How likely are Pakistani Schools to adopt Vegetable Gardens? Predicting the likelihood using the theory of Planned Behavior

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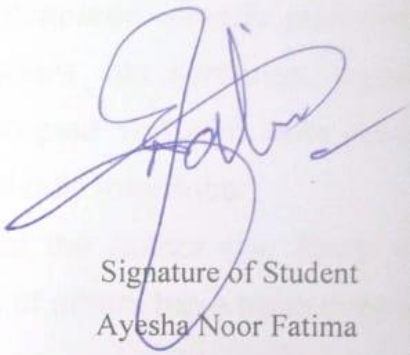
I certify that this research work titled *"How likely are Pakistani schools to adopt vegetable gardens? Predicting the likelihood using the theory of planned behavior"* is my own work. The work has not been presented elsewhere for assessment. The material that has been used from other sources has been properly acknowledged/referred.



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Copyright Statement

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Abstract

The purpose of this study is to predict the likelihood of the school principals and science teachers across the selected government high schools of Rawalpindi city in using school gardens whereby the theory of planned behavior is used as a predictive model for the study. A quantitative research method with a descriptive, exploratory research design was employed. Multistage stratified random sampling was employed. Survey method was employed for elicitation of responses from the sample (n=132). The response rate was 92.0% whereby 122 filled questionnaires were received, teachers (n=100) and principals (n=22). The research instrument comprising of six sections of which five sections aligned with the theory of Planned Behavior (attitudes, Perceived Behavior Control, subjective norms and intentions) was employed. A data set of 122 responses was subjected to descriptive and inferential analysis through SPSS version 20. Regression analysis, Independent sample t-tests and ANOVA tests were also applied. The key findings indicated that a) all the three components of theory of planned behavior i.e., affective and cognitive attitudes, subjective norms, perceived behavioral control significantly ($p<.001$) predicted intentions to use school vegetable gardens; b) The demographic variable of gardening or farming in personal time rendered a significant and positive effect ($p<.001$) on the all the components of theory of planned behavior; c) significant differences were observed between the two groups of those who gardened or farmed in their personal time and those who did not in relation to the components of theory of planned behavior, whereby the group that gardened or farmed in personal time reported higher mean scores on all components of theory of planned behavior.

Key Words: *School vegetable garden, theory of planned behavior, food security, food gardening, experiential learning*

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CHAPTER I: INTRODUCTION

1.1.1 Background of the Study

Like other underdeveloped countries, Pakistan is grappling with an economic crisis that is unprecedented in its nature and is exacerbating with each passing day. The crisis is amplifying the inflation at a staggering level of over 30% thereby aggravating the poverty where around 38.3% of the population in the country is currently rendered as multidimensionality poor (UNDP, 2022).

The recent Flash Floods in Pakistan in 2022 amidst COVID-19 further wreaked havoc causing a loss of more than $3.7 billion dollars to the agricultural sector (MoPD&SI, 2022) damaging more than 80% of the crops and causing a hike in inflation to 36.4% (PBS, 2023). As a consequence, Pakistan ranks 92 out of 121 nations, with its hunger categorized as 'serious' (Global hunger Index, 2022). The Integrated Food Security Phase Classification (2022) estimated that approximately 43% of Pakistanis are food insecure and the percentage is expected to rise to 60% by 2050. This means that the majority of Pakistanis shall be rendered incapable of affording nutritionally acceptable dietary requirements for adequate growth and development.

This situation has intensely affected the children whereby almost half of them are stunted under 5 years, 15% suffer from wasting and 31% remain malnourished (Siddiqa, 2022). The instances are considerably higher among poorer segments in Pakistan (Waghmare, et al., 2022).

Studies indicate that undernutrition among children is a precursor of not only their illnesses and mortality but also a pertinent factor contributing to their impaired physical and cognitive and psychosocial development (Hoddinott et al., 2008). Children suffering from malnourishment are most likely to develop mental disorders such as aggression, depression, and anxiety (Kimbro & Denney, 2015) and need mental health counseling (Caine et al., 2022). Other health complications arising from undernutrition include anemia (Adeyemi et al., 2022); asthma (Mehmood et al., 2020) with a greater risk of hospitalization (Ettinger de Cuba et al., 2018). At the academic front undernutrition has been linked to low academic performance and retention (Black, et al., 2013; Weaver et al., 2020) with increased incidences of school absenteeism (Tamiru & Belachew, 2017) and decreased work efficiency later in life (Aguayo, et al., 2015).

Amidst the global concerns regarding rising food insecurity particularly among underdeveloped and developing countries; schools are now being re envisioned as a viable

platform that can support the national efforts in combating hunger and malnutrition through school vegetable gardening. Through active student hands-on practice, school vegetable gardens provide experiential learning for growing vegetables as well as building vocational agricultural and entrepreneurial skills. School vegetable gardening, therefore, serves as a pivotal conduit that can develop positive attitudes and healthy practices of young students and the community towards vegetable gardening for combating food insecurity, and raising awareness regarding nutrition and health across the rural and urban areas (Peterson et al., 2014). The Social policy framework of World health organization (WHO) also recognizes the importance of school gardens in reducinto combat food insecurity and improving childhood health and nutrition. The school gardens have been regarded as one of the UN's "Quick Wins" (2012) action at the local community for producing effective results within a time frame of 3-5 years in combating food insecurity.

From the pedagogical perspective, school gardens are a viable source of experiential learning, environmental, health and nutrition education for children at school (Desmond, 2002). This is critical because school children in their formative years of cognitive development develop a worldview through self-learning and scaffolding. By actively involving the students in experiential learning through vegetable gardening not only build their life skills at growing vegetables but also reinforce their science concepts taught in the curricula, and allow the students to develop an understanding of the interconnections between agriculture, environment, business, health, and nutrition and sensitizing about the pressing world issues (FAO, 2005). Research alludes to a number of additional benefits of vegetable school gardens for the pupils such as improved academic performance (Ambusaidi et al., 2018), improved socio-emotional development (McMane, 2013), promoting positive environmental attitudes (Amiri et al., 2021), improved self-efficacy (Holloway et al., 2015), improved literacy for food (Chan et al., 2019) and promoting positive school community environment with parental involvement (Malik, 2020).

School principals and teachers are the pertinent actors that are critical for the successful implementation and sustainability of school gardens (Landry et al., 2017). Principals popularly known as "Seed Champions" (Damons & Abrahams, 2009, p. 123) have a mandate to lead from the front in strategic planning, allocation of resources, and motivating the teachers to undertake their teaching roles effectively for effective integration of school gardens in school curricula. Principal approval and support has been cited most critical factor for sustainability of school gardens (Garwood et al., 2016; Hoover, 2021). Similarly, for the sustainability of school vegetable

gardens, the contribution of teachers and integration of their role with teaching curriculum is well elucidated in the mainstream research (e.g. Loftus et al., 2017 ;). Ineffective teacher involvement with school gardens has been regarded as most frequently cited obstacles to implementing school gardens (Tomomi et al., 2019).

The school gardens have implications in the Pakistani context amidst the looming national crisis of food insecurity and where these gardens are virtually non-existent in Public school system. In this milieu it is pertinent to conduct studies that can predict the likelihood of principals and teachers of public schools to use school gardens.

1.1.2 Problem Statement

While there is a plethora of studies in the Pakistani context regarding the theme of kitchen gardening (e.g., Mohsin, 2017; Rehman et al., 2013; Yasmin, et al., 2014 etc.), yet there exists a void in studies regarding the topic of school vegetable gardening. Despite of the fact that FAO (2005), encourages schools to engage in vegetable gardening that not only contributes to science learning, build vocational skills among students in vegetable gardening but also offers a source of nutritious vegetables and herbs for students and staff as well as for the community; the public schools in Pakistan still lag behind in offering experiential learning (Akhtar, 2020) through school gardens to the students. Considering the fact that School principals and teachers are the key actors in the successful implementation and sustainability of school gardens; it is pertinent to conduct studies that can predict the likelihood of Pakistani principals and teachers in public schools in using vegetable gardens as a learning strategy and generating a good source of nutrition, particularly in the current scenario where there is a looming food insecurity crisis in Pakistan. Further, the theory of Planned Behavior (Ajzen, 1991) has not been adequately tested (Soomoro *et al*., 2018), in the Pakistani context, particularly in concurrence with the school vegetable gardens. More studies are warranted in this regard.

1.1.3 Scope of the Study

The study aims to predict the likelihood of using school vegetable gardens across selected government high schools of Rawalpindi city by assessing the inclination of school principals and science teachers towards implementing this practice. The study also seeks to determine whether

any differences exist in the attitudes, intentions, and perceived control behavior among the sample elementary school principals and science teachers of the nominated government schools towards using school vegetable gardens.

1.1.4 Objectives of the Study

The current research encompasses two key objectives:

1. Predict the likelihood among the Government High school principals and teachers to use school vegetable gardens using the theory of planned behavior's components.
2. Explore the effect of demographic factors of gardening or farming in personal time, experience and qualification on the components of theory of planned behavior

In conjunction to the second key objective, the study also seeks to report on its subsidiary objective:

2a) Determine if there are any differences with reference to the teachers and principals, their educational qualification, service experience and those who do gardening or farming in personal time in their attitudes, Perceived Behavioral Control and intentions.

1.1.5 Conceptual Framework

The theory of Planned Behavior (Ajzen, 1991) has been widely used as predictive model explaining the likelihood of an individual's behavior as an outcome of four motivational factors-, subjective norms, personal attitudes, perceived behavioral control, and intentions. Personal attitudes refer to how positively or negatively one feels regarding a particular behavior. Norms refer to our worldview regarding the normative views of other people regarding a certain behavior. Perceived behavioral control (PBC) denotes the personal belief as to with how much ease or difficulty one can execute a behavior. Behavioral, control and normative beliefs tend to be the antecedents of the attitudes, norms, and PBC respectively. All the factors of planned behavior theory with its antecedents influences each other, they also tend to individually influence the intentions, which eventually predict the likelihood of certain behavior. PBC has the potential to directly influence a certain behavior. The stronger the perceived control behavior stronger would be the likelihood of execution of the intended behavior.

