Research Article

Exploring the Rewards and Consequences of Wastewater Irrigation in Vegetables: Case Study of Central Punjab, Pakistan

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Abstract | The main focus of the study was to explore the rewards and consequences of wastewater irrigation in vegetables in the central Punjab. Two highly populated districts of the Punjab (Lahore & Faisalabad) were purposively selected as the targeted research area. Data were collected from randomly selected 120 vegetable growers from each district who used to do vegetable farming using wastewater. Total sample size of the study was 240 vegetable growers. Quantitative and qualitative data were collected by conducting research survey. Interview schedule as well as interview guide was used as the research instruments. The data thus collected were analyzed using SPSS for interpretation. Findings revealed the most prominent reason behind wastewater irrigation was uncertainty about energy supply. In addition, majority of the respondents were aware about health associated hazards (Hepatitis, Nausea *etc.*) of wastewater produced vegetables. It was further concluded that there exists a difference between mean of perceived rewards/incentives received from (especially untreated) wastewater irrigation in vegetables and mean its consequences/disadvantages. Therefore, it is recommended that timely and effective campaigns must be launched in the extensive vegetable growing areas for reduced use of wastewater irrigation.

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Introduction

In Asian countries including Pakistan vegetables are commonly used and serve as an important component of diets (Yaseen *et al.*, 2020). In the context of Pakistan, farm size is low as majority of the farmers are referred to as small farm producers (CABI, 2018). In most of the cases farm labour is available to undertake field operations. In this situation, vegetable farming is one of the best options for earning considerable amount of income for better and sustainable livelihoods (Adil *et al.*, 2007). Vegetables are widely grown in all the four provinces of Pakistan due to the diverse climatic conditions (Naqvi *et al.*, 2020). There is an increasing trend of vegetable production and its export during the last five years in order to cope with the growing demands of ever-growing population of the country (GoP, 2019).

In addition to good source of income as alternative to crop production, vegetable farming also possesses medical significance as a rich source of protein, carbohydrates, minerals and vitamins (Muhammad *et al.*, 2015; SMEDA, 2007). Another significant feature of vegetable is that they can easily be grown on small size of land for household consumption as well as commercial purposes (Khokhar, 2014). Due to short duration nature of vegetables, growers receive quick income return compared to field crops (Jan *et al.*, 2009). In Pakistan due to continuous increase in population and changes in dietary patterns keeping in view the emerging health issues, there is an increasing trend of vegetable consumption (Ali *et al.*, 2017).

This has been observed that vegetable cultivation in the areas called peri-urban is increasing rapidly due to minimum distance from local market and high profit rate (Eigenbrod and Gruda, 2015). Peri-urban agriculture especially vegetable farming is gaining importance due to its potential role in improving food security situation, generating employment and ultimately reducing poverty (NAAS, 2004). To meet the ever-growing demand of vegetables especially in urban areas of Pakistan, vegetables are widely grown in peri-urban areas in addition to rural localities. Rapid urbanization and decreasing arable land are also the major factors behind large scale vegetables cultivation in peri-urban areas (Hassan *et al.*, 2017). In developing countries where there is shortage of potable water, wastewater is being used to irrigate vegetables (Sharma *et al.*, 2016). The application of waste water is increasing day by day in terms of area under irrigation as well as volume of its application (Drechsel *et al.*, 2010).

