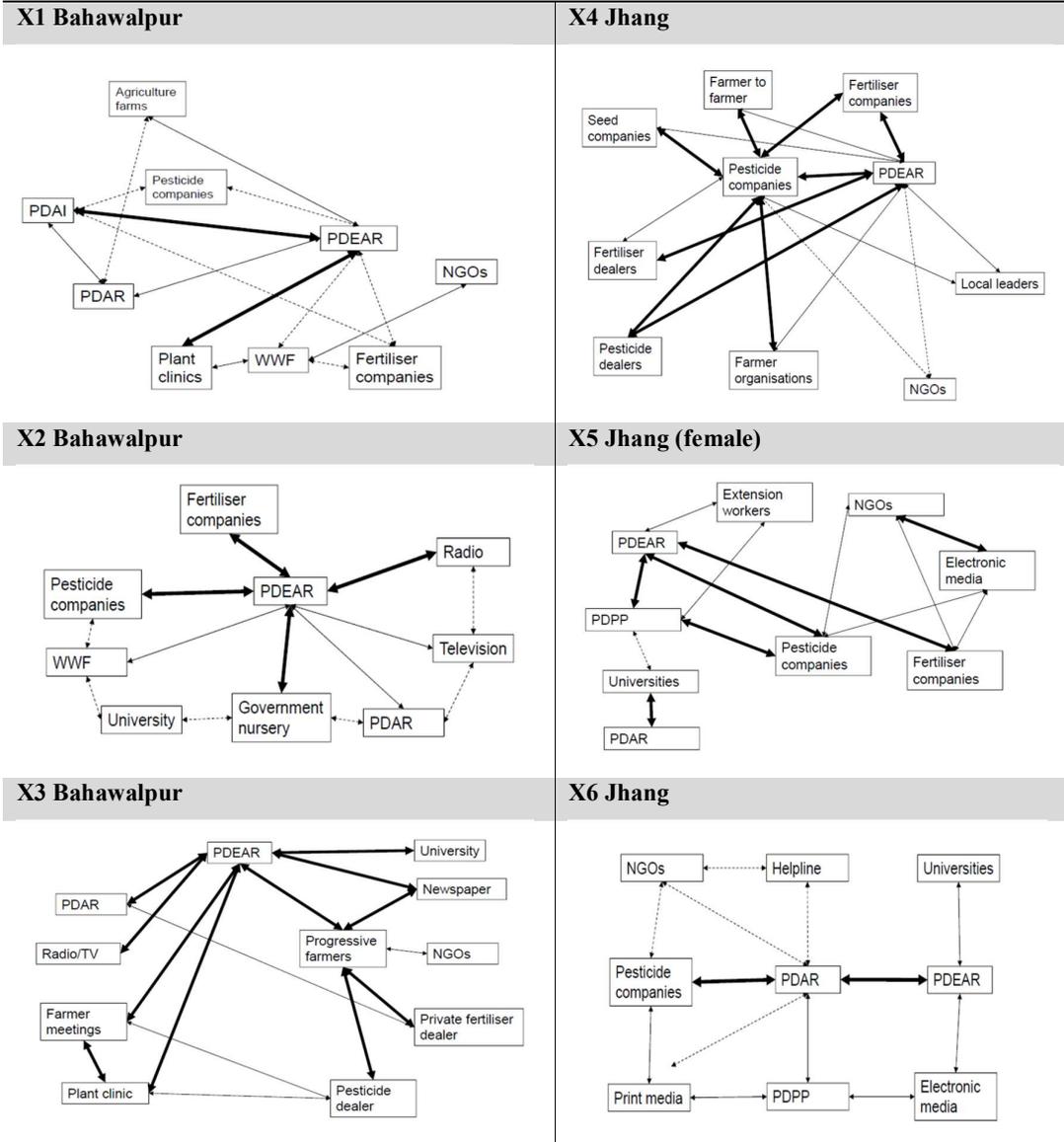


Figure 1: Rural advisory services' systems visualisations from a PW and non-PW district administration

District	Group	Group composition	PDEAR	Private sector RAS	Other public bodies	NGOs	Electronic or print media	Universities	Plant clinics	Farmer organisations	Farmer to farmer	Local leaders	Agriculture farms	Helplines
Bahawalpur	X1	4 agricultural officers from PDEAR	7.5	2.5	5.5	4.5			3				1.5	
	X2	1 deputy district officer and 1 agricultural officer	11	4.5	5	2	4	1						
	X3	4 agricultural officers from PDEAR	14	7	3	0.5	6	2	5	5	8.5			
Jhang	X4	3 agricultural officers from PDEAR	12	27.5						3	3	2		
	X5 female	1 deputy district officer and 1 agricultural officer	9	10	7	4	4	2.5						
	X6	1 assistant director and 2 agricultural officer from Pest Warning Department	4	3.5	9.5	1.5	4	1						1

Table 5: Interaction scores between stakeholders in a RAS network in a PW and non-PW district administration

(Assumptions: 'PDEAR' includes 'extension workers'; 'Other public bodies' include 'government nurseries', 'PDAR', 'PDPP', 'PDAI'; 'NGOs' includes 'WWF'; 'Farmer organisations' includes 'farmer meetings'; 'Farmer to farmer' includes 'Progressive farmers')

## Discussion

The sustainable and long-lasting integration of RAS initiatives into existing systems requires on the one hand organisational, logistical and administrative inclusion, and on the other a conscious openness to socio-cultural change in formal and informal gendered interactions. The following discussion focuses on the study's research questions: has the PW approach contributed to a change of institutional and individual perceptions of public provincial RAS systems? Secondly, can the study's results offer theoretical insights into gender-responsive agricultural information access initiatives? This enables the study to reflect on clear prospective strategies that link the PW programme activities to impactful, gender-focused transformative change.

### Perceptions Of Plantwise Organisational Impacts

Specific analyses focusing directly on the influence of PW – utilising plant doctors and non-plant doctors in both districts, and then conducting a comparison in the PW district only – did uncover some interesting results: plant doctors in a PW district felt farmers accessed information more often than extension workers in a non-PW district, and a further analysis focusing on plant doctors and non-

plant doctors' perceptions of farmers' information access in the same PW district showed that plant doctors felt that farmers were accessing more information through PDEAR.

As with the farmer-based results, this extension worker study also doesn't clearly show that active participation in plant clinics is contributing to a change in their perceptions of farmers' information access. However, a correlation between PW involvement and increased perception of the preponderance of PW in RAS does exist. This correlation is apparent as the study considers the RAS network perception results: indeed, while respondents in the non-PW district perceived there to be a more equal share of responsibilities between the public and private sector in RAS, in the PW district, PDEAR and other public services were perceived to be the most important stakeholder RAS network.

Could PW be contributing to a positive perception of PDEAR's capacity to deliver RAS? As the PW programme indeed works exclusively with PDEAR in three provinces in Pakistan, and all plant doctors and system operators reside in public offices, this seems a plausible explanation. This is corroborated by the results from perceptions of extension workers who are working in the PW programme. Moreover, preliminary findings surrounding the programmes' impacts on institutional perceptions are overwhelmingly positive: individuals state there are more opportunities to interact, and higher quality exchanges, with the private sector and academia regarding farmer advisory services; moreover, extension staff also have a clear understanding of programme ownership and its aims in the community.

### **Perceptions Of Plantwise Institutional Impacts From A Gendered Perspective**

Understanding the programme's impacts on socio-cultural institutions such as the empowerment of women are very hard to directly quantify. Even though the study's preliminary results are consistent with previous findings regarding men and women's choice of information sources and the frequency of their access (Hassan, Ali and Ahmad 2007; Lamontagne-Godwin et al 2018), general comparisons between datasets in a PW and non-PW district did not produce substantial evidence of PW impacts on male and female farmer perceptions of information access, location convenience, source variety, trust and perception of advice quality.

However, certain male-focused analyses did provide some interesting findings, worth discussing in more detail. Where PW has had the opportunity to have more influence due to male farmers' attendance at clinics, we find some interesting correlations. Men in a PW district access PDEAR and agrodealers significantly more often than men in a non-PW district. Moreover, men specifically interacting with plant clinics also access PDEAR and agrodealers significantly more often, and also dislike accessing information from domestic locations – a more traditional extension method (Rivera

2011) – more than non-plant clinic users in a PW district. These specific results suggest that plant clinics could be enabling male farmers who are interested in receiving information from public services outside of the more traditional home or field visits. A plant clinic could therefore possibly be viewed as an agent of change, as clear links exist between PW initiation and plant clinic use, and an enhanced interaction between male farmers and public RAS actors.

Regarding female related analyses, it would perhaps be unrealistic to assume that PW would have any effects on women's perceptions of access, trust, quality and convenience given their low turnout to plant clinics and current prohibitive socio-cultural norms (Lamontagne-Godwin et al 2019b; Tsegaye, Druzca and Hailemariam 2018). There are also some further discouraging signs from extension worker perspectives: for instance, while male extension workers working in the PW programme believed they interacted more than before with men from other departments and from rural households (namely through plant clinics), their interactions with women in professional settings (i.e. with women in other public departments) and with female farmers did not improve. This further reinforces the evidence that men in RAS involved with PW are not indicating any changes to their gender-based interactions in a professional capacity.

How do these male and female-specific findings relate to the PW programme attempts to create opportunities for gender transformative change? Clearly, improved information access for both genders is important, and a key aim of the programme. From a male perspective, some key elements should be reviewed: men in a PW district believe that the marketplace and administrative locations are less convenient locations to access information than men in a non-PW district. This is important to note, considering that many plant clinics are held at or near market places in the Bahawalpur district (Plantwise 2019). Moreover, the overwhelming acceptance of spiritual location by both genders as an acceptable place to access information should also be seriously considered. These findings could significantly improve the efficiency of plant clinic services, and help test long-held assumptions.

However, this study cannot categorically state that the active participation in plant clinics is contributing to a change in farmers' perceptions of information access, much less from a gendered perspective: indeed, the fact that plant clinics are hardly visited by women makes it extremely hard to investigate gendered perceptions of agricultural information access when it comes to the role of clinics. In 2018, Plantwise took the steps to increase women's participation in the programme, developing women only plant clinics in Pakistan (Plantwise 2019). Over 377 plant health queries were recorded. In order to better understand the impacts and provide a clearer gender aware strategy in Pakistan it will be important to analyse this specific initiative in more detail from a variety of angles.

Firstly, what type of issues did the women bring to the clinics, and are they reflective of the roles they have in agriculture (Doss 2002)? Secondly, were the recommendations they were given to deal with the plant health problem gender aware, an issue highlighted in previous studies (Lamontagne-Godwin et al 2017). Finally, are clinics' being held at locations and timings suitable to women's schedules? These activities, and the gender-specific findings in this study – the attractive nature of spiritual locations, or indeed the significantly greater activity of women's agricultural information access in a non-PW district – should be supported by further in-depth quantitative and qualitative analyses of the socio-economic factors that influence women's access to agricultural information (Lamontagne-Godwin et al 2018). These would provide the programme with a deeper understanding of the influence of socio-cultural norms have on female information access behaviours, and a clearer strategy on how to provide gender responsive RAS.

## **Conclusions**

The study helps to highlight an initiative's impacts on systemic processes which ultimately have the potential to contribute to gender-transformative change, and a more efficient and sustainable RAS. Using an established and dynamic programme can offer some interesting insights, as well as the opportunity for the programme to take findings on board in the future.

While it is clear that plant clinics as a technology offers some useful access for a certain population in rural areas, its development into a specific tool has also limited its access to another group in society. Indeed, Plantwise has achieved a great deal in Pakistan since its inception in 2011. Its organisational impacts on RAS networks are clear to see, as well as its impacts on individuals working within the programme. However, it is vital to analyse the programme from a gendered perspective in order to learn important lessons, and aim for longer-term transformative change, and move away from simplistic project-delineated outputs which focus on erroneous socio-economic assumptions.

Whilst the programme may have some good organisational impacts as mentioned, it must improve its understanding and application of gender-responsive activities at all levels of programme implementation. The lack of female presence from an end-user and extension practitioner's perspective is symptomatic of current gendered socio-cultural and professional norms. The programme should focus on actively understanding these, and how it can offer an opportunity for equal access to agricultural information. In more practical terms, it should also develop opportunities to integrate a higher proportion of female professionals within its programme, thinking creatively and piloting potentially gender transformative schemes, such as the women only plant clinics, or other schemes identified in other gender literature.