In the current study, our theoretical assumption is that the practice of teachers in using school vegetable gardens in their teaching is influenced by their intention to use the school vegetable gardens which in turn is influenced by their attitudes, as well as the perceived behavioral control (PCB) to incorporate school gardens in their teaching practice. The attitudes and the PCB of the teachers is also influenced by the norms as to what are the beliefs of their colleagues towards using school vegetable gardens in the teaching. The attitudes of the teachers and their perceived behavioral control both are also effected by their demographic characteristics. The interconnections between these factors is depicted below:

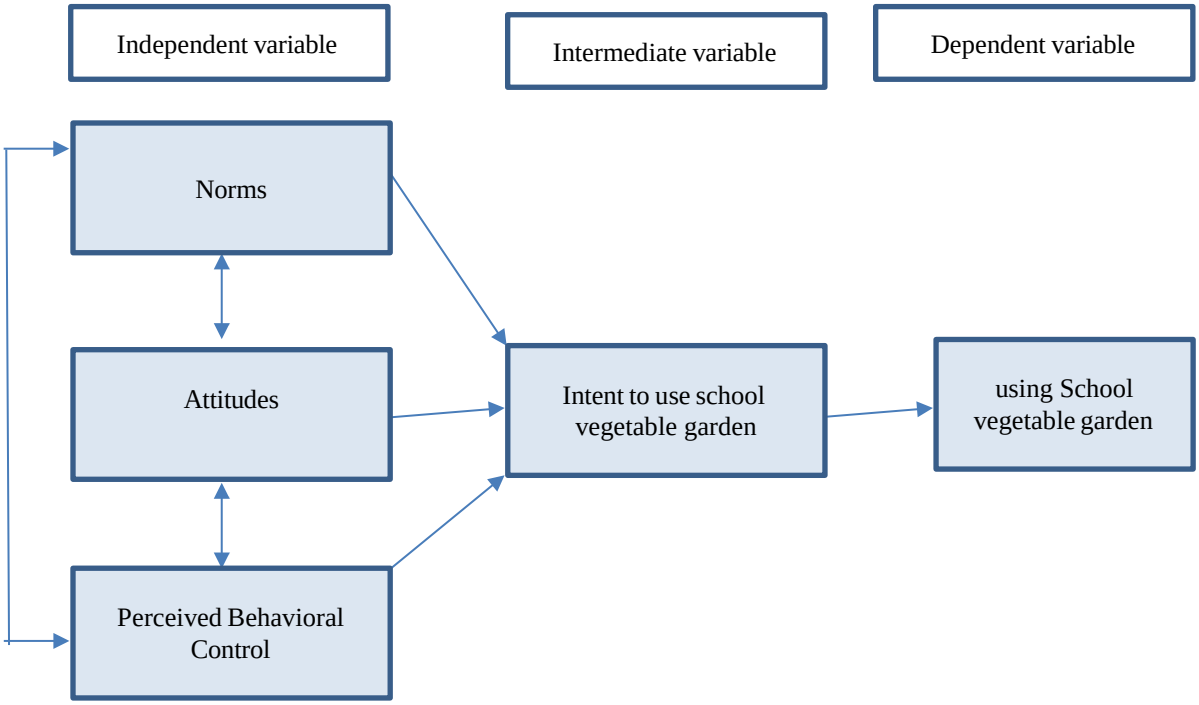

Figure 1.1: Conceptual Framework being used in the current study

1.1.6 Significance of the Study

i. While there are plethora of studies in Pakistani context regarding the theme of kitchen gardening (e.g., Mohsin, 2017; Rehman *et al*., 2013; Yasmin, *et al*., 2014 etc.), yet there exists a void in studies on school vegetable gardening despite of the fact that FAO,

encourages schools to engage in vegetable gardening that not only contribute to science learning, builds vocational skills among students in vegetable gardening but also offers a source of nutritious vegetables and herbs for students and staff as well as for the community. The current study with its humble findings contributes to the much needed relevant literature in the Pakistani context.

ii. This study can serve as a basis for more elaborate studies in predicting the likelihood of the schools in employing school vegetable gardening in their curricula. It is through these findings initiatives can be taken by the community, education departments, and non-governmental organizations to strengthen the schools by building their capacity to contribute in building the vocational skills of their students for growing vegetables particularly at homes in a cost-effective manner amidst the high inflation and the looming food insecurity.

iii. The study offers implications for in-service as well as pre-service teacher training institutes in designing training modules for the capacity building of the science teachers in teaching through school vegetable gardening and building the vocational skills of students at the same time.

iv. The study tests the Planned Behavior theory (Ajzen, 1991) in the context of Pakistan in concurrence with the school vegetable gardens where the theory has not been adequately tested (Soomoro *et al*., 2018).

1.1.7 Delimitations

i. The study is delimited to Government High schools of Rawalpindi city

ii. The responses are elicited only from Government High school principals and science teachers of selected schools

1.1.8 Operational Definition

“School vegetable garden" is operationalized as a garden at school premises that exists to grow vegetables for student learning and human consumption

1.1.9 Organization of the Thesis

This research thesis has been systematized into five chapters. The first chapter gives an background of the study, its purpose and scope, objectives, the theoretical framework adopted were discussed. This chapter also dilated on the significance of the study along with its delimitations. The second chapter dives into the review of literature surrounding the theme of School vegetable gardens. The third Chapter describes the research methodology of the study. It describes the instrument, the population, the sample and sampling technique of the study. The fourth Chapter focuses on the analysis of the data and tests employed in this regard. The result of analysis is well elucidated in this chapter. The last chapter focuses on the discussion and conclusion of the research. This chapter also dilates on the recommendations proposed by the study.

CHAPTER II: LITERATURE REVIEW

Chapter II offers an extensive examination of the existing literature regarding school gardens. This chapter comprises four distinct sections. The first section provides a clear definition of the concept of a school vegetable garden. Following that, the second section offers an overview of the historical context surrounding school gardens. The third and fourth sections delve into the advantages and challenges associated with the implementation of school vegetable gardens. Additionally, the fifth section expounds upon the roles played by school principals and teachers in the implementation and management of these gardens. Finally, the concluding section of the chapter provides an in-depth exploration of the theory of planned behavior, which serves as the foundational framework for the current research.

1.1.10 Defining School Vegetable Garden

The Food and Agricultural Organization (FAO), a branch of the United Nations, emphasizes the concept of school vegetable gardens as "cultivated areas around or in close proximity to primary and secondary schools, primarily intended for educational purposes but also capable of yielding food and income for the school" (FAO, 2004, p. 3). According to Bhattarai and colleagues (2016b), a school vegetable garden is described as "a dynamic learning environment where school children can engage with the natural world, offering both knowledge and nutritional benefits" (p. 2). In this current study, school vegetable gardens refer to in-ground or raised-bed gardens situated on school grounds, under the school's management, with the aim of enhancing learning, promoting health, and contributing to the economic well-being of the school, its students, and the wider local community through the cultivation of vegetables.

School vegetable gardens may be grown in-ground or in raised bed. The in-ground vegetable gardens are grown directly in a patch on ground by using the existing soil and enriching it through compost or fertilizer. These tend to be financially economical. The raised bed vegetable gardens are raised above the ground through blocks or planters. While these gardens tend to costly they however offer easy accessibility and manageability (Griffin, 2018). Irrespective of the design of school vegetable garden they are deemed a viable tool for integrating with curricular as well as

extracurricular learning (Schreinemachers, et al., 2017) and food generation resource (Hoover, 2021).

3.1.1 History of School Gardening

History of School gardens can be traced as early as the 19th century in Europe where they were ordained under the law in Austria and Sweden in 1869, in Belgium in 1873 and in France in 1880 where 28,000 school gardens existed (Ribarič, 2021). The premise was to integrate the classroom with the natural environment for effective learning. Distinguished educational philosophers such as Comenius, Rousseau, Pestalozzi, and Froebel endorsed the idea of utilizing gardens as a means to nurture young children's intelligence by facilitating their exploration and understanding of the natural world (Burt, 2016, p. 298). With the rise of the Nature-study movement in the United States in the late 19th century, the proliferation of school gardens became evident across the nation. Notably, during the two World Wars, the School Garden Army Movement (1917-1947), financially supported by the U.S. government, played a crucial role in maintaining the food supply through vegetable gardening, thereby ensuring food security during times of turmoil and uncertainty (Trelstad, 1997, p. 164). Later the Farm- to- school movement in US in 1990s, led to the renaissance of school gardens under the patronage of U.S agricultural department. School gardens were seen as an effective means for agricultural education and a source of fresh agricultural produce that could be utilized in school cafeterias, potentially playing a role in mitigating food insecurity (United States Department of Agriculture, 2011a). Today more than 44% of schools in the rural and urban areas of United States have vegetable gardens (Harding, 2018).

The school gardens have been regarded as one of the UN's "Quick Wins" (2012) action at the local community for producing effective results within a time frame of 3-5 years. By growing vegetables, the school garden can sustainably feed the pupils and nearby community thereby combating hunger while teaching life skills to the pupils. FAO (2004) defines the educational, economic and food security, health and nutrition objectives for establishing school gardens.

With these objectives various U.N agencies are unified in promoting school gardens in developing countries. The World Food Programme (WFP) and the FAO's Special Programme on

Food Security (SPFS), a subsidiary of the FAO, are joining forces with local non-governmental organizations (NGOs), foundations, and research centers to jointly implement school gardens aimed at providing nourishment to schoolchildren. These agencies are active in collaborating with local partners in implementing school gardens across Indonesia, Syria, Myanmar, India, Central African Republic, Lesotho, Kenya, Senegal, Laos, Bangladesh, Srilanka etc. The number of school gardens and the relevant literature surrounding this theme is steadily growing (Williams & Dixon, 2013).

3.1.2 Benefits of School Vegetable Gardens

Research points to numerous advantages associated with school vegetable gardens. The key benefits are elaborated below:

1.1.1. Environmental Awareness

School based gardens as a viable pedagogical tool enhances the environmental knowledge of the students with a applied understanding of horticulture and sustainable food production (Maciel et al., 2022; Passy et al., 2011; Plaka & Skanavis , 2016; Davari & Iranmehr, 2020). Garden based learning besides stimulating environmental awareness across the school community and beyond (Alexander, & Grannum, 2022) also influence the attitudes of students towards environment (Nováková & Giertlová, 2016). Students who are engaged in gardening tend to demonstrate a greater appreciation of nature (Frantz & Mayer, 2013) with a positive environmental outlook (Taylor et al., 2017). With an increased awareness of their responsibility towards environment they are likely to engage in environmental advocacy, and environmental activism (Wake & Birdsall, 2016) and share their learnings with others (Frantz & Mayer, 2013).