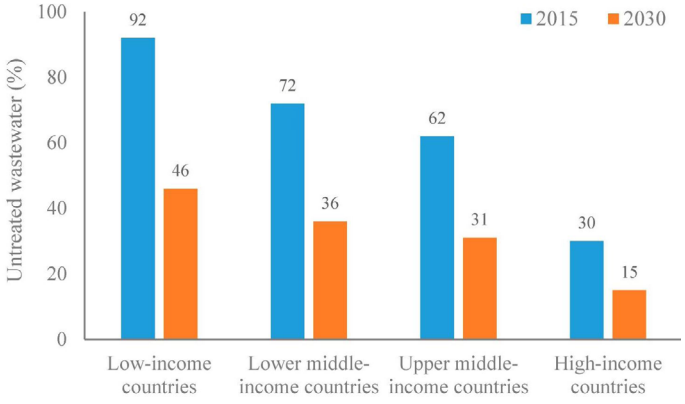
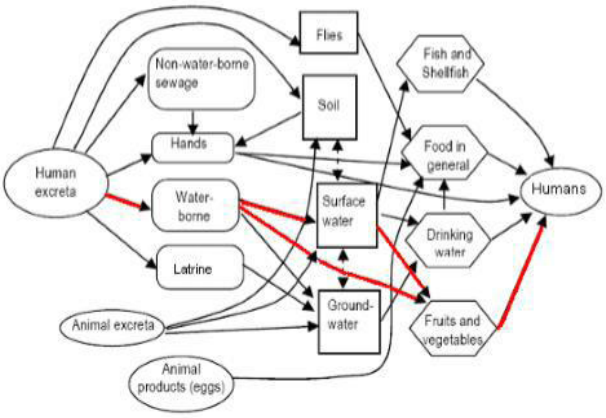


Figure 1: *Percentage of untreated wastewater discharged into the environment in low and high-income countries (adopted from* Khalid *et al.*, 2018*).*

Application of wastewater in agriculture is an ancient practice but it was poorly managed and no quality parameters were being followed (Angelakis and Snyder, 2015). It serves as an alternative irrigation source. Research studies conducted in the past up to 1990s revealed that wastewater can be reused after treatment (Brega and Mancuso, 2003; Asano and Levine, 1996; and Jiménez and Asano, 2008). Particularly in developing countries it is a reputed source of nutrients and water (Jiménez, 2006). But its discharge into the environment significantly varies from high income to low-income countries (Khalid *et al.*, 2018). The percentage (%) of untreated wastewater discharged into the environment in low and high-income countries is presented in Figure 1.

It is very important to mention here that in majority of the low income and underdeveloped countries like Pakistan municipal wastewater tend to be extensively used for irrigation purposes especially around populous metropolitan cities without scientific and proper treatment (Perveen *et al.*, 2012). Pakistan is not included in the list of those countries where wastewater is being applied in agricultural fields after treatment. All the wastewater that is being used in agriculture in Pakistan is untreated (Jaramillo and Restrepo, 2017). With special reference to irrigation in vegetables using untreated wastewater in Pakistan is very old practice. The major reason behind this illegal and malpractice is the shortage of fresh water and non-availability of canal water in peri-urban areas, where vegetables are widely grown to meet the demands of urban population (Ashraf *et al.*, 2013). Increasing volume of wastewater due to urbanization also contribute towards its common use for irrigation in vegetables. Vegetable growers claimed that wastewater is readily available with low cost (Ensink *et al.*, 2004). According to the report of International Water Management Institute (IWMI), Lahore, Pakistan, about one-fourth (26.0%) of vegetables are being produced by using wastewater (Drechsel *et al.*, 2010). Mostly, the wastewater that is being applied in vegetable cultivation is untreated (Baig *et al.*, 2011). Pakistan is included in the list of top five countries of the world where about 90.0% of the total agricultural land is under irrigation through wastewater (Yusuf, 2017). Application of such untreated wastewater in vegetables especially leafy vegetables accumulate large quantity of heavy metals like copper, aluminum, zinc, chromium, arsenic, lead, cadmium etc. All these metals are toxic in nature for human body. The continuous consumption of these heavy metals in daily diet resulted in a number of in-

fectious diseases like cancer, cholera, typhoid, brain damage and many other health related issues (Jadoon *et al.*, 2013). A number of international research studies reported serious health issues associated with wastewater irrigation like Wen *et al.* (2014), Husaini *et al.* (2010), Rosegrant *et al.* (2009), Mapanda *et al.* (2005) and Singh and Singh (2004) many others.