## Author Contributions

Julien Godwin was the main researcher and writer for this study. Dr Peter Dorward and Dr Sarah Cardey supported the development of the study's thought processes, whilst Naeem Aslam helped throughout, in particular for the local workshops in Jhang and Bahawalpur.

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## 4. Gender Differences In Use And Preference Of Agricultural Information Sources In Pakistan

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### Abstract

Rural advisory services ensure agricultural information is disseminated to rural populations, yet they are less accessible to women. This research provides insight on gender differences in information access by investigating frequency of use and preference of agricultural information sources by gender in a rural setting, differentiated according to literacy and age. This study interviewed 401 male/female individuals in farm households in Jhang and Bahawalpur district of Punjab, Pakistan in 2016. Men and women farmers' use and preferences in accessing information sources are extremely different. Women hardly use sources for agricultural information, and value interpersonal communication from informal sources. In contrast, men use and value official agencies more. Radio, surprisingly, was very rarely used, contradicting previous findings of research elsewhere. Age and literacy affect differences between women more than it does between men, particularly for convenient locations to access information. The study identified and refined major gender differences regarding use and preference for agricultural information in relation to age and literacy, and helps to articulate options to improve gender equality of access to agricultural information in Pakistan. The focus and outcomes regarding gender intersecting with age and literacy in agricultural information access imply the need for more refined socioeconomic models, discerning and interrelating gender and other social dimensions beyond the standard of male-headed households. This paper adds to the growing body of evidence on information access according to gender, highlighting the need to investigate deeper socio-cultural issues around age and literacy.

**Keywords:** Age; literacy; socio-cultural norms; agricultural information access; gender; rural advisory services; Pakistan

## **Introduction**

Across broad geographic and cultural contexts, women working in agriculture in rural settings tend to have less access to, and make less use of, land, quality seed, fertilisers, pesticides, credit, insurance, education and rural advisory services (Cohen and Lemma 2011; Manfre et al 2013; Meinzen-Dick et al 2011; Ragasa et al 2013), despite their significant and culturally specialised input in agricultural activities (Doss 2002; FAO 2011; World Bank, FAO and IFAD 2008) and their potential to improve agricultural productivity (Doss 2011; FAO 2011; Pardey et al 2006). The warnings about the lack of equal opportunity for women are constantly heard in international settings (Commission for Africa 2005; Moon 2014), yet significant progress will only be achieved at a local scale when underlying effects causing an inequality between men and women in access to agricultural knowledge are understood (Olajide 2011; Tandi Lwoga, Stilwell, and Ngulube 2011; Yaseen et al 2016). There are many aspects to consider when focusing on the inequality of access to agricultural knowledge. A number of studies (Lawal, Alabi, and Oladele 2017; Mtega, Ngoepe, and Dube 2016; Rehman et al 2013) suggest that age has a significant influence on access to agricultural information. They found that adult male farmers (over 35 years of age, as defined by UNESCO (2017)) access more information than younger male farmers (under 35) do. There is also a common perception that low literacy rates also reduce access to information (Odini 2014; Rehman et al 2013). However, socio-cultural norms, such as age and literacy have rarely been related to information access from a gender perspective. Therefore, in this study, we shall attempt to answer the following research question: how do male and female farmers differ and resemble in their frequency of use and preference of various sources for gaining agricultural information, and how is this differentiated by age and literacy. This study investigates this in effect of age and literacy on perceptions of information access according to gender in a rural setting in two districts (Jhang and Bahawalpur) of the Punjab province in Pakistan. Due to a lack of sufficient data on households run by women, it will solely focus on male headed households.

In patriarchal countries, gender inequalities in agricultural information access are readily reinforced in their socio-cultural contexts (FAO 2015). Pakistani women farmers have limited access to adequate resources, including agricultural knowledge. Increasing access to information for women in rural settings is very challenging: according to previous research, women farmers face not only a shortage of information sources to consult (Hassan, Ali, and Ahmad 2007; Sadaf, Asif, and Muhammad 2006), but the sources they do consult are generally perceived as poor in quality (Sadaf, Asif, and Muhammad 2006). For example, over 80% of women interviewed stated they never accessed eight of

the nine sources of information investigated in Hassan, Ali, and Ahmad (2007) dual-gender study. Indeed, both studies (Hassan, Ali, and Ahmad 2007; Sadaf, Asif, and Muhammad 2006) found the main information source for women to be through face-to-face contact in the community (either with the male head of household, female relatives or female neighbours), suggesting that women primarily have mediated, rather than direct, contact with expert sources. Access to information requires further elaboration. A farmer first needs the important capacity to identify and understand what can be of good use. Clearly, a farmer therefore needs to be able to obtain the information in a useable (e.g. print media or through hearing it e.g. radio) and understandable format (e.g. in local language, pictorially for farmers who have lower levels of education). The farmer also needs to be able to obtain the information from an easily accessible location (e.g. village hall, place of worship, radio). Not only is this situation complicated by different genders' access, explained above, but also the evolution of knowledge exchange in the twenty-first century. The introduction of extra information communication technologies (ICT) in the dissemination of information for example, is creating a new dynamic that is worthwhile exploring. Adult farmers (over 35) access radio more than younger (under 35) farmers in Kenya (Mburu 2013) but younger farmers preferred to access television, mobile phones and computers. Despite increased mobile phone ownership, only farmers under 40 years used mobile phones to access agricultural information in Kenya (Mburu 2013). Moreover, information disseminated through text print media will not be accessible to those who are unable to read. This will also apply to information in text formats provided through mobile phones or computers. For those farmers who are not able to read, information is only accessible in visual formats, such as graphics in print media, or through audio formats such as radio or TV. However, access to radio, TV and even print media is influenced by the sources of information that are available in the home. Men tended to access information from TV, internet, print media and extension agents during their leisure hours when they are outside the home in Tanzania (Mtega 2012). However, women have no such free time, as it is taken up by household activities. Therefore, their access to such information sources is very limited.

Rural advisory services – defined as services seeking to deliver a wide range of processes and activities through institutional arrangements that respond in a sustained and inclusive manner to the communication needs of rural populations (adapted from GFRAS 2011; Leeuwis and van den Ban 2004; Peterman et al 2011) – are extremely important for the communication of information (Leeuwis and van den Ban 2004). In Pakistan, they are a dynamic sector based on an interaction between public, private and civil society bodies (Riaz 2010). This study enables rural advisory services to understand how to make a more effective and inclusive impact on farmers of both genders involved in

agriculture. Indeed, by understanding end-user perceptions of access, this article also hopes to be an important addition in the development of gender responsive services in a major agricultural production country. This study is sorely needed, seeing as no (Sadaf, Asif, and Muhammad 2006) or 11% (Hassan, Ali, and Ahmad 2007) of women had actually accessed public rural advisory services in previous studies. Women face decision-making constraints due to cultural, traditional and sociological factors, and their work in the agricultural sector is largely ignored by federal and provincial development efforts even though they make up three quarters of its workforce (Davidson, Ahmad, and Ali 2001; FAO 2015; Hassan, Ali, and Ahmad 2007; Jamali 2009; Sadaf, Asif, and Muhammad 2006). One of the ways to contribute to challenging many of these socio-political challenges is through an improved access to knowledge (FAO 2015).

The article will first briefly introduce the study's methodology before analysing and listing the results according to gender, age and literacy. Secondly, the authors will discuss the results found in the Pakistan study. Finally, conclusions and possible follow up studies will be mentioned.

## **Methods**

The population studied in this study were male and female smallholder (defined here as cultivating land less than one hectare) farmers in Bahawalpur district's 24-BC union council, and Jhang district's Kotla Zareef Khan union council in the Punjab province of Pakistan. Overall, 201 farmers in 24-BC (101 women and 100 men), and 200 in Kotla Muhammad Zareef Khan (100 men and 100 women) were interviewed. The research used a random sampling questionnaire strategy: interviewers used household district agriculture office lists available in each union council to sample households. The sampling aimed for a 50:50 male and female ratio. For female interviews, the first household on the rural population list was picked, and every third household thereafter (1, 4, 7, 10...). For male interviews, the second household on the rural population list was picked, and every third household thereafter (2, 5, 8, 11, 14...). Depending on the numbered household, the interviewer would ask to speak to a woman, or a man. If farmers of either gender did not want to be interviewed in selected households, the interviewer moved on to the following household on the list. A female interviewer was used to interview female participants, and a male interviewer was used to interview male participants to minimise bias and possible participant discomfort. No two farmers of different genders from the same household could be interviewed for the survey. Respondents were not interviewed if they did not participate in the household's agricultural activities. Interviewers were left to make this decision at their discretion. Various aspects of rural life were investigated: participants were asked about household dynamics and decision making, the information needed for the different crops they

grew, and their perceptions of access, trust and quality of various information sources. Data were collected through the use of paper-based questionnaires, and took between half an hour and forty-five minutes to complete. The activity took place in the participant's home, or in a public place if preferred. Data were collated onto Microsoft excel, and then into SPSS<sup>tm</sup> statistical package for cleaning and descriptive tests. Data were then analysed according to male and female headed households, age and literacy. Due to the categorical nature of the dependent and independent variables, cross tabulated descriptive statistics and binomial Z tests were used. In this case the article's null hypothesis states there are no significant differences in access to information between men and women of a certain age and literacy level correlated with a 5% margin of error. When sample sizes were too low for Z tests, descriptive statistics were still conducted for qualitative perspectives. In order to keep statistical analyses powerful and conclusions relevant, the study focused the majority of its age and literacy correlations on the top three/four information sources. The categories 'very bad' and 'bad', and 'very good' and 'good' were grouped for statistical reasons when discussing information access and convenience of locations. Age sub-categories were grouped according to participants under 30 and over 30, to be as similar to UNESCO's 2017 definition of youth.

## **Results**

### **Study Population**

From the 401 interviewees (200 men and 200 women) of both genders in smallholder households in 2 districts, 72% of women and 69% of men were over 30 years old. Women between the age of 30 and 40 (29%), and men between 20 and 30 (25%) were best represented in their respective gender groups. The smallest age group was under 20 years old both for men and women. Three quarters of women, but only 38% of men, were illiterate, a significant difference ( $z = 7.39$ ;  $p \ll 0.05$ ). 384 participants (200 men and 184 women (92%)) identified themselves as living in a male headed household. 16 women (eight per cent) were in female-headed households.

### **Information Access According To Gender**

Overall, participants' access to information was low: 883 of 6817 answers over 401 interviews on 17 different sources, (or 13%) gave a positive account of information access. Of these, less than a third of answers (29%) were listed as 'frequently' or 'mostly' accessed. For male participants, 699 of 3400 answers (or 20%) were positive. Of these, 27% were classed as 'frequently' or 'mostly' accessed. Six of the 17 sources were accessed by more than 20% of participants. For women, the figures are even lower: 184 of 3417 (or five per cent) were positive. Of these, 21% were listed as 'frequently' or

‘mostly’ accessed. Only one of the 17 sources were accessed by more than 20% of women (female friends/ neighbours).

### **Frequency Of Use Of Information Sources By Men/Women Of Male Headed Households**

#### *Frequency Of Use And Preference For Information Sources For Men*

Seventy-nine per cent of men interviewed had ‘never’ accessed information through the sources listed. 128 men (or 64%) had used the Provincial Department of Extension and Adaptive research (PDEAR) as an information source (82 participants using it ‘frequently’ or ‘mostly’) (Table 1). This is the most popular source of information, followed by agrodealers (55%), male neighbours/friends (53%), NGO workshops (27%) and radio programmes (23%). 20% of men had used television, radio programmes and village leaders, whilst less than one in five men had used PDAI, PDAR, PDPW, plant clinics, university extension, village leaders or male lead farmers. Female neighbours and lead farmers were never consulted. Over two thirds of male participants view official public sector locations (district, subdistrict (the tehsil), or village offices) to be good or very good locations. The market and the field are also attractive locations for male farmers to source information. Indeed, significantly more male participants classified the district ( $z = 8.6$ ;  $p \ll 0.05$ ), tehsil ( $z = 10.8$ ;  $p \ll 0.05$ ), and village offices ( $z = 7.6$ ;  $p \ll 0.05$ ), markets ( $z = 13.6$ ;  $p \ll 0.05$ ) and fields ( $z = 6$ ;  $p \ll 0.05$ ) as ‘good’ or ‘very good’ location to access information compared to ‘bad’ or ‘OK’. Significantly more men stated spiritual places were ‘bad’ or ‘OK’ compared to ‘good’ or ‘very good’ to access information ( $z = 9.6$ ;  $p \ll 0.05$ ). However, the homestead is a location that splits opinion in the survey. 52% of men stated it was ‘bad’ or ‘OK’, and 48% marked it as a ‘good’ or ‘very good’ location (Figure 1).