Study by Dilip and colleagues (2020) in district Kerala, India reported positive attitudes of students who were engage in school gardening. Similar results were documented in a study conducted in an Iranian context (Amiri et al., 2021), where notable distinctions were observed between the experimental and control groups in terms of students' attitudes toward the environment.

1.1.2. Academic Benefits

School gardens as a "living laboratory" (Eugenio-Gozalbo et al., 2020) offer students experiential, integrated, and collaborative learning (Kelly & Williams, 2013) in outdoor settings that enhance the students' scientific knowledge and observational skills (Williams, 2018). As a result, this enhanced retention of concepts empowers students to apply their knowledge to real-world challenges (Berezowitz et al., 2015; William & Dixon, 2013). Furthermore, the inclusion of school gardens in the curriculum has been associated with notable enhancements in overall academic performance and test scores among students (Nedovic & Morrissey, 2013; Ambusaidi et al., 2017). A meta-analysis of studies conducted between 2002 and 2018 (Holmes, 2019) revealed improved performance in science and mathematics among students when school gardens were integrated into math and science instruction. The earlier studies also reported better science and math scores (Klemmer et al., 2005; Blair, 2009; Gaylie, 2009; Williams & Dixon, 2013) and achievement in English (Pascoe & Wyatt-Smith, 2013) among the students who were imparted learning through vegetable gardens. The science improvements are also reported among children with special needs (Rye, 2012). More recent study by Davis and colleagues (2023) reported modest effects on academic achievement and emphasized more studies in this regard. Ozer (2007) also contend that the effect of school gardens on academic achievement is not direct, there may be many intervening factors and those mediators ought to be considered before any conclusions may be drawn. She calls for more research in this regard.

1.1.3. Social/ Psychological well being

Research literature is replete with the study findings that school garden based learning (GBL) render a positive effect on the social and psychological wellbeing of the students (Alexander & Grannum, 2022; Nedovic & Morrissey, 2013; Lam et al., 2019). Pollin and Furst (2021) in their study that involved standardized observations of students of 6th grade in school garden learning activities reported that school gardens augment emotional and social competence among the students. Maciel and colleagues (2022) in their study in the Brazilian context also reported similar results whereby GBL not only enhanced the social competence among the students that involved active engagement among the students and

school community but also instilled the communal values such as ethics, cooperation, respect, and sense of community. Chang and colleagues (2016) in their study in the Taiwanese context reported enhanced relationships among the students as a significant socio-psychological advantages of school gardens on children. The socio-psychological benefits also extended to the students with physical disabilities who had taken a part in the school garden initiative through raised beds. Findings of studies in African context (e.g. Lucke et al., 2019) reported social benefits as students interacted with each other and formed from relationships through school gardening.

Apart from the enhanced social skills, garden based learning is also reported to develop self-confidence (Landry & Logue, 2017), self-efficacy (Guo, et al., 2023) and self- esteem (Lange, 2019) and confidence (Ruiz-Gallardo et al., 2013) especially among the students from low income areas (Reis, 2015). School garden programs are also reported to develop leadership skills among the students as they actively work with their student teams and are engaged in the decision-making for of designing and development of school vegetable gardens and the maintenance of those later on (Klish et al., 2022). The students also demonstrate their leadership role as they take a lead role in transferring the skills of vegetable gardening to their local community (Wilkerson-Franklin, 2016). In a study conducted by Holmes and Campbell (2020) assessing the effectiveness of the Delta EATS school garden program in three participating schools within the Mississippi Delta, findings revealed that students who actively participated in the school garden programs exhibited increased teamwork and leadership skills. Another psychological benefit that has been linked to school vegetable gardening among the students is stress reduction. Since gardening has been linked to reduced stress (Young et al., 2020), studies on school based learning (e.g. Truong et al., 2016) report decreased disciplinary referrals among students who were more engaged with school vegetable gardens. Additional studies (Wilson & Christensen, 2011; Wood et al., 2016) report similar findings where they indicate an association between School gardening and lower levels of emotional distress, aggression, anxiety and other negative emotions among the students. This reduction is attributed to the fact that gardening tends to reduce levels of cortisol-a stress hormone (Van den Berg & Custers, 2011). Findings from the cross-sectional study (Koay & Dillion, 2020) in the context of Singapore reported subjective well-being, resilience and openness among those

who were involved with community gardening. Other studies (e.g. Reis & Ferreria, 2015) contended that school gardens may lead to the development of four social resilience abilities among the students namely "(a) self-reliance and self-organization, (b) empowerment and participation, (c) inclusiveness and social ties, and (d) learning and adaptation" (p.72)

1.1.4. **Community Connection**

School gardens are considered social spaces that play a crucial role in promoting health, fostering social inclusion, encouraging active civic participation, and cultivating sustainable living practices within urban environments (Turner, Henryks, & Pearson, 2010, p. v). Maciel and colleagues (2022) in their study in the Brazilian context reported that school garden based learning stimulated social competence among the students that involved active engagement with the school and local community and instilled in them values such as mutual respect, ethics and collaboration.

Literature alludes to the school garden programs as a conduit leading to wider community involvement and partnership (Foua, 2021) for symbiotic gains. From the standpoint of community supporting the school gardens; the stakeholders outside the school render critical support to school community in sustaining and supporting the school garden initiatives (Swank & Swank, 2013). In this context, local gardeners and experts from extension schools often provide mentorship to teachers and students, typically on a voluntary basis. They offer guidance in implementing best practices for planning, establishing, and effectively managing school gardens, ultimately contributing to the success of these school garden initiatives (Ohly et al., 2016). Similarly, community volunteers' support in managing the school gardens has been identified in the literature as critical for the success of school gardens (Hoover et al., 2021). Partnerships with local organizations such as local councils and town trusts as well as community and business groups serving as effective sources of financial and in kind support is also well documented (Paliewicz & Wojciak, 2019).

On the flip side school gardens can also extend support to the community in numerous ways. Numerous School garden projects particularly those supported by UN. Self-sustained school garden is able to sell fresh and healthy vegetables to local markets

and community members at a subsidized rate and fundraise for the garden and school (USDA, 2016). By getting involved in the marketing and selling the vegetables for income generation, students learnt financial literacy, business and entrepreneurship skills (FAO, 2016). In addition to acquiring market-oriented skills, students also had the opportunity to develop community development and citizenship skills (Wake & Birdsall, 2016). Gruenewald (2008) argues that educators who emphasize experiential learning for student involvement in community life go beyond the goal of solely preparing students for competition in the marketplace (p. 315). Case studies on school gardens (Habib & Dhoerty, 2007) report that trained students and staff at the school in vegetable production skills contributed to the local community development for reducing food insecurity and malnutrition by transferring the skills to their family and friends who subsequently applied those in their home gardening for food generation. The school garden projects in Kenya and Rawanda Africa through parental involvement are able to share the agricultural produce with the poor families and orphans in the community for their sustenance (Rizwana, 2023).

1.1.5. Health and Nutrition

School gardens through outdoor activities outside the classroom settings have a potential to improve health and wellbeing of the students (Ohly et al., 2016) through increased use of gross motor skills (Somerfield et al., 2021) thereby reducing obesity among the students (Rochira et al., 2020). Apart from improving the physical health, school gardens are also deemed as creative strategy for enhancing students 'nutritional awareness and knowledge of food systems and agriculture (Carlsson et al., 2016) as well as improving the nutrition among the school children.(Gebrim et al., 2017) and teaching them about healthy life style through vegetable production. Studies have shown that garden-based nutrition education can lead to an increase in fruit and vegetable consumption among students who participate in gardening activities (Barnard et al., 2020; Sossamon & Miketinas, 2020). Further as this knowledge of nutrition and vegetable production is extended to the families outside in the local community, healthy eating habits are transferred to the community (Alexander& Grannum, 2022).

Studies in Nepal, US, Korea, Africa, Netherlands, Australia, (e.g., Bhattarai et al., 2016; Schreinemachers et al., 2020; Crary et al., 2022; Davis et al., 2021; Kim et al., 2020; Banning, 2015; Leuven et al., 2018; Gibbs et al., 2013) report a significant increased the knowledge, awareness and preference towards nutrient rich vegetables among the students through school vegetable gardening programs.

3.1.3 School Principal and Teacher support

Literature on the sustainability of school gardens encompassing peer reviewed journals, gray literature, and anecdotal evidence indicate the long term support of two actors in the school community–principals and teachers as critical to the sustainability of school gardens among other factors. Damons and Abrahams (2009) view school principapals as "Seed Champions" (p. 123), emphasizing their crucial role in the successful execution of school garden initiatives. Research (e.g. Hoover, 2021; Greer et al., 2019) indicate that the school gardening initiatives suffered failures that lacked the support of principals or where principals failed to developed a shared vision of teaching through school vegetable gardens.

School principals by virtue of their influential position as an administrator (Alquizar, 2013) and leadership role in school community (Mombourquette, 2017) have a mandate to lead from the front in strategic planning, allocation of resources, and motivating and developing the teachers to undertake their teaching roles effectively (Sheperd et al., 2018). In this context, it can be argued that school principals play an essential role in both the execution and the sustainability of school gardens. This involves being passionate in building a shared vision of integrating school gardens in school curricula (Lakin et al., 2008) thereby maintaining a strategic orientation, building the capacity of the teachers (Mann et al., 2022), motivating and engaging the teachers (Garwood et al., 2016), learners and stakeholders outside the community in the school garden initiative (Somerset & Markwell, 2008) by fostering a collaborative culture and resolving conflicts. In this regard the principal may delegate the leadership role to these entities through their involvement in garden management committees (West, 2022) and act as a facilitator. School principals also have a critical role in providing and generating resources through fundraising (West, 2022) for the sustainability of the school gardens by taking a lead role in formulating plans of action (Meresman, Pantoja, & da Silva, 2009). As a leader, the principal's role is to remain abreast on the challenges

in the implementation of the school garden initiative (Ferreira & Jordaan, 2019; Garwood et al., 2016; Somerset & Markwell, 2008). In essence transformational leadership that involves the active engagement of school principal with teachers, learners and external stakeholders is integral for school garden initiatives that may lead to wide array of intended outcomes such as improved learning, physical and psycho social wellbeing, supporting local communities, economic gains etc. (Holloway et al., 2023).