In most of the developing countries like Pakistan, wastewater especially untreated sewage municipal water contains bacterial, viral, protozoan and other pathogens that are endemic for the human beings. All these endemics posture a serious health related issues and problems (Drechsel *et al.*, 2009). This has been reported that vegetables especially leafy vegetables grown in fields irrigated through untreated wastewater are mostly eaten half of un-cooked. Due to this reason growers of these vegetables, their families and ultimate users (consumers) are facing a number of health-related issues and problems and they are considered as most vulnerable and their healthy is at high risk (Blumenthal *et al.*, 1996; Feenstra *et al.*, 2000). Concisely, health issues faced by humans connected with waste water irrigation are hereby demonstrated in the figure given below as reported by Fewtrell *et al.*, (2007).

Besides health-related issues associated with wastewater (especially untreated) irrigation in vegetables, there is big debate on advantages and disadvantages of application of untreated wastewater. Different research studies show that application of wastewater for irrigation purposes in vegetables provides high level of nutrients and it is very cheap for vegetable growers to produce large quantity of vegetables with minimum or no use of fertilizers (Luqman *et al.*, 2017; Ullah *et al.*, 2012; Ghosh *et al.*, 2012). Irrigation using wastewater provides a good source of nutrient enriched water (Singh and Dhar, 2006). Wastewater from urban localities was transported to the crop fields and orchards to be used as fertilizer (Cooper, 2001). Some research studies reported that use of wastewater even its treatment (reuse) is significantly affecting the texture properties of soil (Jaramillo and Restrepo, 2017). The present research study was designed with following research objectives:

1. To study the demographic profile of respondents (vegetable growers) in the research area
2. To identify the irrigation sources for vegetable cultivation available in the research area and their extent of use
3. To identify the major reasons for using wastewater as an irrigation source in vegetables
4. To study type of hazards linked with wastewater irrigation in vegetables as reported by respondents
5. To identify prominent health issues associated with wastewater irrigation of vegetables
6. To identify the rewards and consequences of wastewater irrigation in vegetables as perceived by respondents

Materials and Methods

For this study, the Punjab province was selected, keeping in mind the feasibility with relevance and importance of issue under consideration. Being the most populous province of the country (Pakistan), the Punjab is known for its major contribution in agricultural production. The reason behind selection of the Punjab province for the current study was that on the area under cultivation of vegetables and production, Punjab is on the top (Luqman *et al.*, 2017). The province is divided into 36 administrative units or districts. Out of these districts, two districts *i.e* Lahore and Faisalabad were purposively selected as the targeted research areas. The main purpose behind the selection of these two districts was that both of these cities were the highly populated cities of the province.

From the respective districts, list of vegetable growers using wastewater was developed with the consultation and help of staff of Department of Agriculture (Ext.) of respective districts. From each list, random selection was made to select respondents. Before conducting final survey, a preliminary survey was conducted in both the selected districts to record insights into present farm management practices used by vegetables growers especially sources of irrigation water. Additionally, the research instrument (interview schedule)

was prepared keeping in mind the major objectives of the study. The interview schedule was pre-tested on 40 vegetables growers who used to apply waste water for irrigation (20 from each district) to see the validity and reliability. Interview schedule comprises of both open and close ended questions. Five (05) point Likert scale was used to record opinion of respondents regarding types of issues linked with wastewater irrigation and rewards & consequences of wastewater irrigation in vegetables. Three (03) point Likert scale was used to record opinions of respondents regarding extent of application of water from different irrigation sources.

Furthermore, the content validity of the interview schedule was checked by its validation from panel of experts from University of Agriculture, Faisalabad, University of the Punjab, Lahore and University of Sargodha. Cronbach Alpha test was run using SPSS to determine the reliability of interview schedule. Final data were collected from 240 vegetable growers (120 from each district) who used to do vegetable farming using wastewater. Personal face-to-face interviews were conducted in the respective fields of vegetable growers. In addition to quantitative data, some qualitative data were also collected using key informant interviews and observations. Three (03) key informant interviews (Officials of Agricultural Extension Department, Health Department & Sewerage Department/municipal corporation of respective districts), were conducted for the said purpose. Observations were also made while interviewing with the respondents to understand the processes of social scenario within the perspective of vegetable production through waste water irrigation. The collected quantitative data were analyzed using computer operated software SPSS and qualitative data through categorical data analysis technique for drawing conclusions and formulating recommendations.