Where do you get your information	Male n=200				
	Never	Rarely	Sometimes	Frequently	Mostly
PDEAR <sup>1</sup>	72	16	60	47	5
PDAR <sup>1</sup>	173	0	24	3	0
PDAR <sup>1</sup>	178	0	16	6	0
PDPW <sup>1</sup>	162	1	30	7	0
Plant clinic <sup>2</sup>	179	1	14	6	0
Agrodealers	89	6	68	29	8
Private extension service	190	0	9	1	0
University extension	192	0	8	0	0
NGO workshop	146	3	40	11	0
Radio programme	155	7	24	14	0
Information brochure	176	1	23	0	0
Television programme	156	9	26	9	0
Male neighbour/friend	107	1	53	39	0
Female neighbour/friend	200	0	0	0	0
Village leader	154	1	29	16	0
Lead male farmer	172	0	23	5	0
Lead female farmer	200	0	0	0	0

*Table 1: perceptions of information access for men in male headed households*

<sup>1</sup> PDEAR (Provincial Department of Extension and Adaptive research); PDAR (Provincial Department for Agricultural Information); PDAR (Provincial Department of Agricultural Research); PDPW (Provincial Department for Pest Warning and Quality Control of Pesticides);

<sup>2</sup> Plant clinics are a network of plant health information advice points run by agricultural officers and field assistants of PDEAR and supported in their implementation by CABI's Plantwise programme ("[www.plantwise.org](http://www.plantwise.org)")

<sup>3</sup> Private extension services are a service working for a particular agrochemical company that travels to a household, compared to agrodealers who have a shop and await farmers' custom

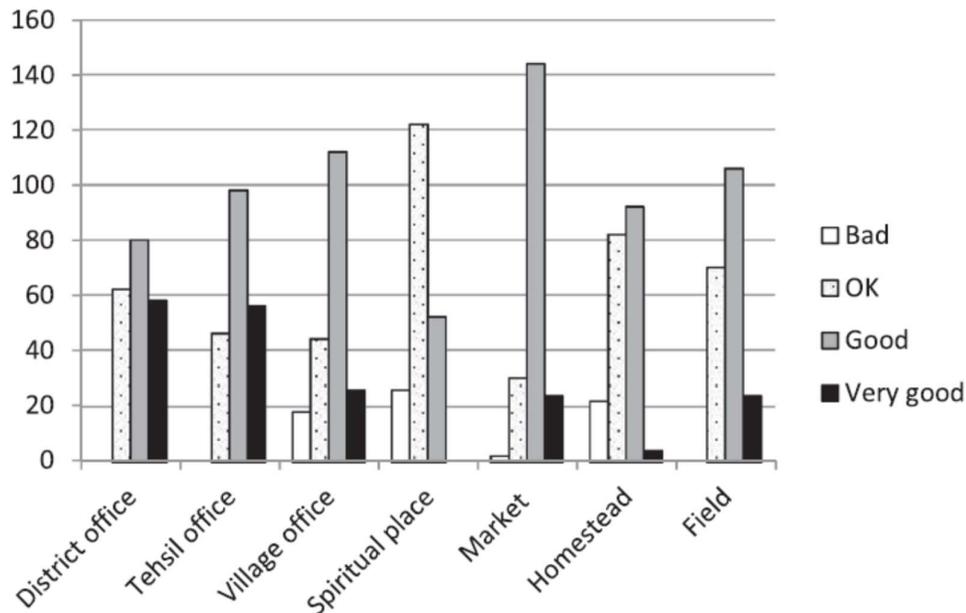


Figure 1: Male participants' perceptions of location convenience in male headed households

#### Frequency Of Use And Preference For Information Sources For Women

Table 2. There is an extremely significant difference in agricultural information access between men and women in a male headed household ( $z = 16.2$ ;  $p << 0.05$ ). Indeed, 167 answers out of 3162 (five percent) stated they had accessed information, of which only a quarter were listed as 'frequently' or 'mostly' accessed. The most popular sources of information were female neighbours/friends (30%), PDEAR (ten per cent) and lead female farmers (eight per cent). The remaining 14 sources were accessed by less than six per cent of all women in male-headed households. Four sources – PDAR, private extension services, university extension and radio programmes – were never consulted (Table 2).

Spiritual places are by far the most favoured location for women to access information. Over 98% of women view this location to be 'good' or 'very good', a very significant proportion ( $z = 19.1$ ;  $p << 0.05$ ). The field (72%;  $z = 9.2$ ;  $p << 0.05$ ), the market (61%;  $z = 4.14$ ;  $p << 0.05$ ) were attractive to a significant proportion of female participants. Much like for men, the homestead is a location that splits women's opinion in the survey. 54% of men stated it was 'good' or 'very good' location, whereas the remaining 46% stating it was 'bad' or 'OK'. Of the women, 43% and 38% state the district and tehsil offices are a 'very bad' or 'bad place' to receive information. The village office was rated 'OK' by 68% of women to access information (Figure 2).

Where do you get your information	Female n=186				
	Never	Rarely	Sometimes	Frequently	Mostly
PDEAR	166	6	13	1	0
PDAI	185	0	1	0	0
PDAR	186	0	0	0	0
PDPW	186	0	0	0	0
Plant clinic	185	0	1	0	0
Agrodealers	174	3	8	1	0
Private extension service	186	0	0	0	0
University extension	186	0	0	0	0
NGO workshop	180	0	6	0	0
Radio programme	186	0	0	0	0
Information brochure	184	0	2	0	0
Television programme	177	1	7	1	0
Male neighbour/friend	178	0	7	1	0
Female neighbour/friend	125	0	37	33	2
Village leader	178	0	8	0	0
Lead male farmer	173	1	11	1	0
Lead female farmer	171	0	14	1	0

Table 2: perceptions of information access for women in male headed households

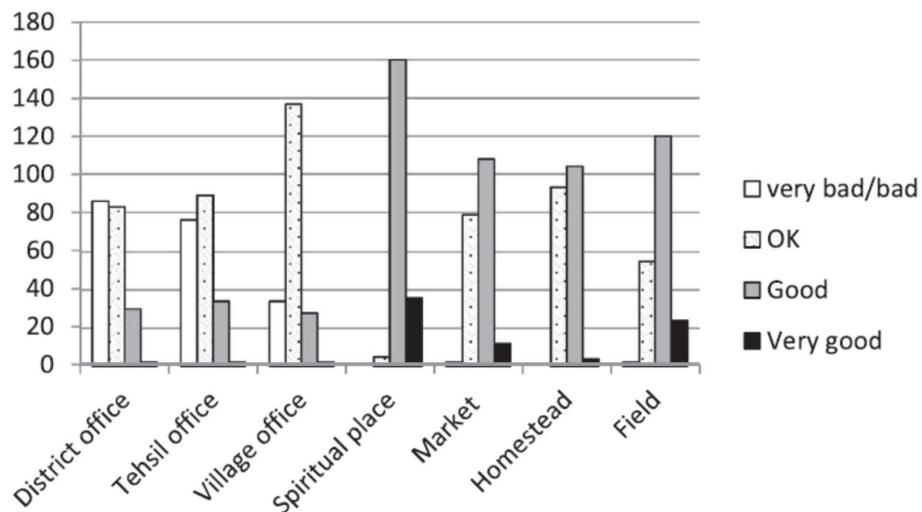


Figure 2: Female participants' perceptions of location convenience in male headed households

### **Male Information Access According To Age**

Being over or under 30 does not affect men's perceptions of information access overall. There are no specific relationships between age and access to PDEAR, agrodealers and male neighbours in this survey. Age also does not affect perceptions of information access at official locations like district and tehsil offices, and spiritual locations. However, men over the age of thirty are more likely to feel comfortable accessing information at village offices ( $z = -2.78$ ;  $p \ll 0.05$ ), in the market place ( $z = 2.6$ ;  $p \ll 0.05$ ) and in the field ( $z = 2.55$ ;  $p = 0.01 < 0.05$ ).

### **Female Information Access According To Age**

Women over the age of 30 feel they access more information ( $z = 5.6$ ;  $p \ll 0.05$ ) compared to women under 30 in a male headed household. No women under the age of 20 access information at all. Age affected perceptions of information access from PDEAR and female neighbours and friends: women over 30 years of age were statistically more likely to utilise a female neighbour or friend ( $z = 2.44$ ;  $p = 0.01 < 0.05$ ) and PDEAR ( $z = 3.06$ ;  $p = 0.002 \ll 0.05$ ) than women under the age of 30. Age was not a factor in accessing information from female lead farmers however. Age does not affect assessments of information access at spiritual places and district offices. Older female participants (over 30 years of age) are more likely to find the market place ( $z = 2$ ;  $p = 0.04 < 0.05$ ), the homestead ( $z = 2.91$ ;  $p \ll 0.05$ ), the field ( $z = 3.2$ ;  $p \ll 0.05$ ), the tehsil office ( $z = 2.09$ ;  $p \ll 0.05$ ) and the village office ( $z = 4.01$ ;  $p \ll 0.05$ ) convenient compared to younger female participants (under the age of 30). Age did not affect district offices.

### **Male Information Access According To Literacy**

Overall, literacy does not affect male participant's access to all information sources in male headed households, and specifically in their access to PDEAR, agrodealers and male neighbours in this survey. The study also suggests literacy does not alter perceptions of access to information in district and tehsil offices, the market place, spiritual places and the homestead. However, illiterate men consider village office less convenient than literate men ( $z = 2.16$ ;  $p = 0.03 < 0.05$ ).

### **Female Information Access According To Literacy**

Literate women feel they have greater access to official services like PDEAR ( $z = 3.1$ ;  $p = 0.002 \ll 0.05$ ) and agrodealers ( $z = 1.9$ ;  $p = 0.04 > 0.05$ ) compared to illiterate women. However, literacy does not affect women's perceptions of information access from female neighbours/friends ( $z = 0.98$ ;  $p = 0.3 > 0.05$ ) or female lead farmers ( $z = 1.1$ ;  $p = 0.2 > 0.05$ ). Literacy does not affect views of information access in official locations such as district and village offices, spiritual locations, the

market place, the homestead and the field, apart from a slightly significant difference in the tehsil ( $z = 1.98$ ;  $p = 0.047 < 0.05$ ), which illiterate women are more negative about.

## **Discussion**

The discussion firstly identifies the limitations of the research based on the study group. The section then proceeds to discuss aspects of information access, focusing on gender, age and literacy. Finally, the article seeks to suggest focused messages for Pakistan's rural advisory services as well as guidelines for rural advisory services' future research.

### **Study Limitations**

The study acknowledges age and literacy differences between study populations and national averages that could influence findings and conclusions. The national age average in Pakistan is 23.3 for men, and 23.4 for women in Pakistan (Index Mundi 2016), whilst the study's median and average age is between 30 and 40 for both genders. Moreover, three quarters of farm women and 38% of farm men in this study are unable to read and write compared to 44% of women and 31% of men in Pakistan (World Bank 2014). However, household head proportions are closer to reality (eight per cent of women in the study compared to the national average of 11%; World Bank 2016), which helps to justify many assumptions in the study. Unfortunately, whilst this study's results and discussion would have been improved by quantitative comparison of male and female headed households, the sample size for female headed households (15) was too low to offer significant statistical results. Therefore, the discussion will be focused on male-headed households, and offer loose qualitative comparisons with female-headed household results later on in the discussion.