Teachers as executors of school curriculum, have a critical role to perform in school garden based initiative. Through garden base learning they have a role to integrate school gardens in their curriculum and employ school gardens as extracurricular activity for their students' physical, academic and psycho-social wellbeing as well as facilitating healthy eating behaviors among their students through nutrition education (Loftus et al., 2017; Sottile et al., 2016; Hutchinson et al., 2015). Teachers are responsible for planning, designing, implementing and sustaining the school gardens (Felicia Yu, 2012). In this connection the teachers' motivation and their willingness is imperative for the success of school garden initiatives. Literature is replete with studies that report active involvement of school teachers and principals as critical for successful implementation and sustainability of school gardens (e.g. Burt et al., 2018; Holloway et al., 2023). The contribution of school teachers in school garden management committees (West, 2022) with learners and other stakeholders particularly for the management of gardens and fundraising both within and outside the school is well documented.

3.1.4 Perceived Barriers

The extant literature on the barriers to effective implementation and sustainability of school gardening initiatives is fairly large. The barriers identified in the literature pertain to the school system as well as those outside the school. Interesting the barriers identified in the earlier literature resonates well with those in the contemporary literature. This means that more efforts are warranted by the school gardening programs, local community and departments of agriculture and education to mitigate the issues if the potential benefits are to be extricated from the school gardens else the projects are likely to abandoned and turned into "ghost gardens" (Ratclifee, 2017, p.31).

The key barriers identified in the studies that involve teacher and principal surveys include lack of long term support of school administrators and teachers (Hoover, 2021; Greer et al., 2019). The low teacher involvement and support has been credited to a number of factors such as their

burnout (West, 2022) while teaching large class sizes through time intensive garden based learning and their involvement in managing school gardens generally without the support staff while fulfilling their role in school garden committees as well as their commitment towards other academic/non-academic obligations. The lack of teacher support has also been attributed to their lack of horticulture experience and training (Webb et al., 2018; Mann et al., 2022; Brut et al., 2018). The lack of teacher interest that result from these inadequacies propels them towards direct instruction devoid of experiential learning (Tomomi et al., 2016) thereby leading “plant blindness” in the students (Balding & Williams, 2016). High stakes standardized tests also render immense stress on the teachers to relinquish time intensive garden based learning (West, 2022; Harding, 2018). In this regard, Mark Graham (2007) asserts "When standards are established at a distance from educational institutions, the curriculum intentionally loses its contextual relevance. This detachment results in the erosion of ties to local communities and a diminished sense of responsibility for the environment. Additionally, alternative cultural perspectives that are more attuned to ecological considerations are pushed to the sidelines" (Graham, 2007, p. 377). Management issues related to integrating an experiential and innovative garden based learning curriculum into a traditional classroom teaching also pose a challenge for teachers (Webb et al., 2018)

Other barriers that have been reported in the literature include lack of staffing and volunteer support (West, 2022; Burt et al., 2018). Volunteer management and retention has also been identified as a barrier in school garden management literature (Webb et al., 2018; Brut et al., 2017; Ohly et al., 2016). Lack of continuous funding (Loftus et al., 2017; Hoover et al., 2021), lack of related resources and supplies (West, 2022) as well as inadequate skills in searching for funding sources (Davis & Brann, 2017; Brut et al., 2018) are financial barriers that are replete in the school garden literature. These barriers not only lead to the impediments in the implementation of the gardens but also in their management and maintenance. Insufficient spaces for building urban school gardens have also been identified as a barrier in some studies (Brut et al., 2018). Additional studies allude to lack of community and effective school support (Brut et al., 2018; Hoover et al, 2021) in maintaining the school garden all year round (Diaz et al., 2019; Fifolt & Morgan, 2019; F Yu, 2012).

3.1.5 Theoretical framework

The theory of Planned Behavior, proposed by Ajzen (1991), represents a progression from the earlier Theory of Reasoned Action (TRA). It offers a predictive model that explains the likelihood of an individual's behavior as an outcome of four motivational factors- personal attitudes, perceived behavioral control, subjective norms, and intent. Personal attitudes refer to how positively or negatively one feels regarding a particular behavior. Ajzen (2000) posited that the attitudes factor consists of two sub components: the affective attitude (i.e., based on emotions) and a cognitive attitude (i.e., based on logical thinking). Subjective Norms pertain to our individual beliefs regarding whether significant others expect us to engage in a particular behavior. Perceived Behavioral Control (PBC) refers to our personal belief concerning how easily or challenging it is for us to perform a specific behavior. Behavioral beliefs, normative beliefs, and control beliefs are typically the precursors or antecedents that influence the formation of attitudes, norms, and perceived behavioral control (PBC), respectively. Each of the beliefs tend to influence each other. The behavioral beliefs refer to the positive or negative perspectives regarding a certain behavior. These emanate either from any past experience and/or from the nature of the behavior itself in connection with our subjective normative beliefs. The subjective normative beliefs are the personalized beliefs in relation to the normative views of the majority or normative conventions. Control beliefs refer to the personal belief as to with how much ease or difficulty one can execute a behavior.

In the Theory of Planned Behavior, each of these factors, along with their respective antecedents, not only interact with each other but also have individual influences on the intention to engage in a specific behavior. According to Ajzen (1991), intention plays a crucial role as it represents the reasoning that influences behavior and serves as the driving force behind taking action. In other words, the stronger the intention, the more likely it is that the action will be carried out (Ajzen, 1991, p. 190). Consequently, intention can predict the likelihood of a specific behavior with a high degree of accuracy. Moreover, when combined with perceived behavioral control, these intentions have the capacity to explain a significant portion of the variance in behavior (Ajzen, 1991, p. 206). The theory of Planned Behavior and its components are shown in Figure 2.1

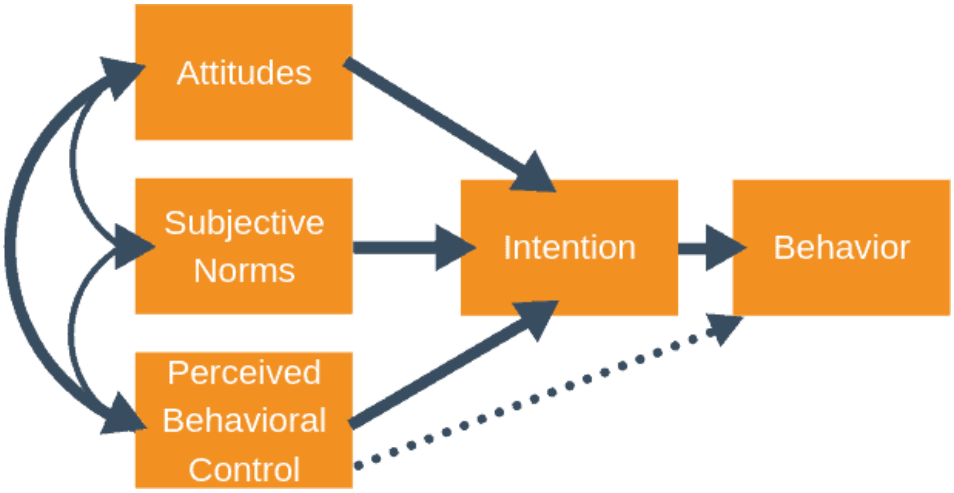

Figure 2.1: Components of Theory of Planned Behavior

Ajzen's (1991) Planned Behavior theory, by far and large has proven as an effective model for studying the predictability of a certain behavior. It has gained wide acceptability and has been applied in diverse settings with regards to individual behavior across the health, sociological, environmental psychology, finance, marketing, commerce, transportation, leisure and business contexts.

CHAPTER III: RESEARCH METHODOLOGY

This chapter provides a detailed explanation of the research methodology and strategy employed in the study. It delves into the research population and the selection of the study sample. Furthermore, it offers an in-depth discussion of the research instrument used in the study. The chapter also outlines the procedures employed for data collection and subsequent data analysis.

3.1.6 Research Method

This research study utilizes a quantitative research method and employs a descriptive, exploratory research design. Quantitative research entails the data collection whereby the information is quantified and subjected to statistical tests for supporting or refuting hypothesis (Creswell, 2003, p. 153). Descriptive research is employed to analyze and tabulate the data quantitatively, using frequencies, percentages, averages, or other statistics (Nassaji, 2015). According to Creswell (2003) exploratory research is a study that seeks to answer a question or address a phenomenon or an issue for developing initial insights and to provide direction for additional research (Best & Kahn, 2007).

3.1.7 Research Strategy and Time Frame

The current study adopts a cross-sectional survey research strategy whereby through survey questionnaires responses are elicited from the respondents at one timeframe in contrast to longitudinal studies that collect data over a longer periods of time typically years (Kumar, 1999). The survey method is a widely used approach in descriptive research, involving the collection of responses from a relatively large sample (Kelly et al., 2003). These gathered responses are subsequently subjected to either descriptive or inferential analytical techniques to draw conclusions (Antonakis et al., 2004).

3.1.8 Research Population

As per the lists of government schools received from the EDO office, a total of almost 158 schools existed in Rawalpindi city. The population of the current study comprises all the Principals and science teachers of government schools in Rawalpindi city. The population displayed diversity in terms of age groups and years of service.

3.1.9 Sample of the Study

A multistage sampling approach was employed to select the sample. In the initial stage, a random sampling method was used to select government schools as part of the sample. By referring to L.R Gay (2012) minimum sample size estimation whereby for population (101-1000) 10% should be selected; therefore, for a total of 158 Government high schools a total of 22 schools were taken as minimum sample for the study. The government schools from Chaklala, Saddar, Satellite town, Khayaban-e-Sir Syed, Muree road, and Liaqat bagh regions of Rawalpindi city were selected.

In the second stage, the selection of the respondents was carried out from the selected sample schools through proportionate stratified random sampling. The respondents were stratified across the two strata- Principals and Science teachers. For the first stratum, all the science teachers (n=132) from each of the sample schools were selected. For the second stratum, all principals of the sample schools (n=22) were selected.

The rationale for the selection of school principals and teachers is based on the fact that the literature on the sustainability of school gardens including peer-reviewed journals, gray literature, and anecdotal evidence indicate the long-term support of two actors in the school community–school principals and teachers being critical to the implementation and sustainability of school gardens among other factors (e.g. Ferreira & Jordaan, 2019; Garwood et al., 2016).