Results and Discussion

Using wastewater for the irrigation purpose is widely practiced phenomenon in Asian countries. This practice is harming the life and agriculture sector at its full fledge. Being an agricultural country, Pakistan is also a victim of this practice (untreated wastewater irrigation). In this section demographic profile of respondents is presented.

Data in the Table 1 portray that absolute majority (59.2%) of participants fell in age class of 31 to 40 years. It was followed by marginally one-third (32.5%) of the participants who devolved in age category of 41 years and above. In case of education, a simple majority (55.8%) of respondents had middle level literacy rate while slightly greater that one-fourth (28.3%) of the participants earned primary level of literacy rate. Most (78.3%) of the participants reported that that their major source of income was farming. A few (21.7%) respondents reported that they were practicing both farming and non-farming activities for income generation. While responding about the farm size, a good majority (69.2%) of the respondents revealed that they had landholding of upto 10 acres and about 26% reported that size of their farm ranged between 11-20 acres. In connection with these findings Tahir and Altaf (2013) concluded that mean age of respondents (vegetable growers) was 34 years.

Table 1: *Demographic profile of respondents. n=240.*

Demographic profile	f	%
Age		
Young age group (upto 30 years)	20	8.3
Middle age group (31 years to 40 years)	142	59.2
Old age group (41 years and above)	78	32.5
Education		
Primary level (5 years of schooling)	68	28.3
Middle Level (8 years of schooling)	134	55.8
Matriculation (10 years of schooling)	38	15.8
Income source		
Farming as single income source	188	78.3
Multiple income sources including farming	52	21.7
Farm-size		
Small land holders (Having land upto 10 acres)	166	69.2
Medium size land holders (Having land 11 to 20 acres)	62	25.8
Large land holders (Having land 20 acres and above)	12	5.0

Table 2: *Origins of irrigation in vegetables and their level of use. n=240.*

Irrigation sources	Extent of use		
	Low	Medium	High
Freshwater	137 (57.1)	86 (35.8)	17 (7.1)
Wastewater	29 (12.1)	97 (40.4)	114 (47.5)

Scale 1: *Low;* **Scale 2:** *Medium;* **Scale 3:** *High.*

Irrigation is the compulsory components of any farming activity in Pakistan. Therefore, the respondents

were called for revealing their sources of irrigation and data related to this is presented in Table 2.

Fare majority (57.1%) of the respondents was negating that they were using very minute quantity of fresh water for vegetable production followed by 35.8% of respondents who used medium degree of freshwater for irrigation purpose. Furthermore, using wastewater for vegetable production was high as reported by 47.5% of the respondents. A few (12.1%) of the respondents reported that they used low amount of wastewater for irrigating vegetables. In connection with these findings Baig *et al.* (2011) concluded that although wastewater irrigation showed negative and bad impacts on human health but farmers in the research area (Faisalabad) mostly used wastewater as it is cheaper than fresh water irrigation. They concluded that about 46% of farmers used wastewater to irrigate their fields.

Reasons for using wastewater as an irrigation source in vegetables

Vegetable farming in peri-urban areas is most susceptible to wastewater due to its easy availability and accessibility. Peri-urban vegetable production has become a lucrative endeavor for farming community due to less input investment and high production. Keeping in view the abundant use of wastewater for vegetable production, respondents were asked to highlight the reasons of wastewater usage and data related to this are presented in Table 3.

