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Analysis Of Urbanization As Contributing Factor To Agricultural Productivity

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Abstract

The aim of this study was to know about the effects of urbanization over agricultural production especially sugarcane. The study was conducted in district Mardan and Charsadda, where the data was collected from 384 sugarcane growers. These farmers were selected through multistage random sampling technique from 12 Union Councils of two districts. The data was collected through a well-designed interview schedule/questionnaire. Major findings of the study reflected that urbanization was noticed as an important contributing factor influencing agricultural activities in the study area. Vast agricultural lands are converted into residential and industrial areas due to both demographic and economic reasons. Farmers, especially the youth, switched to business and other professions by selling their small fragments of land or migrated to urban areas in search of white-collar jobs with negative repercussions on agricultural productivity.It is recommended that through the subordination of housing policies to agricultural policy and by stopping the dumping of waste products on agricultural lands, we can save agricultural land and increase agricultural productivity.

Introduction

Urbanization is an intersectoral phenomenon which involve all dimensions of economy and society (World Bank, 2018). Due to urbanization urban population increases and expansion occurs in non-agricultural industries, which also put pressures on farmers and make it difficult for them to cultivate in traditional ways. The problem is more aggravated because most of these industrial growths occur in prime agricultural areas (Asamoah, 2010). Urbanization leads to the conversion of fertile agricultural land for non-agricultural purposes like infrastructure, commercial, industrial and residential uses due to which the fertile agricultural land is reduces which largely affect agriculture and food production (Franciset al.,2013).

State of agricultural production in general and sugarcane production in particular is below national average in Khyber Pakhtunkhwa province (table 1). The province is divided into four agro-ecological zones (Northern, Eastern, central and southern zones) based on edaphic and climatic factors, out of which the central zone (Peshawar, Charsadda, Swabi, Nowshera, Kohat and Hangu districts) is the most productive region in terms of agricultural production due to its fertile plains and network of irrigation system (Ahmad et al., 2012; Chandio et al., 2016; PES, 2019; Shah et al., 2018). Sugarcane is cultivated in 17 districts of the province om 0.116-million-hectare area, constituting 8.55 percent of total country production. Charsadda is the leading district in terms of sugarcane production in the province followed by Mardan, D.I. Khan and Peshawar (GOKP, 2018). To enhance the agricultural production in the province, the government of KP has initiated several projects and programs through its agricultural development. In this connection the Sugar Crops Research Institute (SCRI) was established in 1952 and upgraded in 1981 to develop and diffuse high yielding and resistant varieties of sugarcane in the province. In addition, the institute introduced various farming technologies (fertilizers, machines, chemicals, irrigation system etc.) and practices (spacing, tending etc.) that were meant for enhancing agricultural production. The agriculture extension department was also overhauled and updated for efficient diffusion of these technologies. However, achievement of high sugarcane production goal remained unachieved. Research studies investigating the causes of low sugarcane production in the province were also focused on technical reasons for low sugarcane production like insufficient adoption of technologies, inappropriate use of technologies by farmers, pessimist approach of farmers toward technologies, introduction of inefficient technologies as compared to modern world and lack of economic incentives etc. (Jadoon et al., 2017; Masood et al., 2012; Ahmad et al, 2012; Parvan, 2013; Truong and Yamada, 2002). These research studies have their own significance in determining the proximate causes of low sugarcane production in the province. However, there is a mounting criticism that there is no serious attempt to determine the underlying social factors like urbanization behind sugarcane production problem that has long lasting effect on low sugar output, high sugar prices, reduced export, reduced employment opportunities and low standings on socioeconomic indicators.

The cities are expanding due to population growth under the influence of high fertility and migration. As an outcome, the cities are growing literally in all directions. The developed nations have introduced the concept of echo-cities in which environment friendly cities are built with the concept of vertical buildings. In such cities, high skyscrapers to accommodate high population influx with least pressure on surrounding natural environment. In developing nations like Pakistan, urbanization is lateral, unplanned and haphazard that is not only engulfing productive agricultural lands but also adding to the miseries of human lives and environment as well. Under the influence of urbanization, in developing countries, the land use patterns are dramatically changing with high expansion of habitation and associated infrastructure and loss of agricultural land. That's why the present study was designed to assess the association of urbanization with sugarcane productivity.