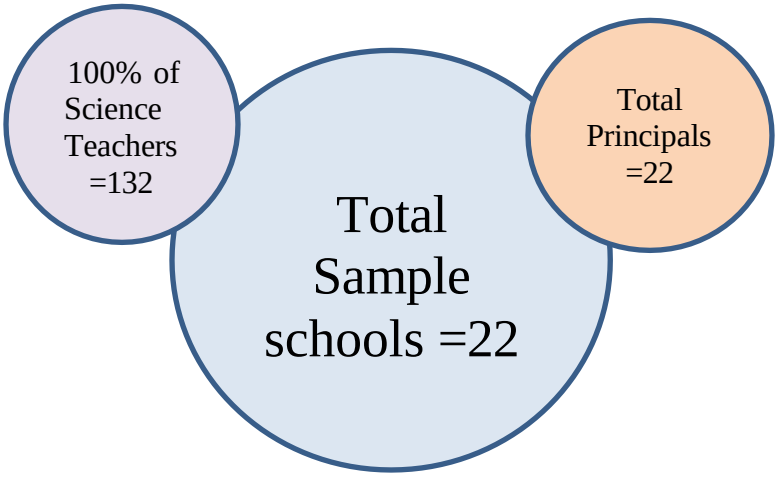

Figure 3.1: Sample of the current study

Table 3.1 *Sample size from Sample Government High Schools*

S. No	Area	Government High Schools	Respondents (Principal & Teachers)
1	Chaklala Cantt	Govt boys High school Dhoke	7
2	Chaklala Cantt	Govt girls High School Jhanda	7
3	Satellite town	Govt Muslim High school Saidpur	5
4	Satellite town	Govt High school F-block Satellite	6
5	Satellite town	Govt Noor Islamia girls High	5
6	Saddar	Govt Islamia High school #2	6
7	Saddar	Govt Dannys High school	5
8	Khayaban e Sir Syed	Khadija girls High School	5
9	Khayaban Sir Syed	Govt girls High School KSS	4
10	Khayaban Sir Syed	Govt boys High School KSS	4
11	Khayaban e Sir Syed	Govt girls High school KSS sector	5
12	Khayaban Sir Syed	Govt boys High school KSS Sector	6
13	Khayaban Sir Syed	Govt High school KSS Sec#2	5
14	Murree road	Govt Muslim High school#2	4
15	Murree road	Govt Islamia High school#1 Muree	7
16	Murree road	Govt Muslim High school Muree	6
17	Murree road	Govt girls High school#2 Muree	6
18	Murree road	Govt Usmania girls High school	5
19	Liaqat Bagh	Govt boys High school DAV	6
20	Liaqat Bagh	Govt Islamia High school#4	6
21	Liaqat Bagh	Govt MC girls High school Naya	5
22	Liaqat Bagh	Govt High school Faizul Islam,	6
Total			122

3.1.10 Survey Instrument

The current study employed a modified questionnaire that was originally developed by Kincy (2016) for determining the likelihood of teachers in using school vegetable gardens for teaching. The modification involved simplifying the language. Since the study involved the principals as another stratum of respondents, the questionnaire for the teachers was reworded to tune it for the principals of those schools as well. The study therefore employed two sets of questionnaires, one for the teachers and another one for the principals of those schools.

The questionnaire used in this study consisted of six sections. Sections 2 through 6 of the questionnaire corresponded to the constructs outlined in the Theory of Planned Behavior (Ajzen,

1991). Table 3.2 offers a concise overview of the instrument's constructs and how they align with the components of the Theory of Planned Behavior.

Table 3.2 *Key constructs of the questionnaire and their description*

Section	Construct Name	Sub constructs	Purpose of Construct
Two	Intention		To uncover the reasons why elementary science teachers and principals choose to utilize instructional strategies that incorporate the use of a school vegetable garden in their science teaching.
Three & Four	Attitude		
		Attitude1	To determine Science teachers/Principals' general cognitive feelings toward using vegetable gardening in teaching
		Attitude2	To determine the personal affective (emotion) attitudes of High school science teachers/Principals regarding their use of vegetable gardening in their teaching.
Five	Norms		To determine the normative views of others in the teaching environment pertaining to participants' use of vegetable gardening
Six	Perceived Behavior Control		To assess the participants' perceived level of control regarding the use of vegetable gardening in their school.

Section one sought demographic information from the participants regarding their gender, Age, number of years of relevant experience, academic qualification, whether the participants engaged in gardening or farming during their personal time, participants interest in Continuous Professional Development (CPD) in school gardening.

Section two of the instrument related to the construct of intention and sought information through 5 items as to why sample science teachers/Principals would use School vegetable gardening. Section three and four represented the Attitude Construct. This construct encompasses two sub constructs Attitude1 (cognitive attitudes) and Attitude2 (affective attitudes). Cognitive attitudes represent general attitudes. Affective attitudes represent emotional attitudes.

Section three consisting of 5 items related to Attitude1 sub-construct sought to elicit the general feelings of participants toward the use of school vegetable gardens in teaching of Science. Section four consisting of 5 items related to related to Attitude2 sub-construct sought to elicit the personal feelings of participants toward the use of school vegetable gardens in their science teaching.

Section five sought to elicit the normative views of others (e.g. peers, students and their parents, school administration, education administration) regarding the use of school gardens in

the teaching of science. Section five consisted of 6 items that elicited information from the participants regarding their perceived control in using school vegetable gardens in their teaching if training, time, space, resources, skills, clarity of concepts and freedom were provided.

Section six of the instrument that related to the construct of perceived behavioral control sought information through 6 items regarding the control science teachers/Principals had in implementing, using and managing School vegetable gardening.

3.1.11 Pilot testing: Determining the validity and Reliability

Pilot testing was conducted for the current study whereby reliability and validity of the sample was checked. Reliability was assessed using Cronbach's Alpha (Cronbach, 1984), and a coefficient value of $\alpha \geq 0.6$ was considered acceptable for the test (Nunnally & Bernstein, 1994). To validate the instrument, a Principal Component analysis with Varimax rotation was conducted to identify non-correlated items that could be removed to enhance the instrument's quality.

The study examined a five-item intention construct. Internal consistency, assessed via Cronbach's alpha, yielded a robust value of 0.94. Principal Component Analysis (PCA) with Varimax rotation was utilized for the factor analysis. The Kaiser-Meyer-Olkin (KMO) measure, which was found to be 0.90, and the Bartlett's Test of Sphericity, which yielded significant results, confirmed the suitability of the dataset for factor extraction. PCA revealed a unidimensional factor structure, with all items strongly loading onto a single factor. This factor explained a substantial 77.5% of variance, with loadings ranging from 0.909 to 0.861, attesting to their consistency.

A 6-item Perceived Behavioral Control (PCB) construct was subjected to Principal Component Analysis (PCA) with Varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure, which exceeded 0.70 at 0.82, and a significant Bartlett's Test of Sphericity confirmed the dataset's appropriateness for factor analysis. PCA indicated unidimensional item correlation, with all items loading on a single factor. The cumulative variance explained by the four factors was 58.6%, and item loadings ranged from 0.743 to 0.777. The internal consistency, as measured by Cronbach's alpha, for the PCB construct was 0.85.

The Attitude1 construct exhibited a high internal consistency, with a Cronbach alpha coefficient of 0.97. The five items comprising the Intention construct underwent Principal Component Analysis (PCA) with Varimax rotation. Adequacy for factor extraction was affirmed

by the Kaiser-Meyer-Olkin (KMO) measure, which exceeded the threshold at 0.88, and a significant Bartlett's Test of Sphericity. PCA revealed unidimensional item correlation, as all items loaded strongly onto a single factor. This factor accounted for an impressive 91.3% of the total variance, with loadings ranging from 0.98 to 0.95.

The Attitude2 construct, comprising five items, underwent a factor analysis using Principal Component Analysis (PCA) with Varimax rotation. The dataset demonstrated excellent suitability for factor extraction, as evidenced by a Kaiser-Meyer-Olkin (KMO) measure of 0.935 and a significant Bartlett's Test of Sphericity. PCA revealed a unidimensional item correlation, with all items loading strongly onto a single factor. These items exhibited high consistency, highlighting variance of 92.68% with loadings ranging from 0.967 to 0.946. The internal consistency, measured by Cronbach's alpha, for the Attitude2 construct was exceptionally high at 0.98.

The Norm construct exhibited a high level of internal consistency, as indicated by a Cronbach alpha coefficient of 0.94. To explore the structure of the six items in the Intention construct, Principal Component Analysis (PCA) with Varimax rotation was employed. The dataset demonstrated good suitability for factor extraction, with a Kaiser-Meyer-Olkin (KMO) measure of 0.898 and a significant Bartlett's Test of Sphericity. PCA revealed a unidimensional item correlation, with all items loading strongly onto a single factor. This factor accounted for a substantial 78.4% of the total variance, with loadings ranging from 0.861 to 0.98. Detailed factor analysis and reliability test results are presented in Table 3.3 in the study.

Table 3.3 *Validity and reliability results for scales with the main study data*

Sr.No	Factorial Statistics		Specified factor(s)	Cronbach Alpha
	Loadings	% of Variance		
Intentions				
1	.909			
2	.909			
3	.861			α = .94
4	.861	77.53	All items loaded on 1 factor (intention)	
5	.861			
Perceived Behavioral Control (PCB)				
1	.743			
2	.777			
3	.777			α = .85
4	.777			

5	.743	58.61	All items loaded on 1 factor (PCB)	
Attitude1				
1	.989			
2	.955			
3	.925			α = .97
4	.955	91.37	All items loaded on 1 factor (Attitude1)	
5	.955			
Attitude2				
1	.967			
2	.967			
3	.967			α = .98
4	.967	92.68	All items loaded on 1 factor (Attitude2)	
5	.946			
S. Norms				
1	.861			
2	.898			
3	.898			
4	.898	78.4	All items loaded on 1 factor (S. Norms)	α = .94
5	.861			
2	.898			

3.1.12 Data Collection and Ethical Considerations

Prior to initiating data collection, an institutional support letter from NUST was secured. Following this, approval for data collection from Government schools through the Education District Officer (EDO) in Rawalpindi was sought. Permission was also taken from the school principals for conducting data collection. Focal persons at the schools assisted in identifying the science teachers. Before collecting data, the research's purpose was shared with the respondents. Following ethical guidelines, it was ensured that participation was voluntary, and informed consent from all participants was obtained before distributing the survey questionnaires. Participants were given assurance of the confidentiality of their responses. In cases where respondents sought clarification on the questionnaire, guidance was provided. The data collection process in twenty-two schools spanned approximately twelve days. Out of the 105 teacher questionnaires received,

five were incomplete and thus excluded. All the principals completed the questionnaires, resulting in a total of 22 responses. The response rate is presented in Table 3.4.