Table 3: *Reasons for using wastewater as an irrigation source. n=240.*

Reason	Frequency	Percentage
Minimum availability of water from canals	192	80.0
Tube well (fresh water) expenditures are high	174	72.5
Shortfall of Energy/electricity issues in case of irrigation from tube well water	240	100.0
Perception is that higher production of vegetables is assured by using wastewater for irrigation	231	96.2
Cheaper & timely available	119	49.6

The data tabulated in Table 3 given above shows that cent percent of the respondents were of the view that energy crises and electricity issues while using fresh water through tube wells for irrigation in vegetables especially in peri-urban areas (where there is non-availability or minimum availability of canal water) was the major reason behind application of wastewater for irrigation in vegetables. An overwhelming majority (96.2%) of the respondents said that the reason behind extensive use of wastewater is based on their assumption that vegetables irrigated with wastewater give more production as compared to vegetables irrigated with other sources of irrigation. Similarly, minimum availability of canal water during required period was another reason for usage of wastewater as reported by 80% of the respondents. The high expenditures of pumping fresh water through tube wells was also one of the reasons behind use of wastewater for irrigation in vegetables as reported by 72.5% of respondents. Cheaper and timely availability of wastewater was also a factor in this context as reported by about half (49.6%) of the respondents. More or less similar nature of reasons were also investigated by Luqman *et al.* (2017) while studying the advantages and disadvantages of wastewater irrigation in vegetables in the Punjab province of Pakistan.

It was noted during qualitative interviews that there is high demand of vegetables due to high population of the targeted research districts (Faisalabad and Lahore). To fulfill that demand, majority of the vegetable growers used to cultivate summer and winter season vegetables in peri-urban areas using waste water. One of the key informants narrated that *"production of high value vegetable in peri-urban localities, where there is scarcity of canal and fresh water is mainly linked with high demand of these vegetables in cities"*. Similar reasons were also pointed out by Leeuw (2014) while studying the perspectives of farmers and customers on the application of waste water during cultivation of vegetables in the Kathamndu valley of Nepal.

Knowledge of vegetable growers about health-related issues of using wastewater for irrigation in vegetables

It is evident from previous researches that crops irrigated with wastewater are highly contaminated with hazardous elements (minerals, vitamins, micronutrients *etc.*) and consumption of such crops invites many diseases. Therefore, the respondents were asked to describe their knowledge about health-related issues associated with vegetables production by using wastewater for irrigation. The data in this regard is presented in Table 4.

The data given in Table 4 shows that a meaningful majority (65.0%) of the participants was aware about

human health issues linked with vegetable production through application of wastewater for irrigation. On the other hand, marginally greater than one-third (35.0%) of the vegetable growers were unaware about such heath-oriented issues. The reasons behind application of wastewater for irrigation in vegetables although majority (65.0%) of respondents were well aware of its consequences are continuous availability through out the year with minimum cost. The same was also reported by Luqman *et al.* (2017).

Table 4: *Knowledge of growers about hazards with the usage of wastewater in vegetable cultivation. n=240.*

Response	Frequency	Percentage
Yes	156	65.0
No	84	35.0

Table 5: *Association between educational level of respondents and their knowledge regarding impact of wastewater irrigation in vegetables on human health.*

Education	Knowledge		Total
	Yes	No	
Primary level (5 years of schooling)	14	54	68
Middle Level (8 years of schooling)	120	14	134
Matriculation (10 years of schooling)	22	16	38
Total	156	84	240

χ^2_{cal} value: *93.305*;* **DF:** *2;* **Gamma:** *0.000.*

Data presented in Table 5 indicates that respondents with middle level education were found to be more aware about effects of wastewater irrigated vegetables on human health as compared to respondents having primary level education and matriculation, respectively. The significant value of Gamma shows that there is strong association between educational level of respondents and their knowledge about impact of using wastewater for irrigation purposes in vegetables.