### **Information Access According To Gender, Age And Literacy**

Overall, results show a low level of information access, and significant differences between male and female access, consistent with past findings (Hassan, Ali, and Ahmad 2007; Sadaf, Asif, and Muhammad 2006). Indeed, women access much less variety and frequency of information than their male counterparts. Whilst men value the use of official (public or commercial) services, women clearly feel more at ease with informal means of communication. These perceptions can be linked to convenience of locations. For example, men feel official locations (the district, tehsil and village offices) and the field are the most suitable locations, which relates well to PDEAR being the most popular service to access information, seeing as those locations are where extension agents traditionally discuss agricultural matters with farmers. Agrodealers, also interacting with farmers in the marketplace (near the town centre) and in the field – locations perceived as convenient for male

farmers – were also popular. Male participants also accessed a considerable portion of their information through informal discussions with male neighbours and friends. This could also explain their preference for the marketplace and the field where the majority of male interactions are said to occur, and their disinterest in the homestead (confirming past research in Tanzania (Mtega 2012)). Although age and literacy were not a defining factor for male participants' use of information sources, it did affect their perceptions of location convenience. Men over the age of 30 feel more comfortable accessing information in the market, the field and the village office. Perhaps these are the more traditional locations to receive information, although more research would be needed to further investigate the underlying nature of these perceptions.

Women use informal services, like their female neighbours/friends or lead farmers (of both gender) proportionally more often than formal public and private services. This could explain their preference for accessing information in informal places, conducive to informal discussions with neighbours, such as spiritual locations, the field or the marketplace. It could also explain their discomfort in more official locations like the district, tehsil or village offices. Age is an important factor to consider not only for use of the information, but also their access: women over 30 were significantly more comfortable accessing information from the two most popular sources, female neighbours/friends and PDEAR. This is perhaps due to their social standing and increased freedom in the household (Acharya et al 2010). The fact that older women feel more comfortable accessing information in variety of locations suggests this may be the case. None of the 55 women under 30 utilised PDEAR as a source, and no women under 20 had any contact with any information sources. Considering all men under 20 accessed information from PDEAR either 'sometimes' or 'frequently' in this study confirming past research (Rehman et al 2013), this study shows that age remains a barrier for women, again confirming previous results (Okwu and Umoru 2009).

Literacy does not affect women's perception of use and access to informal services, such as face-to-face interactions with female neighbours and friends, or lead farmers. Illiterate women feel as confident interacting orally with neighbours and other female farmers as literate women. However, illiterate women do not feel as confident using formal services, such as PDEAR and agrodealers. Interestingly, this dichotomy is not found in women's perceptions of access: a literate woman will feel as uncomfortable or comfortable in an official location as an illiterate woman. This is a potentially important finding as it demonstrates the complexities of equal access to information. Whilst improving literacy rates around the world is a worthwhile and valuable aim, it should not be viewed as a goal in itself. Instead, improving one aspect of a gender's capacity, such as literacy, should be

seen through the context of a country's individual socio-cultural norms. In this example, even though increased literacy might improve women's interaction with formal services, it will not improve their willingness or capacity to visit official locations in order to get this information. Individual and institutional gender perceptions need to be explored, understood and raised before any worthwhile changes occur. That is not to say that change is not happening. The 'Punjab Women Empowerment Package 2014' was launched on International Women's Day as a concrete example. The package is aimed to advance the status of women in the province through safeguards, legislative action and increased representation in government institutions (The News 2014), although critics stated it would only target privileged and educated women (The Tribune 2014).

### **Ideas To Improve Access In Pakistani RAS**

Based on the study's findings, various options could be considered. Firstly, a simple solution, often discussed and rationalised in past studies (Abbas et al 2009; Butt et al 2010; FAO 2015; Nosheen et al 2008), is reiterated in this paper: increasing the presence of women agricultural extension workers or field assistants in the field or in offices. Clearly, this option represents a major challenge in an extremely populous country. Currently, 763 agricultural officers and 3264 field assistants work in the Punjab province, tending to a rural population of 69 million (PARC 2011). Moreover, institutional interactions with and between women are made harder to implement due to patriarchal norms. Indeed, traditional belief systems in favour of male dominance are major constraints for women farmers in the field. These are portrayed by the challenges of mobility of women in a traditionally male-run environment that largely discourages female travel without male family members (Butt et al 2010). This can produce an adverse institutional atmosphere for women to progress socially or professionally (Chauhan 2014).

Secondly, informal interactions are extremely important based on these findings. Indeed, interactions with male and female neighbours are in both genders' top three sources of information. Discussions with lead farmers of both genders are also important for women. Encouraging information dissemination through informal means could be an interesting route for improving women's access to information. The Training and Visit (T&V) extension system was popular in the 1990s in Pakistan, but failed for a variety of reasons, not least the systems inflexibility, but also due to financial complications once the international funding had expired (Hussain, Byerlee, and Heisey 1993). This paper is not advocating a return to such a network. However, the clear indication that informal interactions not only with neighbours and friends, but also lead farmers – the mainstay of the T&V system – suggests that an integrated and simplified scheme based on similar principles could be

proposed exclusively for women. Indeed, whilst past training and visit schemes' gender bias have been exposed (Due, Magayane, and Temu 1997; Hussain, Byerlee, and Heisey 1993), some recent studies show that if women's role in household agricultural activities were provided with specific agricultural training, rural areas of Pakistan could be significantly better off (Khurshid et al 2013; Malik et al 2016). It is also important to note that proposing a system that enables and reinforces current knowledge pathways does not always guarantee sustainable and transformative change, as it focuses on existing prejudices rather than forces stakeholders to investigate new avenues for knowledge exchange. Other initiatives, such as Plantwise ([www.plantwise.org](http://www.plantwise.org)) have also engaged with the lack of equal access to information according to gender (Mur et al 2015). Information on women's preferences for use and access, such as spiritual locations, could be especially interesting to the programme developing plant clinic system.

Finally, certain findings in this study can be extremely important for the future of RAS: radio, largely advocated as a useful tool for gender equal rural advisory services (GFRAS 2013), and previously found to be popular amongst women in Pakistan (Hassan, Ali, and Ahmad 2007), is surprisingly absent from women participants' results (even though 10 women had accessed information through television). Whilst these results do not directly contradict research stating that rural households' access to radio is often good (Meinzen-Dick et al 2011), it does imply women farmers in Pakistan do not perceive radio to be an effective information tool even though information and communication technologies (ICTs), such as radio and mobile phones, are changing the landscape (Karubanga et al 2016). Results could also suggest that radio content and timetables for agricultural programmes do not suit women's lifestyle and schedules in the day-to-day rural life.

This does suggest ICTs in Pakistan deserve more focus. In this study, as well as answering questions on the 17 information sources listed, two further rows were left blank. Participants were free to list any extra information source they used. Indeed, enumerators conducting the interview were instructed to specifically notify participants of this. No extra information sources were added by any participant. This could be due to a prohibitive atmosphere during the study that did not allow women the comfort to list personal information. However, the study methodology specifically tried to put women at ease, through women-to-women interviews in a setting of their choice. Therefore, this shows that participants either do not use other sources than the ones listed, or socio-cultural norms dictate they are not allowed/capable of accessing or mentioning them. This might be particularly interesting in regards to digital access technologies.

There is a growing trend in rural advisory services' use of ICTs to increase ubiquity of service, efficiency and gender equality (Foster et al 2012; GFRAS 2016). However, much still needs to be achieved to attain significant impacts (Mbo'o-Tchouawou and Colverson 2014). Indeed, as ICT-based rural advisory services are booming in Pakistan, largely due to the incredible rise in access to mobile technologies and coverage (Siraj 2011), understanding underlying socio-economic factors such as age and literacy is crucial. As mentioned in the introduction, not only does age affect perceptions and access to ICTs, but literacy severely affect their use. This suggests further participatory research must be conducted to not only reach households, but reach the right household members according to the information they provide. Findings from Farm Radio International across Africa and the GSMA mAGRI programmes state that farmers who are engaged in the radio programme design are more likely to adopt new practices and technologies than passive listeners (African Farm Radio Research Initiative 2011). The mAGRI programme in Africa is focusing on connecting women to knowledge and credit systems, using data driven processes to understand the gender gap in mobile and media access. Methods such as theirs may need to be piloted in Pakistan to increase the effectiveness of radio as an extension delivery method.

## **Conclusions**

This study has reiterated the fact that men and women use and access information differently. Men more frequently use and prefer official sources of information and value formal communication means, while women favour informal sources of information. Official sources of information, such as PDEAR and agrodealers, should not be discounted however. More could be done to facilitate official sources in the context of the country's patriarchal socio-cultural norms. One solution, voiced by many past studies would be to recruit a higher proportion of women professionals in the public sector as field workers. Extension workers, agrodealers and lead farmers of both sexes are well trusted and their advice is considered of high quality. Hence the issue with promoting women as professionals is not the perceived lack of trust in their abilities, simply the physical barriers imposed by socio-cultural norms that make it harder for women to work in the field. These are made all the more complex by particular aspects such as age and literacy, which need to be carefully considered when developing initiatives.

Rural advisory services at a national and international level are evolving, but need to ensure they reach the right audience, considering conflicting results in different studies. This study has shown the importance that men and women farmers attach to face-to-face interactions. Nevertheless, it is important to consider the ever-increasing digital world of ICTs. The international development

community is keen to explore new mass communication approaches through radio, text and voice messaging in order to reach high numbers of farmers. However, it must be careful with pre-conceived ideas about the effectiveness of these tools, as the results around the use of radio in this study suggest. It is also important to distinguish between reach and impact. These are two separate issues that need to be investigated thoroughly in a country context in order to reach a delicate balance of approaches suitable to all needs, more specifically tailored to either male or female, and young and adult recipients in order to make it relevant to their situations or address the constraints. This can only help to increase the efficiency of various information services.

This analysis affords us a glimpse of the actual practices and values attached to various sources of information men and women have access to in the community. The value of the results found in this article would be increased in two ways: firstly, a similar comparison should be made directly between women in male and female headed households. Unfortunately, it was not possible to complete this activity in this article. Secondly, it is important to remember that the exchange of knowledge is a dual activity, relying on information beneficiaries being permitted to receive the knowledge provided equally, but also on information providers to provide information equally between genders. Whilst this article has chosen to focus on the importance of end-user accessibility, in this case male and female farmers, the authors realise the necessity to analyse upstream advisory services' gender responsiveness. Even though certain stakeholders in the network are increasingly committing to reduce the gender imbalance, the majority of members in a RAS network are gender blind (i.e. do not differentiate their products between male and female needs) and do not understand the significance of developing targeted and integrated messaging for the appropriate member of the household fulfilling the agricultural activity. A detailed analysis of this aspect would be incredibly powerful in shaping the future of Pakistani RAS.

One must not forget to ask whether the practices and preferences shown are borne of choice or lack thereof; whether the country's cultural norms have shaped the information pathways, and forced women to access information through this manner based on their age and literacy, or whether women's preference for informal information access has shaped the country's rural advisory services. These issues cut to the heart of gender equality research and development, and one that agencies and institutions should constantly keep in mind during rural advisory services' development if we are to improve agricultural information access, and agricultural productivity, to half the world's rural population.

## **Author Contributions**

Julien Godwin was the main researcher and writer for this study. Frances Williams commented and discussed specific findings with the first author. Dr Peter Dorward and Dr Sarah Cardey supported the development of the study's thought processes. Naeem Aslam helped coordinate the logistics of travel to study locations, whilst Muntazir Almas helped for female-based interactions during the questionnaires in Jhang and Bahawalpur.

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## 5. Identifying Gender-Responsive Approaches In Rural Advisory Services That Contribute To The Institutionalisation Of Gender In Pakistan

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### Abstract

Unequal reach and access to information is an issue that affects women involved in agricultural activities around the world. Recent initiatives to address gender unequal access to agricultural information have been clumsy, overlooking participatory approaches that focus on transformative change. This study uses Pakistani rural advisory services to compare farmers' and extension workers' perceptions of access to agricultural information, to identify culturally acceptable gender-responsive schemes. One-hundred and eleven extension workers in Pakistan's public rural advisory services were interviewed and cross-tabulated with farmers' answers in previous studies. Male extension workers are aware that women access less information less often; however, they might not be aware of its importance in the gender inequality debate. Lead farmers could offer a potentially transformative knowledge pathway because of its blend of formal and informal interactions – both systems favoured by female smallholders. An exclusively female-led lead farmer approach could be developed and trialled in specific areas of the province. Targeted initiatives focusing on improving awareness and importance of gender inequalities in information access as well as specific extension system development centred on lead female farmers and extension agents are important in institutionalising gender and creating transformative change. Linking these activities to in-depth social network and agricultural innovation system analyses would provide further evidence of the importance of focused gender activities and their impact on food security. This paper highlights the importance of analysing individual perceptions to understand the types of initiatives that could be considered for a wider institutionalisation of gender in RAS.