Table 3.4 *Response rate*

Government Schools	Sample		Return	Return %
22	Teachers	132	100	75
22	Principals	22	22	100
Total		154	122	79

CHAPTER IV: RESULTS

This chapter discusses the statistical procedures that were applied on the data (N=122) to elicit the findings in reference to the research objectives. Both descriptive and inferential statistics were used. Inferential analysis was carried out through independent sample T-test and ANOVA using IBM SPSS version 22.

3.1.13 Demographic Characteristics of the Respondents

The survey elicited data from 122 respondents across the sample 22 Government high schools from Rawalpindi city. The demographic characteristics of the respondents of the present study are depicted in Table 4.1

Table 4.1 *Demographics data of Respondents (N=122)*

Demographic attributes		Female (n=59)		Male (n=63)		Total	Total %
		(f)	(%)	(f)	(%)	(n=122)	
Role in School	Principal	9	7.37	13	10.65	22	18.02
	Teacher	50	40.99	50	40.99	100	81.98
	Total	59	48.36	63	51.64	122	100
Age	24-30	21	17.21	8	6.55	29	23.76
	31-40	22	18.03	28	22.95	50	40.98
	41-50	11	9.01	20	16.39	31	25.4
	51-60	5	4.09	7	5.73	12	9.82
	Total	59	48.34	63	51.62	122	100
Experience	1-5	21	17.21	8	6.55	29	23.76
	6-10	27	22.13	29	23.77	56	45.9
	11-15	6	4.91	19	15.57	25	20.48
	More than 15	5	4.09	7	5.73	12	9.82
	Total	59	48.34	63	51.62	122	100
Qualification	Bachelor	2	1.63	1	0.819	3	2.449
	Master	28	22.95	34	27.86	62	50.81
	M.Phil.	29	23.77	28	22.95	57	46.72
	Total	59	48.35	63	51.63	122	100

GFPT	Yes	23	18.85	28	22.95	51	41.8
	No	36	29.50	35	28.68	71	58.18
	Total	59	48.35	63	51.63	122	100
Training in SVG	Yes	59	48.36	63	51.63	122	100
	No	0	0	0	0	0	0
	Total	59	48.36	63	51.63	122	100

Note. GFPT=Gardening or Farming in Personal Time

The sample of the current study comprised of 22 Principals (18.02%) and 50 teachers (50%) of Government high schools of Rawalpindi city. Out of a total of 122 participants, 63 (51%) were males while 59 (48.3%) were females. Majority of participants (40.98%) was within the range of 31-40 years, they had an experience of 6-10 years (45.9%) and held the last qualification as Masters (50.81). A small majority of the participants (41.8%) was involved in gardening or farming in personal time. All of the participants were receptive to trainings in school vegetable gardening.

3.1.14 Preliminary analysis

Prior to the inferential analysis a preliminary analysis was carried out. The descriptive statistics consisting of Means, SD, Min and Max are presented in Table 4.2.

Table 4.2 *Descriptive Statistics of the Study Variables (N=122)*

	Min	Max	M	SD	α	Skewness	Kurtosis
Intention	16	33	21.43	4.037	.94	.360	.435
PCB.	10	36	22.75	7.07	.94	.121	.435
Norm	11	27	18.21	4.50	.85	.221	.435
Attitude2	11	33	19.82	6.85	.97	.315	.435
Attitude 1	10	35	21.61	8.29	.98	.087	.435

Note: PCB=Perceived Behavior Control

It is recommended that if the Skewness and Kurtosis values fall under the range of +2 to -2 the data would be considered as normally distributed (George & Mallery, 2009; Gravetter & Wallnow, 2016). The Skewness and Kurtosis values as depicted in Table 4.3 fall with the acceptable range. Bivariate correlations among the study variables is presented in Table 4.3

Table 4.3 *Correlations among variables (N=122)*

		1	2	3	4	5
1	Intention					
2	PCB	.823**				
3	Norm	.843**	.815**			
4	Attitude2	.834**	.819**	.796**		
5	Attitude1	.832**	.725**	.786**	.768**	

*Note. N=122. **p < .01; PCB=Perceived Behavior Control*

3.1.15 Data Analysis

To achieve the objective 1, stepwise regression was performed in SPSS whereby the dependent variable intention to use school vegetable garden was regressed on the predicting variables of norms, attitudes and perceived behavioral control. The independent variables significantly predicted the dependent variable [F (4,117) = 408.48, p<.001]. This indicates that the three factors under study have a significant impact on intention to use school vegetable gardening. Moreover, the R^2=.829 depicts that the model explains 82.9% of variance in the intention to use school vegetable garden.

Additionally, coefficients were further assessed to ascertain the influence of each of the factors on the criterion variable (intention to use school vegetable garden). The results reveal that Perceived Behavioral Control has a significant and positive impact on the intention to use school vegetable garden (B=.122, t= 2.82, p<.01). Norms variable also rendered a significant and positive impact on the intention to use school vegetable garden (B=.219, t= 3.14, p<.01). Similarly, Attitude1 (B=.152, t= 4.65, p<.001) and Attitude2 (B=.133, t= 2.96, p<.01) also rendered a significant and positive impact on the intention to use school vegetable garden. The results of stepwise regression are depicted in Table 4.4

Table 4.4 *Summary of Stepwise Regression Analysis for Variables Predicting Intention (N=122)*

	Model1			*Model2*			*Model3*			*Model4*		
Variables	*B*	*SEB*	*β*	*B*	*SEB*	*β*	*B*	*SEB*	*β*	*B*	*SEB*	*β*
Norm	.756	.044	.843***	.443	.062	.494***	*..299*	*.065*	*.333****	*.219*	*.070*	*.244***
Attitude1				.216	.033	.433***	*.158*	*.034*	*.324****	*.152*	*.033*	*.312****
Attitude2							*.188*	*.041*	*.320****	*.133*	*.045*	*.225***
PBC										*.122*	*.043*	*.214***
R^2		.710			.785			.817			.829	
F for change in R^2		293.750			217.131			175.572			141.44	

*Note. *p < .05. **p < .01; ***p < .001*

To achieve the objective 2 regression was performed in SPSS whereby the dependent variable Attitude2 was regressed on the demographic variables of gardening or farming in personal time, qualification and experience. The independent variables significantly predicted the dependent variable [F (3, 118) = 93.35, p<.001]. This indicates that the demographic variables under study rendered a significant effect on Attitudes2.

Additionally, coefficients were further assessed to ascertain the influence of each of the factors on the criterion variable (Attitude2). The results revealed that the demographic variable of qualification rendered a significant and positive impact on the criterion variable (*B=1.41; t= 2.00; p<.01*). Similarly, the demographic variable of gardening or farming in personal time also rendered a significant and positive impact on the criterion variable (*B=11.39; t= 16.33; p<.001*). The demographic variable of experience in service did not render an impact on the criterion variable (*B=.611; t= 1.42; p=.157*). The results of regression are depicted in Table 4.5

Table 4.5 *Summary of Regression Analysis for Variables Predicting Attitude2 (N=122)*

Variables	*B*	*SEB*	*β*	*t*	*p*
Constant	11.63	1.74		6.68	*.000*
Experience	.611	.429	.080	1.42	*.157*
Qualification	1.413	.706	.113	2. 00	.048
GFPT	11.39	.697	.823	16.33	.000
R^2	.704				
F for change in R^2	93.35				

Regression was performed in SPSS whereby the dependent variable Attitude1 was regressed on the demographic variables of gardening or farming in personal time, qualification and experience. The independent variables significantly predicted the dependent variable [F (3, 118) = 115.5, p<.001]. This indicates that the demographic variables under study rendered a significant effect on Attitudes2.

Additionally, coefficients were further assessed to ascertain the influence of each of the factors on the criterion variable (Attitude1). The results revealed that the demographic variable of qualification rendered a significant and positive impact on the criterion variable (*B=1.56; t= 1.97; p<.01*). Similarly, the demographic variable of gardening or farming in personal time also rendered

a significant and positive impact on the criterion variable (*B=14.27; t= 18.2; p<.001*). The demographic variable of experience in service did not render an impact on the criterion variable (*B= -.04; t= -.005; p=.930*). The results of regression are depicted in Table 4.6

Table 4.6 *Summary of Regression Analysis for Variables Predicting Attitude1 (N=122)*

Variables	*B*	*SEB*	*β*	*t*	*p*
Constant	13.36	1.94		6.86	*.000*
Experience	-.042	.480	-.005	-.088	*.930*
Qualification	1.56	.790	.103	1.97	.049
GFPT	14.27	.780	.852	18.29	.000
R^2	.746				
F for change in R^2	115.59				

Regression was performed in SPSS whereby the dependent variable intention to use school vegetable garden was regressed on the demographic variables of gardening or farming in personal time, qualification and experience. The independent variables significantly predicted the dependent variable [F (3, 118) = 293.8, p<.001]. This indicates that the demographic variables under study rendered a significant effect on intention to use school vegetable gardening.

Additionally, coefficients were further assessed to ascertain the influence of each of the factors on the criterion variable (intention to use school vegetable garden). The results revealed that the demographic variable of qualification rendered a significant and positive impact on the criterion variable (*B=.70; t= .262; p<.01*). Similarly the demographic variable of gardening or farming in personal time also rendered a significant and positive impact on the criterion variable (*B=7.56; t= 29.20; p<.001*). The demographic variable of experience in service did not render an impact on the criterion variable (*B=.219; t= .1.37; p=.171*). The results of regression are depicted in Table 4.7

Table 4.7 *Summary of Stepwise Regression Analysis for Variables Predicting Intention (N=122)*

Variables	*B*	*SEB*	*β*	*t*	*p*
Constant	16.726	.646		25.886	.000
Experience	.219	.159	.049	1.377	.171
Qualification	.701	.262	.095	2.673	.009
GFPT	7.565	.259	.928	29.206	.000
R^2	.882				
F for change in R^2	293.8				

Regression was performed in SPSS whereby the dependent variable Perceived Behavior Control was regressed on the demographic variables of gardening or farming in personal time, qualification and experience. Only the independent variables of gardening or farming in personal time rendered a significant and positive impact [F (3, 118) = 171.12, p<.001] on the criterion variable (*B=12.8; t= 22.5; p<.001*). The results of regression are depicted in Table 4.8

Table 4.8 *Summary of Regression Analysis for Variables Predicting PBC (N=122)*

Variables	*B*	*SEB*	*β*	*t*	*p*
Constant	17.11	1.42		12.2	.000
Experience	.209	.351	.027	.595	.553
Qualification	-.128	.578	-.010	-.222	.825
GFPT	12.85	.571	.900	22.52	.000
R^2	.813				
F for change in R^2	171.12				

Our third objective is positioned to address if there are any differences with reference to the teachers and principals, their educational qualification, service experience and those who do gardening or farming in personal time in their attitudes, intentions, and Perceived Behavioral Control.