Table 6: *Type of issues linked with wastewater irrigation.*

Risks	Mean	SD
Health	4.5	0.501
Environmental	3.8	0.627
Consumption	4.3	0.508

Scale 1: *Strongly disagree;* **Scale 2:** *Disagree;* **Scale 3:** *Undecided;* **Scale 4:** *Agree;* **Scale 5:** *Strongly agree.*

Respondents were asked to indicates a hazard linked with wastewater irrigation and related to this is depicted in Table 6. Health and consumption hazards ranged between agree and strongly agree category with mean values of 4.5 and 4.3, respectively. Health hazard sloped more towards strongly agree according to scale while consumption hazard tended more towards agree category. Furthermore, mean value (3.8±0.627) of environmental hazard ranged between undecided and agree categories tending more towards agree category.

Table 7: *Prominent health issues in case of wastewater irrigation reported by respondents. n=240.*

Health issues	Frequency	Percentage
Stomach disturbances	179	74.5
Jaundice	105	43.7
Hepatitis	196	81.7
Respiratory problems	112	46.7
Skin problems	37	15.4
Headache	108	45.0
Nausea	187	77.9
Multiple health issues	130	54.2
Don't know about the disease	31	12.9

Data depicted in Table 7 that large majority (81.7%) of the respondents were aware that "Hepatitis" is strongly associated with consumption of vegetables grown with wastewater followed by a large majority (77.9 and 74.5%) of the respondents who reported that "Nausea" and "Stomach disturbances" are closely linked with wastewater vegetable consumption. Moreover, a few numbers (15.4%) of the respondents agreed that using wastewater vegetables can lead to skin problems. It is important to mention here that slightly more than fifty percent (54.2%) of respondents reported that they faced multiple health issues and only 12.9% of respondents didn't know about the disease in case of waste water irrigation in vegetables. With these findings Baig *et al.* (2011) concluded that wastewater faced more health incidents compared to other farmers using fresh water for irrigation. Serious human health hazards were found as a result of wastewater irrigation in vegetables as reported by Jadoon *et al.* (2013).

Perceived rewards of wastewater irrigation in vegetables

Around the globe there is a debate on the rewards and consequences of wastewater irrigation in vegetables. Under present research opinion of respondents were obtained regarding rewards and consequences associ-

ated with application of wastewater in vegetables for irrigation. The self-perceptions of respondents (vegetable growers) were recorded with the help of five (05) point likert type scale. The data in this regard in presented in Table 8.

Table 8: *Self-perceived rewards of wastewater irrigation in vegetables.*

Rewards	Mean	SD
Reliable and cheap irrigation source	3.5	0.981
Increased yield due to high nutrient content	3.9	0.831
More secure and higher urban vegetable production	3.6	0.987
Provide income and employment opportunities for urban dwellers	3.5	0.932
Improved livelihoods of subsistence farmers	3.6	0.765
Reduces the cost of fertilizers	3.6	1.129
Continuous availability during the whole year	3.8	0.517
Save fresh water for other cash crops	3.6	0.964
Mean of Means	3.2	0.888

Scale 1: *Strongly disagree;* **Scale 2:** *Disagree;* **Scale 3:** *Undecided;* **Scale 4:** *Agree;* **Scale 5:** *Strongly agree.*

The data presented in Table 8 shows that rewards/advantages of wastewater irrigation in vegetables in the targeted area were "reliable and cheap irrigation source", "Increased yield due to high nutrient content", "More secure and higher urban vegetable production", "Provide income and employment opportunities for urban dwellers", "Improved livelihoods of subsistence farmers", "Reduces the cost of fertilizers", "Continuous availability during the whole year" and Save fresh water for other cash crops with mean value 3.5/5.0, 3.9/5.0, 3.6/5.0, 3.5/5.0, 3.6/5.00, 3.6/5.0, 3.8/5.0, and 3.6/5.0, respectively. The over mean value (3.2/5.0) of all the rewards received through application of wastewater for irrigation purposes in vegetables inclined towards "agree". This indicate that majority of the respondents were of the view that wastewater irrigation in vegetables is somewhat beneficial for human life. During qualitative interviews/discussion meetings, it was noted that a large majority of the respondents were against this illegal practice of using untreated wastewater especially in vegetables. They viewed that to save water and to reduce impacts of environmental pollution, wastewater should be treated properly on the basis of scientific lines before its application to the agriculture fields. These qualitative remarks were also discussed by Jaramillo and Restrepo (2017).