**Keywords** Agricultural information access; gender debate; women farmers; extension worker; institutionalisation of gender; transformative change

## Introduction

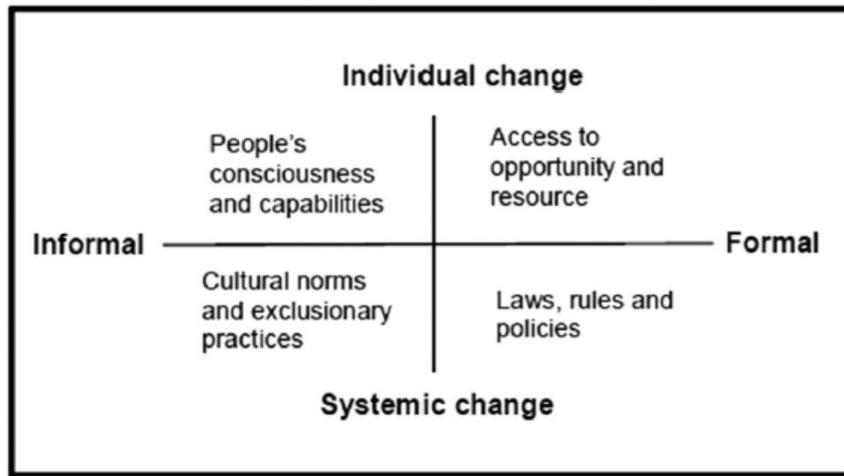
As global populations and food consumption are projected to rise (Cleland and Machiyama 2017), food security challenges become increasingly important (Sustainable Development Goals 2017). Smallholder agriculture is an important sector to prioritise when addressing food security as up to 500 million smallholder farms supply food to over 2 billion people in Africa and Asia (International Fund for Agricultural Development 2013). Yet major issues need resolving. Geographically isolated smallholder farmers are, unlike large-scale commercial enterprises, less embedded in the national knowledge and information infrastructure. This reduces their access to safe, up-to-date and effective agricultural information. Rural Advisory Services (RAS) – a multisectoral network of actors who design and deliver knowledge exchange processes and activities to respond to a rural population’s needs (adapted from GFRAS 2011; Leeuwis and van den Ban 2004; Peterman et al 2011) – can alleviate this knowledge gap. Over a million individuals currently work in public agricultural RAS ministries/departments worldwide (Swanson and Davis 2015). These usually government-led services utilise a combination of innovative and traditional approaches that focus on systematising specific communication pathways in order to deliver high-quality information whilst maximising impact. However, as with many development activities, unequal reach and access is an issue to resolve.

Globally, approximately 43percent of the one and a half billion agricultural workers are women (World Bank, FAO and IFAD 2008). However, the rise of the patriarchal agricultural revolution system has created gender inequalities across a variety of professional and social spheres through national, religious and tribal socio-cultural contexts (Harari 2014). Throughout the ages until the eighteenth Century, gender roles and sexuality were a fluid notion (Laqueur 1990). However, women and men’s physical differences have become more important in our society’s definition of gender roles after the medical proof of sexual dimorphism between genders in the twentieth Century (Haines, Deaux, and Lofaro 2016). In a society increasingly defined by urbanised, industrialised and growing middle class came the demand for equality of women, challenging the ‘domestic ideal’ idealised by this middle-class ideology (the suffragettes for example). The activists were typically classed as feminists: liberal feminism seeks equal rights for women via political and civil channels; cultural feminism seeks to recover lost female voices from the past; and separatism seeks to establish female-only spaces and fora where women can determine their own values and beliefs (Laqueur 1990). These gender-based theories have permeated into many professional and popular domains, including agriculture: indeed, women are currently woefully under-represented as scholars, extension agents, researchers and instructors (World Bank and IFPRI 2010). This imbalance is also reflected in

smallholder farming, where women farmers struggle to achieve equal representation, access to information and resources as male farmers. This includes land ownership, high quality inputs, access to credit, insurance, education and rural advisory services (Carter and Weigel 2011; Cohen and Lemma 2011; Jafry and Sulaiman 2013; Johnson et al 2016; Lamontagne- Godwin et al 2018; Manfre et al 2013; Meinzen- Dick et al 2011; Ragasa et al 2013; Samee et al 2015). Indeed, certain figures put women's agricultural information access at less than ten percent in certain countries (Lamontagne- Godwin et al 2017; Lamontagne- Godwin et al 2018). These figures highlight significant issues, especially given women's complex role in the agricultural value chain (Doss 2001; Meinzen-Dick et al 2011) and their importance in increasing agricultural productivity (Beintema and Stads 2010; FAO 2011; Pardey et al 2006; World Bank, FAO and IFAD 2008).

International development entities and multilateral organisations, many of whom are responsible for RAS initiatives at the national level – such as the Training and Visit (Due 1997), Farmer Field Schools models developed by the FAO (Davis et al 2012), or CABI's Plantwise approach (Evidence on demand 2015), have attempted to respond to gender inequality in agriculture. However, traditional development efforts often promote mainstreaming approaches that aim to increase numbers of disenfranchised or vulnerable groups involved, with a particular focus on women (Doss 2001; Quisumbing 2003; Rao and Kelleher 2005; Schilling, Froese, and Naujoks 2018). However, these efforts are mostly driven by top-down project management approaches rather than by participatory activities which consider inherent gender issues – the topic they set out to resolve in the first place – in the developmental stages of any initiative (Kristjanson et al 2017; Mishra and Sinha 2012; Tegbaru et al 2010), often overlooking transformative empowerment processes that come from in-depth ethnological research responsible for long-term sustainable improvements in gender equality (Agarwal 2000; Gurung and Biggs 2008; Hambly-Odame and Sarapura 2009; Mukhopadhyay 2014). National systems usually compound the issue by operating under similar administrative and monitoring constraints in order to satisfy donor requirements and expectations (Chauhan 2014). According to many, the institutionalisation of gender – the process whereby gendered social practices become sufficiently regular and continuous to be described as institutions (adapted from Turner, Abercrombie, and Hill 2014) – is still beyond reach. This is partly because the issue is complex, necessitating formal institutional and informal individual agendas to feedback positively amongst themselves. On the one hand, formal institutional processes that frame gender inequality in countries, such as laws and policies governing access to resources, are linked to informal perceptions formed in part by traditional socio-cultural norms and individual beliefs (Rao and Kelleher 2003; Rao and Kelleher 2005). Social customs and the socio-cultural context determine men and women's roles,

restrictions and prohibitions in society, and therefore their position in their community. These roles determine how individuals interact formally and informally with one another, such as an interaction between extension workers and farmers of different genders (Figure 1). This top-down view is consistent with many gender-at-work theories.



*Figure 1. Institutionalising gender across individual and systemic processes.*

On the other hand, a bottom-up perspective, focusing on the operationalisation of gender transformative approaches can also impact on the institutionalisation of gender as a whole. Agricultural research in the past shows that women currently represent a significantly smaller proportion of scholars, extension agents, researchers, innovators and instructors compared to men (Carter and Weigel 2011; Doss 2001; Jafry and Sulaiman 2013; Lamontagne-Godwin et al 2017; Puskur 2013; Ragasa et al 2013). In conjunction with this lack of female representation, many public services still adopt a gender-neutral stance – considering their approaches suitable for and applicable to both male and female genders – when designing and carrying out activities. Consequently, technical information and rural communication efforts follow suit, favouring men over women’s needs (Mudege et al 2016), leading to a positive reinforcement of male farmers consistently reporting better access to extension information (Lamontagne-Godwin et al 2017; Puskur 2013; Ragasa et al 2013;). Research by Farnworth and Colverson (2015) through the Gender-Transformative Extension and Advisory Facilitation system (GT-EAFS) shows that specific gender transformative approaches, developed through a thorough understanding of male and female perspectives on the ground, can be of benefit to gender equality, systematically identifying, integrating and scaling up proven positive women empowerment approaches. The development and promotion of these activities leads to a gradual socio-cultural change from the ground up. This in turn aims to move beyond individual self-

improvement, transforming the power dynamics and structures that serve to reinforce gendered inequalities (Hillenbrand et al 2015). A review of the effectiveness of new approaches targeting women in extension does much to highlight potential avenues of research and development in knowledge pathways (Mbo'o-Tchouawou and Colverson 2014) and its impact on gender equality in the long term. Yet many studies focus on individual activities and neglect the social-cultural impact they have that can be so important in determining whether the technology's application will be successful from a gendered perspective. Certain studies do impress the need for considering gender in each step of the planning phase when trialling new technologies (Kabeer 2010), while others have focused almost exclusively on the importance of gender norms exclusively in the household (Mudege et al 2015). In Pakistan, past research has usually focused on simplistic analyses of gendered activities and did not delve into its gender transformative potential, although urban research on the evolution of gender roles has shown the importance of education and mass media to combat static and enforced structures imbedded in society (Ali et al 2011) so important for promoting long-term change. The integration of non-traditional stakeholders is also vital in order to get a well-rounded view. The inclusion of extension workers' perceptions could lead to more powerful conclusions. Indeed, research focused on the extension worker has previously focused on knowledge of sustainable agricultural practices (Tiraieyari et al 2013), climate change (Obasi et al 2014), agricultural policies (Kinyanjui et al 2000), use of ICTs in extension service delivery (Ajayi, Alabi and Akinsola 2013), and the importance of computers in extension activities (Rad, Hashemi, and Chizari 2014), the impact of devolution (Saeed et al 2006) and staff development opportunities (Masud, Hashmi, and Ali 2011). This study uses RAS in Pakistan as a case study to focus on individual perceptions of farmers and extension workers, helping to triangulate and identify gender responsive approaches in order to trigger, or at least formalise, institutionalised gender processes. In Pakistan, women utilise less sources of information than men, focusing mainly on nonformal individual sources, such as female friends/neighbours (Butt et al 2010; Hassan, Ali, and Ahmad 2007; Lamontagne-Godwin et al 2018; Sadaf, Asif, and Muhammad 2006; Yaseen et al 2016). In spite of their many roles and responsibilities in the field, women have minimal roles in decision-making due to existing cultural norms (Samee et al 2015). This problem is apparent at various official levels. Over 240 of the 259 middle senior and executive level decision makers in the Department of Food, Agriculture and Livestock are men. Only 15 women work in the executive wing of agricultural ministry in Pakistan; none work at the executive level. Finally, 26 of 500 extension workers in the Directorate of Agricultural Extension and Adaptive Research of the Punjab province are women (Chauhan 2014).

A clearer understanding of extension workers' perspectives of male and female farmers' perceptions in agriculture, and how this translates into operational and institutional change, would be of practical value to those attempting to transform extension systems to reach women as well as men. From a theoretical perspective, the approach undertaken to compare both sets of results could provide a perspective for future holistic research to explore the influence of individual perceptions of gender and its institutional impact in a national context. Understanding extension workers as individuals in a large workforce is no guarantee of an effective system (Ragasa et al 2016), but a comparison between both sets of results could support a more comprehensive understanding of the Pakistani context from institutional and individual perspectives. Most importantly, these findings facilitate the continuation of a discussion about the institutionalisation of gender in RAS's evolving environment.

Having demonstrated the importance of the paper's purpose and its contribution to existing theoretical and practical knowledge, the manuscript will present the methodologies used in the research before listing a logical sequence of results. Subsequently, the paper discusses the results in light of existing knowledge and suggests possible ways to develop further in-depth studies, utilising qualitative research theories.