To explore whether there are any differences between the mean scores of teachers and principals regarding their intentions to use school gardens, perceived behavior control and their attitudes. For this purpose, independent sample T-test was run. The results demonstrate

insignificant differences (p>.05) in the mean score across the principals and teacher groups. Findings are depicted in Table 4.9

Table 4.9 *Mean differences between Teachers and Principals' groups on score Intention, PCB, Attitude1 and Attitude2 (N=122).*

Outcome	Group				95% CI for Mean Difference				
	Teachers (*N*=100)		Principals (*N*=22)						
	M	SD	M	SD	LL	UL	t (122)	p	Cohen's d
Intention	21.35	4.074	21.77	3.939	-2.32	1.47	-.443	.65	0.10
PBC	22.86	7.09	22.23	7.12	-2.78	4.05	.349	.70	0.08
Attitude2	19.73	6.91	20.45	6.73	-3.97	2.52	-.481	.65	0.1
Attitude1	21.40	8.22	22.55	8.73	-5.30	3.06	-.57	.57	0.1
Norms	18.24	4.54	18.09	4.41	-1.98	-1.98	.202	.88	0.01

To explore whether there are any differences between the mean scores of participants who did gardening and farming in their personal time and those who don't in relation to their intentions to use school gardens, their attitudes and perceived behavior control; for this purpose, independent sample T-test was run. The results demonstrate positive significant differences (p>.001) in the mean score. Findings are depicted in Table 4.10

Table 4.10 *Mean differences between those who garden and those who do not groups on score Intention, PCB, Attitude1 and Attitude2 (N=122).*

Outcome	Group				95% CI for Mean Difference				
	Those who don't garden (*N*=71)		Those who garden (*N*=51)						
	M	SD	M	SD	LL	UL	t (122)	p	Cohen's d
Intention	18.24	1.38	25.8	1.49	-8.14	-7.10	-28.9	.000	0.3
PBC	17.37	3.57	30.24	2.20	-13.98	-11.7	-13.02	.000	4.4
Attitude2	15.04	3.88	26.57	3.71	-12.90	-10.14	-11.4	.000	3.1
Attitude1	15.61	4.5	29.9	3.9	-15.88	-12.8	-12.81	.000	3.3
Norms	14.93	2.4	22.7	2.0	-8.6	-7.04	-19.24	.000	3.3

A one-way between subjects' ANOVA was carried out to ascertain as to whether there were any differences in the mean scores of the respondents qualification with regards to Intention, PBC, Norms, Attitude1 and Attitude2. The results demonstrate insignificant differences. The results are depicted in Table 4.11

Table 4.11 *Mean, Standard deviation, and F-values on components of TPB among various Qualification groups (N =122)*

	Masters (n=62)		M.Phil. (n=57)		Bachelors (n=3)				95% CI		
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*P*	*F*	LL	UL	Partial eta2
Intention	21.11	4.07	21.54	3.78	25.67	7.02	.155	1.89	20.70	22.15	.03
PBC	22.73	6.8	22.60	7.4	26.0	6.9	.714	.338	21.48	24.03	.00
Attitude2	19.31	7.1	20.12	6.5	26.33	3.05	.207	1.74	18.60	21.04	.02
Attitude1	20.44	8.5	22.72	7.9	24.67	8.02	.265	1.34	20.13	23.10	.02
Norms	17.39	4.3	19.02	4.54	20.00	4.05	.112	2.26	17.40	19.04	.03

A one-way between subjects' ANOVA was carried out to ascertain as to whether there were any differences in the mean scores of the respondents' service experience with regards to their Intention, PBC, Norms, Attitude1 and Attitude2. The results demonstrate insignificant differences. The results are depicted in Table 4.12

Table 4.12 *Mean, Standard deviation, and F-values on components of TPB among various Experience groups (N =122)*

	1-5 (n=62)		6-10. (n=57)		11-15 (n=3)		*Above 15* (n=3)				95% CI		
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*P*	*F*	LL	UL	Partial eta2
Intention	21.0	3.5	21.5	4.3	21.6	3.9	21.6	3.9	.933	.144	20.7	22.15	.01
PBC	21.0	7.2	23.3	6.9	23.4	7.0	22.3	7.4	.48	.822	21.48	25.1	.02
Attitude2	18.6	5.8	20.04	7.1	21.8	7.1	19.3	7.5	.633	.575	18.6	21.04	.01
Attitude1	22.2	7.8	20.9	8.5	22.6	8.0	21.0	9.4	.833	.289	20.13	23.10	.00
Norms	17.7	4.3	18.7	4.5	17.9	4.5	17.5	4.6	.700	.476	17.4	19.0	.01

CHAPTER V: DISCUSSION

The current study aimed at contributing to the relevant knowledge base regarding the likelihood of schools to implement school vegetable gardens using the theory of planned behavior. The study was based upon the perceptions of the teachers and principals of government high schools. The findings that emerged from the study are discussed in the following sections with reference to their research objectives.

Reference to the objective1, the study indicated that the three components of theory of planned behavior i.e., general cognitive attitudes towards school vegetable garden (Attitudes1), Personal affective attitudes towards school vegetable gardens (Attitudes2), Subjective norms and Perceived Behavior control significantly predicted *(p<.001)* the intentions to use school vegetable garden. This finding confirms the theory of planned behavior (Ajzen, 1991) which postulates that the norms, attitudes and Perceived behavior control tend to predict the intention to execute a certain behavior. Further the fact that the factors of attitudes, norms and perceived behavior control in the current study demonstrated inter correlations (*p<.01*) is also in conformity with the theory of planned behavior where the three constructs are contended to render influence and are influenced by each other. The present humble study therefore confirms the assumption of the theory of planned behavior.

The findings with respect to objective 2 indicated that the demographic variable of gardening or farming in personal time significantly predicted (p<.001) the components of theory of planned behavior-cognitive attitude, affective attitude, PBC and intentions to use school garden. It may be argued that since those who farmed or did gardening in personal time (*n=51*) had the necessary skills or concepts of vegetable gardening and hence demonstrated positive cognitive and affective attitudes, higher Perceived Behavioral Control and stronger intentions to use vegetable gardening in their respective schools than their counterpart colleagues who did not garden or farmed in their personal time (*n=71*). Literature is also replete with the findings of research that a lack of previous experience of farming or gardening and a lack of necessary skills tend to be a critical impediment in the use of school vegetable gardening (e.g. Hoover, 2021; Greer et al., 2019). In the present study the lack of practical experience about vegetable gardening may have lowered the self-efficacy in school vegetable gardening which was subsequently manifested in their lowered lower cognitive attitudes, affective attitudes, *Perceived Behavioral Control* as well as lower intentions

to use school vegetable gardening as demonstrated through their mean scores. This was further substantiated by the fact that the demographic variable of experience rendered an insignificant effect on all components of the theory of planned behavior i.e., cognitive attitude, affective attitude, PBC, and intentions to the use school garden.

The fact that in the present study, qualification predicted the intention to use school vegetable gardens as well as the cognitive and affective attitudes may be attributed to the fact that while the majority of respondents lacked the on ground practical experience of farming or gardening, their educational qualification in some way developed their conceptual or theoretical knowledge regarding vegetable gardening. This conceptual understanding may have contributed in developing positive intentions as well as cognitive and affective attitudes of the participants. However the qualification could not compensate for the relevant on-ground practical experiences of vegetable gardening and hence rendered no effect on the perceived behavior control of the participants. Literature has also highlighted that the lack of horticulture experience and training (Webb et al., 2018; Mann et al., 2022; Brut et al., 2018) is a major impediment towards implementing school vegetable gardens.

In reference to this subsidiary objective (2a), the first finding is that there were no significant differences ($p>.01$) among the teachers and principals in their cognitive and affective attitudes, intentions, norm and PCB scores. The unanimity of a shared vision for a school vegetable gardening program among the teachers and principals is critical for the success (Hoover, 2021). Literature also reports that the active involvement of school teachers and principals is critical for successful implementation and sustainability of school gardens (e.g. Burt et al., 2018; Holloway et al., 2023). However, the moderately lower scores among the teachers and the principals on intention *(M=21.35, M=21.77)*, PCB *(M=22.86, M=22.23)*, cognitive attitude *(M=21.40 M=22.55*) and affective attitude *(M=19.73, M=20.45)* may allude to a multiplicity of contextual factors e.g., lack of funds, lack of space, lack of time, in addition to the personal factors such as lack of skills, lack of relevant experience etc. More studies are warranted to explore the barriers confronted by the teachers and the school principals to use school vegetable gardening.

As regards whether there were differences in the mean scores of those who engaged in gardening or farming in their personal time and those who did not. The findings indicate significant differences among the two groups of those who engaged in gardening or farming in their personal

time and those who did not across the TPB components of on intention *(M=18.24, M=25.8)*, PCB *(M=17.3, M=30.2),* cognitive attitude *(M=15.6, M=29.9*) and affective attitude *(M=15.4, M=26.57)* scores; the findings indicate significant differences (p<.001) in the mean scores. These significant differences may be attributed to the fact that those who farmed or did gardening in their personal time had developed a skill set and felt a reasonable level of comfort level in implementing and using school gardens which was manifested through their relatively high scores as compared to the other group who did not farmed or gardened in their personal time. The theory of planned behavior (Ajzen, 1991) posits that individuals with high PBC are more inclined to develop strong intentions regarding that behavior and consequently there exists a more likelihood that these individuals would execute that behavior even when dealt with impediments as compared to those with lowered perceived Behavior Control. Findings of the present study in congruence with the contention of TPB (Ajzen, 1991) indicated that those who did gardening or farming in personal time exhibited higher scores of PBC in addition to high scores on attitudes and hence higher intention levels.