Perceived consequences of wastewater irrigation in vegetables

Although, wastewater irrigation in vegetables possessed some rewards/advantages, but its application also has a number of consequences. The data in this regard were also collected from the targeted population under present research and presented in Table 9.

Table 9: *Self-perceived consequences of wastewater irrigation in vegetables.*

Consequences	Mean	SD
Source of transmission of microbial disease	4.7	0.475
Source of bacterial infections	4.1	0.667
Prolonged exposure to heavy metals cause cancer	4.1	0.657
Effect soil texture and its properties	4.1	0.635
Enhance environmental especially soil pollution	4.0	0.706
Contaminate the vegetables	4.1	0.750
Presence of high concentration of toxic elements	4.4	0.789
Disturb ecosystem	4.0	0.800
Source of contamination fresh water	4.1	0.837
Effects vegetative growth of plants	4.4	0.700
Mean of Means	4.2	0.702

Scale 1: *Strongly Disagree;* **Scale 2:** *Disagree;* **Scale 3:** *Undecided;* **Scale 4:** *Agree;* **Scale 5:** *Strongly Agree.*

The data presented in Table 9 shows that main consequences of wastewater irrigation in vegetables as perceived by respondents were "Source of transmission of microbial disease", "Source of bacterial infections", "Prolonged exposure to heavy metals cause cancer", "Effect soil texture and its properties", "Enhance environmental especially soil pollution", "Contaminate the vegetables", "Presence of high concentration of toxic elements", "Disturb ecosystem", "Source of contamination fresh water", " and "Effects vegetative growth of plants" with mean value 4.7/5.0, 4.1/5.0, 4.1/5.0, 4.1/5.0, 4.0/5.0, 4.1/5.0, 4.4,5.0, 4.0/5.0, 4.1/5.0, and 4.4/5.0, respectively. The overall mean value (4.2/5.0) of all the consequences of wastewater irrigation in vegetables indicate that majority of the respondents were found "agreed" regarding disadvantages and adverse impacts of wastewater application for irrigation in vegetables. There is difference between perceived rewards/incentives received from wastewater irrigation in vegetables and its consequences/disadvantages. This shows that inspite of some short-term incentives of wastewater (especially untreated) irrigation in fields of vegetables, there are a number of consequences of its application in vegetable fields. The same was also reported by Luqman *et al.* (2017).

Conclusions and Recommendations

Majority of the respondents fell in age category of 31-40 years with middle level education and being dependent on farming as their primary source of income. It is very unfortunate that a meaningful majority of the vegetable growers was practicing wastewater irrigation for vegetable production due to many reasons *i.e.* unavailability of canal water, electricity crisis in case of tube well operation, cheaper and timely availability of wastewater. While unveiling the facts about hazardous effects of wastewater irrigation, the respondents reported that they think, Hepatitis and chronic diseases are closely associated with consumption of wastewater grown vegetables. It was also concluded that application of wastewater for vegetable production has many disadvantages in spite of some of its short-term incentives. The wastewater may be reuse for irrigation in vegetables after proper treatment. To bring awareness among community regarding its consequences, it is suggested that an urgent and effective awareness campaigns should be launched in the site affected areas in order to minimize the use of wastewater irrigation.

Novelty Statement

The article presents the pros and cons of using wastewater for vegetable production; a widely prac-ticed activity specifically in urban settings. This pa-per testifies that despite having diverse advantages to the vegetable growers, to what extent vegetable production using wastewater could prove worse for growers specifically and consumers generally.

Author's Contribution

Tahir Munir Butt: Principal author and supervised the whole research.
Azra: Literature reviewed and edited the paper.
Muhammad Luqman: Data analysis and proof reading.
Naveed Farah: Prepared research instrument.
Muhammad Yaseen: Data collection.

Conflict of interest
The authors have declared no conflict of interest.

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