## **Methods**

In this study, the target population were extension workers in the Punjab province of Pakistan, specifically in the Jhang and Bahawalpur districts. The study interviewed one hundred and sixteen staff in the field or in their offices. They were from the Provincial Department of Agricultural Extension and Adaptive Research (PDEAR) and performed a variety of field and office roles in the department. Sixty-six participants were from Bahawalpur's four sub-districts (Ahmadpur East, Bahawalpur, Hasilpur and Yazman) and 50 were from Jhang's three sub-districts (Shorkot, Ahmadpur Syial and Jhang). Of the 116 participants, five were women (three from Bahawalpur and two from Jhang). Ideally, the study would've achieved a 50–50 gender balance. However, data collection efforts could not find enough women extension workers to interview in the area, as they were out of the offices. In addition, women working in low to middle administrative roles in the departments did not interact with farmers professionally so were excluded from this study. Whilst their views would have been interesting to consider, it was outside of the scope of the study. The study subsequently focused on male extension worker findings.

The study interviewed participants through face-to-face administered questionnaires. Questionnaires were designed and tested prior to final data collection activities, conducted in the language of preference of the participant. Each interview took between half an hour and 45 min. The facilitators

led interviewees through their background and current role in PDEAR and their perceptions of agricultural information needs and habits in rural households. The list of information sources was chosen according to past studies (Hassan, Ali, and Ahmad 2007; Sadaf, Asif, and Muhammad 2006) and systematically compared to the information sources cited by farmers in Lamontagne-Godwin et al (2018) farmer study in the same districts. Whilst data sources on access to information are available, the study's aims are as much to highlight the inequality of information access by end-users as they are to contribute to the wider gender inequality debate. Men and women's views reflect socio-cultural norms they adhere to, and the conscious bias/preferences in accessing specific information sources at convenient locations. This paper is keen to highlight how, based on these perceptions, specific short-term gender-responsive schemes can help the unequal access to information to evolve, as well as how these changes can contribute to the wide institutionalisation of gender equality debate.

Data were collated onto Microsoft excel in Pakistan, and cleaned and analysed in the SPSS<sup>™</sup> statistical package in the UK. Due to the categorical nature of the dependent and independent variables, the study used cross-tabulated descriptive statistics and binomial Z tests: the null hypothesis states there are no significant differences in access to information between how extension workers view farmers' access to information, correlated with a five percent margin of error. When sample sizes were too low for Z tests, the study conducted descriptive statistics for qualitative purposes. In order to keep statistical analyses powerful and conclusions relevant, the study focused the majority of its correlations on the top information sources for both farmer genders.

## **Results**

The first section of results describes male extension workers' perceptions of information access for male and female farmers, considering age and profession. The second section compares extension worker and farmer views on information access. Results form the basis for the article's ensuing discussion, focusing on the importance of gender institutionalisation in agriculture.

### **Population Statistics By Gender**

Overall, the survey interviewed 116 staff members (Table 1). This included 24 agricultural extension officers and inspectors (18 extension officers, of which 15 were men, and six inspectors, of which four were men). These professionals mainly spend their time in the office. The study also interviewed four male deputy district officers working exclusively in the district head office, and 88 male field assistants who mostly work in the field. The three female extension workers and two agricultural inspectors worked exclusively from the office, carrying out administrative duties and giving

agricultural advice to visiting farmers. Sixty-nine percent of male participants were over 40, while four of the five women interviewed in the survey were between the ages of 20 and 30. All women and 23 of the 111 men (all extension officers, inspectors and deputy district officers) had completed a postgraduate study. Four field assistants had completed their undergraduate, and the remaining 84 has passed their agricultural diploma.

<b>Job holder</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>	<b>%</b>
Agricultural extension officer	15	3	18	16
Agricultural inspector	4	2	6	5
Deputy district officer agriculture	4	0	4	3
Field assistant	88	0	88	76
<b>Total</b>	<b>111</b>	<b>5</b>	<b>116</b>	<b>100</b>

*Table 1: professional positions of rural advisory service workers in the survey*

### **Extension Workers' Perceptions Of Male And Female Farmers' Information Access**

#### *By Information Source*

Male extension workers view male and female farmers' access to information significantly differently (Table 2). They believe male farmers accessed all 16 information sources listed, while they thought female farmers accessed three sources only ( $z = 22.6$ ;  $p \lll 0.05$ ). Indeed, male extension workers' responses around female farmers' use of information sources were very low: the highest-ranking source used by female farmers was their female neighbours/friends. However, only seven of the 111 extension workers (or six percent) believed female farmers used them. Six male extension workers also thought women used public extension services, and only one extension worker stated women used agrodealers. These results highlight male extension workers' perceptions of the lack of access of female farmers' to sources of agricultural information access. On the other hand, all 111 male extension workers believed male farmers accessed public extension services, followed by agrodealers (89 percent, or 98 of the 111), private extension services (73 percent), male neighbours/friends (43 percent), and lead male farmers (37 percent). Less than a quarter of the extension workers in the survey believed male farmers accessed the remaining 11 sources. These include other public services (PDAR, PDAI, PDPW and plant clinics), mass media communication tools (radio, television, brochures), informal interactions with women (neighbours and lead farmers), NGO workshops and university extension services. The results underline the importance of the top sources as perceived by male extension workers. It is encouraging to see the public, private and informal sectors highlighted in the top five sources.

Sources of information	Male extension workers n=111									
	Where do male farmers get their information					Where do female farmers get their information				
	Never	Rarely	Sometimes	Frequently	Very frequently	Never	Rarely	Sometimes	Frequently	Very frequently
PDEAR <sup>1</sup>	0	0	1	98	12	105	5	1	0	0
PDAI <sup>1</sup>	105	2	1	3	0	111	0	0	0	0
PDAR <sup>1</sup>	107	3	1	0	0	111	0	0	0	0
PDPW <sup>1</sup>	106	1	4	0	0	111	0	0	0	0
Plant clinic <sup>2</sup>	84	0	5	20	2	111	0		0	0
Agro dealer	13	0	35	62	1	110	0	1	0	0
Private extension service <sup>3</sup>	31	5	58	17	0	111	0	0	0	0
University extension	108	2	1	0	0	111	0	0	0	0
NGO workshop	108	2	1	0	0	111	0	0	0	0
Radio programme	90	4	17	0	0	111	0	0	0	0
Information brochure	105	2	3	1	0	111	0	0	0	0
Television programme	87	2	21	1	0	111	0	0	0	0
Male neighbour/friend	63	2	26	20	0	111	0	0	0	0
Female neighbour/friend	110	1	0	0	0	104	0	4	2	1
Lead male farmer	71		28	12	0	111	0	0	0	0
Lead female farmer	110	1	0	0	0	111	0	0	0	0
Total	1298	27	202	234	15	1762	5	6	2	1
Total %	73	2	11	13	1	98	1	1	>>1	>>1

Table 2: male and female farmers' information source access according to male extension workers

<sup>1</sup> PDEAR (Provincial Department of Extension and Adaptive research); PDAI (Provincial Department for Agricultural Information); PDAR (Provincial Department of Agricultural Research); PDPW (Provincial Department for Pest Warning and Quality Control of Pesticides);

<sup>2</sup> Plant clinics are a network of plant health information advice points run by agricultural officers and field assistants of PDEAR and supported in their implementation by CABI's Plantwise programme ("[www.plantwise.org](http://www.plantwise.org)")

<sup>3</sup> Private extension services are a service working for a particular agrochemical company that travels to a household, compared to agrodealers who have a shop and await farmers' custom

### By Location

The study analyses male extension workers' perceptions of location convenience for male and female farmers to access information (Table 3). Male extension workers believe the majority of locations are appropriate for male farmers. Indeed, over 95 percent of all answers were positive ('good' or 'very

good’). The most convenient location is the field, with the highest proportion of ‘very good’ ratings. The market place, the district and sub-district offices are useful locations, as are also spiritual places and the village office to a lesser extent. The homestead is the only location cited with a significant proportion of ‘OK’ ratings (but still manages to receive 73 percent of ‘good’ and ‘very good’ ratings). For women in agriculture, the situation is very different according to male extension workers. ‘Very bad’ and ‘bad’ ratings constitute a quarter of all answers in the survey, and only 36 percent of answers are rated ‘good’ or ‘very good’, a significant difference. Extension workers believe the least convenient locations to access information are the district and sub-district offices, followed by the village office and the market place. The most convenient location by quite a distance is in a spiritual setting. They also view the field in which they work and the homestead relatively positively. There are some significant perception differences according to administrative locations (district, sub-district and village offices), domestic locations (field and home) and commercial locations (market). In a spiritual setting there are slight statistical significances found, although by and large all extension workers believe that spiritual settings are good or very good locations for men to get information, and 96 percent believe spiritual settings are good or very good locations for women to access information.

How convenient is location for accessing information	Male extension workers on male farmers (n=111)				Male extension workers on female farmers (n=111)				Z test
	Very bad / Bad	OK	Good	Very good	Very bad / Bad	OK	Good	Very good	
District office	0	0	92	19	55	40	16	0	22.03**
Sub-district office	0	0	92	19	55	40	16	0	
Village office	0	2	95	14	44	49	18	0	
Spiritual place	0	0	94	17	0	4	106	1	2.08*
Market	0	1	77	33	35	43	33	0	10.98**
Homestead	0	30	71	10	0	69	42	0	5.23**
Field	0	0	75	36	0	63	48	0	
Total	0	33	596	148	189	308	279	1	-25.1**
Total %	0	4	77	19	24	40	36	<1	

Table 3: male extension workers’ perceptions of male and female farmers’ access to information by location

\* Denotes  $p < 0.05$ ; \*\* Denotes  $p = 0 < < < 0.05$

### Extension Workers' Perceptions Of Male Farmers' Information Access

The following analysis investigates the top five male farmer information sources according to extension workers in order to provide a statistically useful sample size (Table 4). The large majority of field and office-based extension workers believe PDEAR services are accessed frequently or very frequently by male farmers. They also have similar perceptions regarding male farmers' access to informal information services, such as lead male farmers or their neighbours. Regarding private services, although both groups believe they utilise private extension services similarly, there is a slight difference in their perception of the use of agrodealers: whereas 15 percent of field-based extension workers believe that male farmers never access information from agrodealers, none of the 23 male extension workers who work in the office believe this. Instead, 43 percent of office-based extension workers believe male farmers' access these services 'sometimes', compared to 28 percent of field-based extension workers (the difference is not statistically different however). Overall, there were no statistically significant differences between opinions from extension workers primarily based in the field and extension workers based in the office and the field.

Top 5 Male information sources according to extension workers' perceptions	Field based extension workers (n=88)				Office based extension workers (n=23)				Z-test
	Never	Sometimes	Frequently	Very frequently	Never	Sometimes	Frequently	Very frequently	
PDEAR	0	1	79	8	0	0	19	4	0.24
Agrodealers	13	25	50	0	0	10	12	1	1.42
Private extension services	29	48	11	0	2	15	6	0	0.28
Male neighbours/friends	53	21	14	0	10	7	6	0	0.56
Lead male farmers	60	21	7	0	11	7	5	0	0.25

Table 4: Top five male information sources according to extension workers' different professions

### Comparison With Male And Female Farmers' Perceptions Of Information Access

This section compares survey results of extension worker perceptions with past farmer-based studies (Lamontagne-Godwin et al 2018) regarding information source access. Overall, male extension workers believe male farmers access information sources significantly more often than they actually

do ( $z = 4.4$ ;  $P < 0.05$ ). Male extension worker responses are consistent with farmer responses in believing that PDEAR and agrodealers are most commonly accessed information resources by male farmers. However, male farmers also value other public services significantly more in the case of PDPW ( $z = 3.2$ ;  $p < 0.05$ ) and PDAI ( $z = 2.32$ ;  $p = 0.02 < 0.05$ ) than extension workers do. Inversely, male extension workers value plant clinics significantly more ( $z = 3.09$ ;  $p < 0.05$ ) as a source of information than male farmers do (Table 5). We can therefore identify a clear bias in extension workers' perceptions of their own value for the dissemination of agricultural information. However, extension workers also understand the importance of informal methods for accessing information for male farmers. Male neighbours and friends are considered the fourth most important source of information, closely aligned to male farmers' views as the third most popular source. There are similarities and differences regarding male farmers' use of mass media communication. While there is little difference in male extension workers' perceptions of radio and television use by male farmers and farmers' actual use, male farmers value information brochures significantly more ( $z = 2.67$ ;  $p < 0.05$ ) than male extension workers think they do. Moreover, some vast differences in perception of information sources are apparent. Over a third of male extension workers believe lead male farmers are an important source of information, compared to 14 percent of male farmers ( $z = -4.54$ ;  $p < 0.05$ ). Male farmers also value NGO workshops ( $z = 5.31$ ;  $p < 0.05$ ) and private extension services ( $z = 12.31$ ;  $p < 0.05$ ) significantly more than male extension workers think they do (Table 5).