In the present study, experience subgroups did not demonstrate significant differences *(p>.01)* in the mean scores of intention to use school vegetable gardens, PBC, attitudes and subjective norms. This well elucidated by a considerably less effect size ranging from (.00-.01). The fact that the groups did not deviate much in their mean scores shows unanimity of their perceptions. As regards the qualification subgroups, while no significant differences *(p>.01)* were observed in the mean scores of intention to use school vegetable gardens, PBC, attitudes and subjective norms. However, the magnitude of difference was conspicuous across the intention and norms components of TPB where the Bachelor qualification subgroup *(n=3)* exhibited considerably higher intention *(M=25.6)* and norm *(M=20.6)* mean scores than the other subgroups.

3.1.16 Summary

The purpose of this study is to predict the likelihood of the school principals and science teachers across the selected government high schools of Rawalpindi city in using school gardens. More specifically the study attempted to: 1) Predict the likelihood among the Government High school principals and teachers to use school gardens based on components of the theory of planned behavior; 2) Explore the effect of demographic factors of gardening or farming in personal time, experience and qualification on the components of theory of planned behavior. In relation to the

second key objective, the study also seeks to report on its subsidiary objective, 2a) Determine if there are any differences with reference to the teachers and principals, their educational qualification and experience and those who do gardening or farming in personal time in their attitudes, intentions, and Perceived Behavioral Control

A quantitative research method with a descriptive, exploratory research design was employed. Multistage proportionate stratified random sampling was employed for elicitation of a sample of 132 teachers and 22 Principals from a total of 22 government high schools of Rawalpindi city. Survey method was employed whereby the perspectives of the sample teachers and principals were elicited regarding their attitudes, Perceived Behavior Control, subjective norms and intentions to use school vegetable gardens. The research instrument comprised of structured questionnaire comprising of six sections of which five sections aligned with the theory of Planned Behavior. This included a 6-item intention construct, 5-item construct of general attitudes towards school vegetable garden (Attitude1). 5-item construct of personal preferential attitude towards school vegetable garden (Attitude2), the 5-item subjective norms construct and a 6-item Perceived Behavior Control construct. The response rate was 70.0% whereby 122 filled questionnaires were received. A data set of 122 responses was subjected to descriptive and inferential analysis through SPSS version 20. Independent sample t-tests and ANOVA tests were also applied for elicitation of findings. The detailed findings of the study are elaborated as under:

3.1.17 Findings

The current study yielded the following key findings:

1. The three components of theory of planned behavior i.e., general attitudes towards school vegetable garden (Attitudes1), Personal preferential attitudes towards school vegetable gardens (Attitudes2), Subjective norms and Perceived Behavior control significantly predicted the intentions to use school vegetable garden.
2. Demographic variable of qualification rendered a significant and positive impact on Attitude2 variable ($p<.01$)
3. The demographic variable of gardening or farming in personal time also rendered a significant and positive impact on attitude2 variable ($p<.001$).

4. The demographic variable of experience in service did not render an impact on the variable of attitude2 (p>.01)
5. The demographic variable of qualification rendered a significant and positive impact on the variable of Attitude 1 (*p<.01*).
6. The demographic variable of gardening or farming in personal time also rendered a significant and positive impact on the variable of Attitude1 (*p<.001*)
7. The demographic variable of experience in service did not render an impact on Attitude1variable (p>.01)
8. The demographic variable of qualification rendered a significant and positive impact on the intention variable (*p<.01*)
9. The demographic variable of gardening or farming in personal time also rendered a significant and positive impact on the intention variable (*p<.001*).
10. The demographic variable of experience in service did not render an impact on the intention variable (p>.01)
11. The independent variables of gardening or farming in personal time rendered a significant and positive impact on PBC variable (*p<.001*).
12. The demographic variable of experience in service did not render an impact on the PBC variable (p>.01)
13. The demographic variable of qualification did not render an impact on the PBC variable (p>.01)
14. No significant differences were observed between the mean scores of teachers and principals regarding their intentions to use school gardens, perceived behavior control and their attitudes (p>.01).
15. Significant differences were observed in the mean scores of those did gardening or farming in their personal time on their Perceived behavior control, intention and attitudes towards school vegetable gardening (*p<.001*).
16. Insignificant differences existed in the mean scores of the respondents' qualification with regards to their scores on Intention, PBC, Norms, Attitude1 and Attitude2 (p>.01).
17. Insignificant differences existed in the mean scores of the respondents' experience in service with regards to their scores on Intention, PBC, Norms, Attitude1 and Attitude2 (p>.01).

3.1.18 Conclusion

The present study sought to predict the likelihood of the school principals and science teachers' across the selected government high schools of Rawalpindi city in using school gardens. More specifically the study attempted to: 1) Predict the likelihood among the Government High school principals and teachers to use school gardens based on components of the theory of planned behavior; 2) Explore the effect of demographic factors of gardening or farming in personal time, experience and qualification on the components of theory of planned behavior. In relation to the second key objective, the study also seeks to report on its subsidiary objective, 2a) Determine if there are any differences with reference to the teachers and principals, their educational qualification and experience and those who do gardening or farming in personal time in their attitudes, intentions, and Perceived Behavioral Control.

On the basis of the findings we safely conclude that the three components of theory of planned behavior i.e., general cognitive attitudes towards school vegetable garden (Attitudes1), Personal affective attitudes towards school vegetable gardens (Attitudes2), Subjective norms and Perceived Behavior control are predictors of the intentions to use school vegetable garden. Thereby supporting the assumptions of the theory of planned behavior.

The study also concludes that the experience of gardening or farming in personal time has a significant influence on the cognitive and affective attitudes, on the perception of teachers and principal's ability to use school gardens and their intention to use the school vegetable gardens.

The study concludes that qualifications that relate to vegetable gardening that builds the theoretical knowledge can also have a significant influence on cognitive and affective attitudes, on the perception of teachers and principal's ability to use school gardens and their intention to use the school vegetable gardens.

The study concludes that the inexperience with on ground gardening or farming practical skills has insignificant influence on cognitive and affective attitudes, on the perception of teachers and principal's ability to use school gardens and their intention to use the school vegetable gardens.

3.1.19 Recommendations

The present study sought to explore the likelihood among the Government High school teachers and principals to use school vegetable gardens in the teaching milieu. While the results of

this humble study cannot be generalized by all means to a larger population, it nonetheless provided useful insights regarding their intentions, their perceptions of their ability to use school gardens, their perceptions as to what their colleagues, parents, students, school administration as well as community generally perceived about the use of school vegetable gardens. The study also shed light regarding the cognitive and affective attitudes held by the teachers and the principals of the respective schools regarding the use of school gardens. In the light of the findings following recommendations are put forth:

i. A large scale study is warranted on determining teacher and principal likelihood to use school gardens, across the public as well as private as the crisis of food insecurity looms in Pakistan. The insights from such a study may have policy implications for inclusion of it in school curriculum and in developing interventions for the sustainability of this initiative
ii. A mixed method study is warranted so that the findings of the quantitative part of the study can be corroborated and elucidated through the qualitative research regarding the likelihood of teachers and principals in using school vegetable gardens.
iii. An important implication of the study is that the pedagogy through school vegetable gardening ought to be included in the curriculum of preservice teacher training institutes and in-service teacher training modules.
iv. An important implication of the study is that the preservice teacher training institutes and in-service teacher trainings out to provide trainings in pedagogy through school vegetable gardening through interdisciplinary approach.
v. Further the preservice and in-service teacher/Principal trainings should also include the component of implementation and management of school gardens as well as Entrepreneurship through School Gardens so that the teachers and students from poor households can generate livelihood through agricultural produce and support thereby supporting the local community.

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DISTRICT EDUCATION AUTHORITY
RAWALPINDI
Dated: 25-05-/2023

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Subject:- **NOC/DEPARTMENTAL PERMISSION TO COLLECT THE DATA FROM THE ELEMENTARY SCHOOLS TEACHER/STUDENTS FOR THE PURPOSE OF RESEARCH STUDY DURING M.S DEGREE COURSE**

Mst. Ayesha Noor Fatima who is bonafide students of Master Programm in Agribussiness Management at National University of Science & Tenchnology (NUST) Islamabad who is desired to research on the topic " How likely are Pakistani Schools to adopt vegetable gardents" " Predicting the likelihood using theory of planned behavior is hereby allowed to collect the required data from the Public School during schooling hours subject to the condition that the work and study of the teaching /student may not suffer. Further more collected data will not use for any other purpose but only for the said research following the instruction as well as SOPs of the Department without fail under rules/law/policy.

Assistant Director (Admn)
Chief Executive Office
District Education Authority
Rawalpindi

Endt No. & Date Even.

1 The District Education Officer (S.E), Rawalpindi.
2 The Heads of the institutions in District Rawalpindi.
3 Applicant concerned.
4 Office copy.

Assistant Director (Admn)
Chief Executive Officer
District Education Authority
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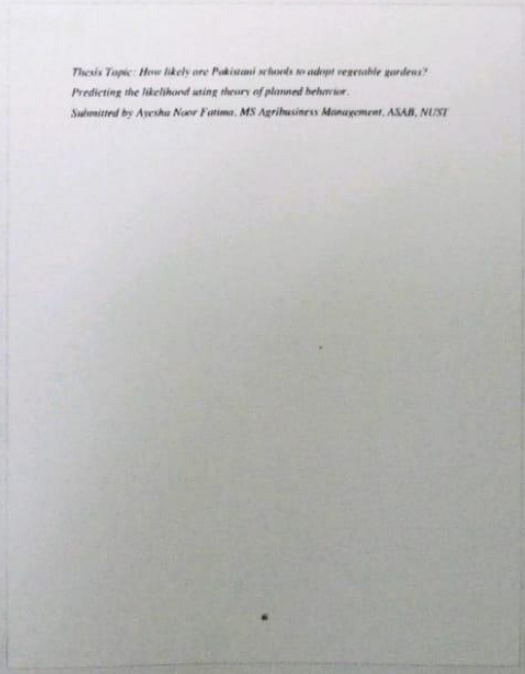

Thesis Topic: How likely are Pakistani schools to adopt vegetable gardens? Predicting the likelihood using theory of planned behavior.
Submitted by Ayesha Noor Fatima, MS Agribusiness Management, ASAB, NUST