When comparing perceptions of female farmer access (Table 6), three clear messages are understood. Firstly, male extension workers believe female farmers access information sources significantly less often than they actually do ( $z = 7.38$ ;  $P < 0.05$ ). Male extension workers have listed three sources (female fiends/neighbours, PDEAR and agrodealers), compared to female farmers listing twelve (although ten of these have a response rate of less than ten percent of female farmers).

Where do male farmers get information?	Male extension workers % (n=111)					Male farmers % (n=200)					Z-test
	Never	Rarely	Sometimes	Frequently	Very frequently	Never	Rarely	Sometimes	Frequently	Very frequently	
PDEAR <sup>1</sup>	0	0	1	88	11	36	8	30	23	3	0.75
PDAI <sup>1</sup>	94	2	1	3	0	86	0	12	2	0	2.32**
PDAR <sup>1</sup>	96	3	1	0	0	89	0	8	3	0	1.15
PDPW <sup>1</sup>	95	1	4	0	0	81	1	15	3	0	3.2**
Plant clinic <sup>2</sup>	75	0	5	18	2	89	1	7	3	0	3.09**
Agrodealer	11	0	32	56	1	44	3	34	15	4	1.13
Private extension service <sup>3</sup>	28	5	52	15	0	95	0	5	0	0	12.31**
University extension	97	2	1	0	0	96	0	4	0	0	0.23
NGO workshop	97	2	1	0	0	73	2	20	5	0	5.31**
Radio programme	81	4	15	0	0	77	4	12	7	0	0.66
Information brochure	94	2	3	1	0	88	1	11	0	0	2.67**
Television programme	78	2	19	1	0	80	4	12	4	0	0.43
Male neighbour/ friend	57	2	23	18	0	53	1	26	20	0	0.15
Female neighbour/ friend	99	1	0	0	0	100	0	0	0	0	0.03
Lead male farmer	64	0	25	11	0	86	0	12	2	0	-4.54**
Lead female farmer	99	1	0	0	0	100	0	0	0	0	0.03
TOTAL	1165	27	183	211	14	1273	25	208	87	7	4.4**
TOTAL %	73	2	11	13	1	79	2	13	5	1	

Table 5: information source access according to perceptions of male farmers and male extension workers

<sup>1</sup> PDEAR (Provincial Department of Extension and Adaptive research); PDAI (Provincial Department for Agricultural Information); PDAR (Provincial Department of Agricultural Research); PDPW (Provincial Department for Pest Warning and Quality Control of Pesticides);

<sup>2</sup> Plant clinics are a network of plant health information advice points run by agricultural officers and field assistants of PDEAR and supported in their implementation by CABI's Plantwise programme ("[www.plantwise.org](http://www.plantwise.org)")

<sup>3</sup> Private extension services are a service working for a particular agrochemical company that travels to a household, compared to agrodealers who have a shop and await farmers' custom

Where do female farmers get information?	Male extension workers % (n=111)					Female farmers % (n=201)					Z-test
	Never	Rarely	Sometimes	Frequently	Very frequently	Never	Rarely	Sometimes	Frequently	Very frequently	
PDEAR <sup>1</sup>	94	5	1	0	0	88	3	8	1	0	1.41
PDAI <sup>1</sup>	100	0	0	0	0	99	0	1	0	0	0.03
PDAR <sup>1</sup>	100	0	0	0	0	100	0	0	0	0	0.00
PDPW <sup>1</sup>	100	0	0	0	0	99	0	1	0	0	0.03
Plant clinic <sup>2</sup>	100	0	0	0	0	99	0	1	0	0	0.03
Agro dealer	99	0	1	0	0	91	2	6	1	0	
Private extension service <sup>3</sup>	100	0	0	0	0	100	0	0	0	0	0.00
University extension	100	0	0	0	0	100	0	0	0	0	0.00
NGO workshop	100	0	0	0	0	97	0	3	0	0	0.05
Radio programme	100	0	0	0	0	100	0	0	0	0	0.00
Information brochure	100	0	0	0	0	99	0	1	0	0	0.00
Television programme	100	0	0	0	0	95	1	4	1	0	0.16
Male neighbour/friend	100	0	0	0	0	96	0	3	1	0	0.12
Female neighbour/friend	93	0	4	2	1	67	0	21	11	1	5.11**
Lead male farmer	100	0	0	0	0	92	1	6	1	0	0.24
Lead female farmer	100	0	0	0	0	91	0	7	2	0	0.27
Total	1586	5	6	2	1	1513	7	62	18	1	
Total %	99	<1	<1	<1	<1	95	<1	4	1	<1	7.38**

Table 6: information source access according to perceptions of female farmers and male extension workers

<sup>1</sup> PDEAR (Provincial Department of Extension and Adaptive research); PDAI (Provincial Department for Agricultural Information); PDAR (Provincial Department of Agricultural Research); PDPW (Provincial Department for Pest Warning and Quality Control of Pesticides);

<sup>2</sup> Plant clinics are a network of plant health information advice points run by agricultural officers and field assistants of PDEAR and supported in their implementation by CABI's Plantwise programme ("[www.plantwise.org](http://www.plantwise.org)")

<sup>3</sup> Private extension services are a service working for a particular agrochemical company that travels to a household, compared to agrodealers who have a shop and await farmers' custom

Secondly, the three sources listed by male extension workers correspond to the three most utilised sources listed by female farmers: male extension workers still recognise the importance of certain sources for female farmers, such as PDEAR and agrodealers. However, analysis of the most utilised source (female neighbours/friends) as listed by both groups shows a significant difference in perceptions ( $z = 5.11$ ;  $p < < < 0.05$  – Table 6): whereas seven percent of male extension workers believe female farmers use female neighbours/friends, a third of female farmers state they use this resource 'sometimes', 'frequently' and 'very frequently'. Finally, whilst lead female farmers are perceived to be a non-existent resource for female farmers according to male extension workers' perceptions,

female farmers actually list lead female farmers at joint third most important source of information. This is an important final message that could point towards new knowledge pathway development.

The study now analyses male extension workers' perception of location convenience and compares it with male farmers' views (Table 7). Overall, male extension workers believed listed locations were more convenient to farmers than male farmers thought themselves. Indeed, an average of 96 percent of extension workers believed the seven locations listed were 'good' or 'very good', compared to 68 percent of male farmers, a significant difference. Individually as well, extension workers believe administrative, spiritual, market and domestic locations are much more convenient than male farmers perceived. According to extension workers, the most convenient location for male farmers to access information is in the field, closely followed by the marketplace. Male farmers stated the market was the most convenient place, followed by the sub-district office. These differences are important to note, as they could have a huge bearing on the efficiency and methods of knowledge exchange between public RAS and the farming community. Overall, the majority of male extension workers believe women do not feel at ease accessing information from the listed locations (Table 7).

How convenient is location for getting information	Extension workers on male farmers (n=111)				Male farmers (n=200)				Z-Test
	Very bad / Bad	OK	Good	Very good	Very bad / Bad	OK	Good	Very good	
District office	0	0	92	19	0	62	80	58	5.82**
Sub-district office	0	0	92	19	0	46	98	56	
Village office	0	2	95	14	18	44	112	26	7.6**
Spiritual place	0	0	94	17	26	52	122	0	
Market	0	1	77	33	2	30	144	24	4.12**
Homestead	0	30	71	10	22	82	92	4	5.39**
Field	0	0	75	36	0	70	106	24	
Total	0	33	596	148	68	386	754	192	15.12**
Total %	0	4	77	19	5	27	54	14	

Table 7: male extension workers' and male farmers' perceptions to access to information by location  
 \*\* denotes  $p=0<<<0.05$

Sixty-four percent of extension workers' responses stated the locations are 'very bad/bad' or 'OK', compared to 52 percent of female farmers' responses (a significant difference). In specific cases, extension workers are more accurate: for example, they accurately perceive female farmers do not find administrative locations convenient. Indeed, less than 16percent of total responses by female farmers state they feel administrative locations (particularly district and sub-district offices) are a convenient location. Male extension workers also accurately perceive the importance and value placed upon spiritual locations by female farmers. Indeed, over 96 percent of male extension workers state spiritual locations are good or very good locations for female farmers to access information. Their perceptions mirror proportions of female farmers (98 percent) who state that spiritual locations are either 'good' or 'very good' locations to access information. Spiritual locations could be a good solution for agricultural information access for women (Table 8).

How convenient is location for getting information	Extension workers on female farmers (n=111)				Female farmers (n=201)				Z test
	Very bad / Bad	OK	Good	Very good	Very bad / Bad	OK	Good	Very good	
District office	55	40	16	0	87	82	30	2	0.25
Sub-district office	55	40	16	0	76	89	34	2	
Village office	44	49	18	0	34	137	28	2	
Spiritual place	0	4	106	1	0	4	161	36	0.83
Market	35	43	33	0	2	78	109	12	-5.15**
Homestead	0	69	42	0	0	92	105	4	-3.85**
Field	0	63	48	0	2	54	121	24	
Total	189	308	279	1	201	536	588	82	5.23**
Total %	24	40	36	<<1	14	38	42	6	

Table 8: male extension workers' and female farmers' perceptions to access to information by location; \*\*Denotes  $p=0<<0.05$

Finally, female farmers feel that the market and domestic locations are more convenient compared to male extension workers' perceptions. Indeed, 60 and 61 percent of women feel the market and

domestic locations (the homestead and their field) are ‘good’ or ‘very good’ locations to access information, compared to 30 and 40 percent of male extension workers. There is a distinct lack of understanding from public services of women’s perceptions of information access in locations traditionally renowned to give men information. These results clearly point to possible solutions, discussed in the following section.

## **Discussion**

The discussion focuses on three specific aspects. Firstly, it attempts to understand extension workers’ overall perceptions of gendered information access. Secondly, it analyses the role of individual perceptions between extension workers and farmers’ perceptions to triangulate and develop specific and targeted gender-responsive initiatives that have the potential to contribute to transformative change, leading to an evolution of institutional gender policies in Pakistan. Finally, the discussion seeks to frame the findings according to the current gender inequality situation in Pakistan. This section goes on to list study limitations.

### **Extension Workers’ Knowledge Of Gendered Situations In RAS**

Past research suggests that extension workers’ view on gender-specific issues is limited: no extension workers interviewed in either Farooq et al’s (2010) or Hussain, Khan, and Asif’s (2010) studies cited access to women farmers or the lack of female extension agents as a major issue for extension departments to deal with. Indeed, compared to issues such as reduced professional development, increased workloads and fiscal constraints at the administrative and operational level that seriously affect staff morale and productivity (Davidson and Ahmad 2002; Okereke and Onu 2007; Rivera and Alex 2004; Rivera 2011; Saeed et al 2006), a concern for women’s access to extension services does not become a priority for a predominantly male extension workforce (Gowda and Saravanan 2001; Pardey et al 2006; Pray and Umali-Deininger 1998; Rivera 2011; Umali and Schwartz 1994).

In this study, extension workers are aware of certain situations confronted by both male and female farmers. They are aware of men’s access to greater variety of information sources, and more often, than female farmers do, corroborating previous Pakistan (Hassan, Ali, and Ahmad 2007; Lamontagne-Godwin et al 2018) and worldwide studies (Lamontagne-Godwin et al 2017; Ragasa et al 2013). They also accurately perceive that female farmers access information significantly less often and understand where women access their information, mentioning the same top three information sources as female farmers (female neighbours, PDEAR and agrodealers). They are also aware that men use formal services more than women do, and discern women smallholders’ preference for spiritual rather

than administrative locations for accessing information. However, certain gendered information access issues are ignored: for example, male extension workers believe male farmers access information sources significantly more often than they actually do and female farmers access information sources significantly less often than they actually do; and of women's perceptions of information access in locations traditionally renowned to give men information. Further qualitative studies focusing exclusively on the differences between farmer and extension worker perceptions would be of great benefit in order to gain a significantly better understanding of the socio-cultural norms influencing their perceptions. This could also enable a targeted gender-responsive extension worker training programme, aimed to improve knowledge and awareness for the individual. As this study discusses later, this could have positive implications for the institutionalisation of gender.

### **Operationalising Gender-Responsive Approaches In RAS: The Importance Of Individual Perceptions**

Whilst the gender-responsive improvement of national RAS systems is a lofty aim; would it perhaps be more appropriate to consider RAS as a service that can help support the attainment of a more gender equal society instead? The development, promotion and scale up of gender responsive approaches might be a more effective and pragmatic manner to achieve practical change, rather than attempting to drive an entire systems evolution through ambiguous gender topic driven discussions (Farnworth and Colverson 2015). A practical approach could therefore result in transformative change for women's agricultural information access, clearly and measurably improving gender equality in agriculture. This study manages to identify an interesting example. A large proportion of male extension workers ignore the importance of lead female farmers, even though women smallholders perceive it to be the joint third most important resource they use to access information. Moreover, extension workers vastly overestimate the importance of lead male farmers in transmitting information to male farmers. These two findings suggest lead farmers could be an interesting gender-specific knowledge exchange pathway to explore. Positive perceptions of lead farmers by extension workers in Pakistan could be due to the long-standing Training and Visit approach disseminated in the late twentieth Century (Ashraf et al 2009). Even though the Training and Visit system suffered from inherent and ultimately fatal administrative, implementation and quality control issues (Dejene 1989), extension workers in the field actually gained time with contact farmers and research stakeholders, and reduced their non-extension duties (Hussain, Byerlee, and Heisey 1994). Lead female farmers could therefore offer a potentially innovative knowledge pathway, blending formal extension worker knowledge with farmer to farmer interactions, and incentivising informal arrangements favoured by

female smallholders in this study. A network of trained and knowledge-rich female lead ‘contact’ farmers could be developed and trialled to understand its potential role in improving the dissemination of agricultural information to women in farm households. By initiating change with women in the household, this could lead to changing beliefs in the household, and instigating transformative change in the process. In this instance, the involvement of national and local RAS institutions to develop, implement and raise awareness of this novel approach would be vital.

### **Gender Responsive Schemes And The Institutionalisation Of Gender In The National Context**

Although three legal documents (Charter of Women’s Rights, 1954; Constitution, 1956; Muslim Personal Law of Shariat, 1948) give women representation in legislative assemblies, the right to own property and vote in Pakistan, and examples of gender-specific approaches’ socio-economic effectiveness are sorely needed (Chauhan 2014). Indeed, institutional activities designed to change the situation, such as Gender Reform Action Plan’s in 2005, or the Punjab Women Empowerment Package launched in 2014, have been unsuccessful to date, largely because they have never been backed up by comprehensive policies, or those that do pass the vote are generally ignored (Chauhan 2014) or would only target privileged and educated women, forgetting the poorer women in society (The Express Tribune 2014). Information access and representation of women in the public sector remains extremely low, or only concentrated in culturally acceptable domains, such as human health and education. The development of gender-responsive approaches and targeted gender trainings could challenge the individual and institutional status quo of gender-specific socio-cultural norms in Pakistan by providing opportunities to gather evidence of successful implementation and its implications on improved knowledge, yields and incomes in rural areas. As discussed by Rao and Kelleher (2005), this evidence could improve gender neutral views, promote transformative policies (or at least not block them), and dictate legal change in the long term. In turn, this would allow informal norms at the individual and systemic level to evolve, as targeted gender-responsive policies with specific resources for gender-specific activities enable these policies to come into practice in a positive feedback mechanism.

A data-focused dialogue with a comprehensive set of stakeholders at all levels of the agricultural innovation system would be an important step forward to understand and analyse the impact of gender responsive approached on transformative change in gender equality in RAS.

## **Limitations And Further Research**

These results are important to consider when planning gender transformative activities in the short-term. Informal perceptions gathered from end-users and extension workers are crucial to help devise specific and tailored systems that not only promote formal gender-specific activities, but also an evolution of gender in informal systems. However, there is a need for a more qualitative perspective in the future, utilising theories such as reasoned action theories or other contemporary social definition methods. While the study suggests trialling an adapted system that incorporates individual perceptions and could potentially drive the development of gender-based approaches, women stakeholders, including extension workers, would still need to be consulted and their perceptions analysed in a qualitative and quantitative fashion. It was in the original objectives of this study to conduct similar perception-based research with female extension professionals in extension. However, the small cadre of female extension professionals in Pakistan meant it was not possible to obtain a clear picture of their views. Whilst this study solely focused on information access, future studies should analyse other factors according to gender, such as the quality of the advice provided, and their trust in sources. A more detailed household background, focusing on crops grown, economic situation and social status, should also be utilised to contextualise the situation of the men and women smallholder farmers interviewed.

## **Conclusions**

This article investigates multiple stakeholders' individual perceptions in order to highlight potential gender inclusive initiatives, with an aim to institutionalise gender in the long-term in RAS in Pakistan. This study draws attention to male extension workers' lack of awareness of specific gender-based realities of agricultural information access, and discusses the importance of implementing targeted initiatives focusing on improving awareness. The article also considers the potential gender-specific success of developing and trialling a specific extension system in development, centred on lead female farmers and extension agents. This is of course dependent on further qualitative and quantitative studies involving female stakeholders, particularly female extension workers. The findings contribute to understanding of individual and institutional processes of gendered agricultural information access, taking a country's socio-cultural context into consideration, with implications for the development of national and international rural advisory service initiatives: indeed, by focusing on key findings that arise from perception analyses, future RAS initiatives can suggest concrete approaches to integrate gender-specific requirements, improving gender awareness in public sector activities, and leading to overall women's empowerment.

### **Author Contributions**

Julien Godwin was the main researcher and writer for this study. Frances Williams commented and discussed specific findings with the first author. Dr Peter Dorward and Dr Sarah Cardey supported the development of the study's thought processes. Naeem Aslam helped coordinate the logistics of travel to study locations, whilst Muntazir Almas helped for female-based interactions during the questionnaires in Jhang and Bahawalpur.

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## 6. Conclusions and Recommendations

Rural advisory services are clearly developed and run with the very best of intentions. However, in their haste to provide farming groups with accurate biological and ecological knowledge, the natural scientific community utilised erroneous knowledge diffusion assumptions when developing RAS initiatives, further compounding gender inequalities and inefficient services. Moreover, RAS are different in every nation, tribe or community as they answer to different societal and political requirements. If this thesis shows the reader anything, it is that policy makers, researchers, extension workers and farmers of both genders are products of their society's views on structures, processes, systems and relations. Comprehensively and systematically understanding the effectiveness and inclusivity of rural advisory services in low income countries is an immensely complex task. Yet, pieces of the puzzle can still be excised for objective analyses, and suggestions on how to improve the system can, in spite of everything, be taken up and offer real hope for the development of an improved and gender-aware rural advisory service. It is with this intention that the author first set out to research and understand the Pakistani rural advisory service domain.

Indeed, this thesis contributes to the current literature by developing a novel method to visualise and understand a RAS system through the eyes of federal and sub-national stakeholders (Chapter 2). In essence, this systems' analysis strays away from a traditional breakdown of a knowledge system in order to understand different stakeholders' perspective of influence and involvement in a RAS network. It enables a detailed and pragmatic understanding of RAS in a particular country and analyses perception differences that are usually the basis for political conflicts and power struggles. Clearly the findings will be different according to the country that is investigated, and the Pakistani case study highlights the ambiguity surrounding the decentralisation of services: the study shows a perceived weak/confusing federal direction and communication to provincial administrations, seldom involving local representatives, further fuelling the perception of top-down decision-making decentralisation was keen to remove. This chapter presents an approach that encourages individuals participating to reconsider their assumptions on systemic processes within RAS, and also highlights the indistinctness of stakeholders' roles in the RAS network, particularly between the private, the public sector and external initiatives such as Plantwise. Indeed, this research is useful for dedicated RAS programmes to plan and implement an inclusive, successful and sustainable integration into local and national RAS systems.

The following (third) chapter focuses on these issues from an institutional, organisational and individual angle. It aims to understand Plantwise's impacts on individuals' perceptions of gendered

individual interactions and systemic processes in a country's RAS network, processes that contribute to inclusive transformative change. Findings clearly show the programme and the technologies it promotes, plant clinics, do actively contribute to important social and systemic elements of Pakistani RAS. The chapter also highlights the importance of these gender-focused analyses, which showcase the value of longer-term programmes that aim for transformative change, rather than the limited worth of simplistic, output-focused projects. It also highlights the need for further research to develop methods to measure efforts to reduce the disparity of agricultural information access between different genders. Finally, this chapter emphasizes the importance of intersecting gender and socio-economic variables, and the need to better understand the impacts that socio-economic factors have on individual perceptions of agricultural information access. The focus on gender is crucial in order to refine RAS approaches in the field.

The fourth chapter therefore investigates specific variables' (age and gender) effects on individual perceptions of agricultural information access in a particular household model. Results shows that men and women farmers' use and preferences in accessing information sources are extremely different in male headed households in Pakistan. Women prefer interpersonal communication methods from informal sources rather than official channels. In contrast, men use and value official agencies more. The study clearly found that age is a key variable that affects access to information for women – particularly when considering convenient locations to access the information. However, literacy presented a nuanced picture: while illiteracy affects women's perception of information access through official channels (meaning they are less confident in interaction with extension workers or agrodealers), literacy does not affect women's ability to access information in official locations. This reflects clear socio-cultural norms and the restrictions they impose on women: literate women will have better interaction with formal services, but being literate will not increase their ability to visit official locations. This study also highlights the need to better integrate these perceptions into more progressive, gender-aware, schemes.

This aspect is investigated in the final, fifth, chapter of the thesis, focusing on specific gendered interactions between male and female farmers and extension workers. Results highlight the different perceptions between male extension workers and male and female farmers. Moreover, findings clearly show that specific, tailored, gender transformative approaches should be explored further: for example, lead female farmers utilise specific communication formal and informal pathways, preferred by women farmers. The development of bottom-up and top-down gender responsive schemes that

enable inclusive and sustainable approaches to be trialled in order to ensure women access higher quality agricultural information more often, should be prioritised in the future.

Overall, this thesis outlines, describes, reviews, discusses and analyses gender specific issues in the context of a country's rural advisory services system. The thesis sets out to characterise a nation's public rural advisory services, and the influences and perceptions they contain from a variety of angles and affected by a variety of preconceived notions, notably the societal roles of gender, and outside influences. The four research strands in this thesis focus on individual and systemic processes and interactions, taking into account stakeholders across the entire agricultural information value chain in the public sector. Through these, the thesis clearly achieves the main aim of highlighting important issues through evidence-based results, identifying clear impediments in the construction of an efficient and gender equal rural advisory service system, and suggests ways to circumvent or avoid them in the future. It would be interesting for future research to consider the norms around the roles of 'experts' and 'farmers' that traditional views of extension reinforce and have to an extent created, and influence the ways that extension staff and farmers interact and behave towards each other. These norms introduce limitations of the potential of approaches which build on, incorporate, encourage, recognise the knowledge, intelligence, problem solving capacities of farmers (including the poorest and including men and women).

This thesis is as much about the analysis and the development of efficient rural advisory services as an engagement to discuss a much-highlighted topic in today's world: an equality of opportunities among genders. While many suggestions in this thesis are borne out of research and backed up by evidence, the author understands the large societal and political obstacles that stand in the way of their suggested development in the future. However, change rarely happens through the occurrence of a defining element. It occurs through constant research, action, advocacy and behavioural change. Whilst humanity will most likely always have structured gender roles in our society, the ability to offer the opportunity for choice is at the very heart of this thesis. The author does not have the arrogance to seek to change society. However, he believes in the opportunity to create a fairer one by giving different genders the opportunity to access the same information, enabling individuals to make informed decisions. This study is not feminist by nature, but an inclusive and egalitarian one that captures the inequalities and offers suggestions to rebalance them in a fair and socially responsive manner. In a world of populism, extremism and environmental degradation, the least this author thinks we should be working towards is parity between both halves of humanity, irrespective of biological differences.

It has been my absolute pleasure to conduct my research in Pakistan, a much maligned but beautiful country, all too aware of its deficiencies according to the many men and women I have spoken to during my work. This thesis is dedicated to the women of Pakistan, and to the men who support them in their endeavours.