If sugarcane production is so important specific in meeting national dietary needs, influencing market prices, creating employment opportunities and earning foreign exchange then what are the various technical and social factors that influence sugarcane production, and how these factors are theoretically grounded is the potential question to be answered.

Table 1 Sugarcane area and Production by Province

Province	Area ('000' Hectares)			Production ('000' Tons)		
	MY 2016/17	MY 2017/18	MY 2018/19	MY 2016/17	MY 2017/18	MY 2018/19
Punjab	782	864	790	49,700	56,000	47,300
Sindh	320	333	300	20,200	20,300	19,000
Khyber Pakhtunkhwa	118	118	110	5,600	5,700	5,200
Baluchistan	-	-	-	-	-	-
Total	1,220	1,315	1,200	75,500	82,000	71,500

Sources: MNFSR, PSMA and FAS/Islamabad (MY represent Marketing Year 2018-19)

Methodology

Research design

The present study adopted cross-sectional design to measure sugarcane productivity, becausethis type of design gives a comprehensive picture of a problem prevailing at a particular time. These sorts of research are both cross-sectional with reference to time and population (Babie, 1989).

Nature of the study

The study was quantitative in nature.

Universe of the study

The study was conducted in district Mardan and district Charsadda of Khyber Pakhtunkhwa, Pakistan to determine the effects of urbanization on sugarcane productivity.

Sampling procedure

For the selection of the respondents, a multistage random sampling procedure was adopted where Districts Charsadda and Mardan were selected as universe of the study at first stage. Three Tehsils from district Mardan were randomly selected while all three tehsils of district Charsadda were selected at second stage. Furthermore, two union councils were selected from each tehsil (12 UCs in total) in third stage, and in fourth stage the number of farmers were selected from these union councils through proportional allocation method.

Sample size

Total population of the study universe (12 selected UCs), as counted through a pilot survey conducted by the researcher, comes out to be 3720 sugarcane growers. Keeping in view the number of variables and study population, the formula proposed by Chaudhry (2009) is used for sample size calculation as below.

$$n = \frac{N\hat{p}\hat{q}Z^2}{\hat{p}\hat{q}Z^2+Ne^2-e^2}$$ Equation-1

N= total number of farmers in selected UCs = 3720, p = population proportion = 0.5, q = opposite proportion = (1-p) = 0.5, z = confidence level = 1.96, e = margin of error = 0.05, n= 384

The required sample size worked out based on above formula is 384 farmers. The calculated sample size was proportional allocated to each Union Council by using formula proposed by (Bowly, 1926).

$$ni = n.Ni/N$$ Equaltion-2

while ni= Proportional allocated sample size to each UC, n= Total population size, Ni= Total number of households in each UC, N= Total number of households.

Conceptual framework

A conceptual framework for this study was designed which was consisted of one independent variable (urbanization), one dependent variable (sugarcane productivity) and one background variable (socioeconomic status of farmers) as depicted in table 2.

Table 2 Conceptual framework

Background variable	Independent variable	Dependent variable

Socioeconomic status	Urbanization	Sugarcane productivity

Tools of data collection

A detailed questionnaire/interview schedule was designed in the light of study variables (see table 2) for collecting quantitative data from the respondents. The research instrument was also pre-tested to 25 respondents to remove ambiguities (Kothari, 2004). After pre-testing some questions were removed while other were added for removing the inconsistencies. The data was collected through a trained team of researchers under the supervision of the core investigator (researcher himself).

Ethical considerations

The study was conducted following the APA standard ethics for social data collection were adopted. The research instrument was approved from the department committee, cultural sensitivity was taken into consideration, prior consent of the respondents was solicited, and anonymity of the respondents was assured. Prior to the collection of data, the purpose and importance of data was explained to the farmers, and data was collected from those who were willing to share information.

Reliability analysis & indexation

In social sciences, indexation is used for assessment of the respondent's attitude about the study variables. Index construction is combining two or more items in a variable (Nachmias& Nachmias, 1992). In this study the independent variable (urbanization) was indexed and cross-tabulated with the dependent variable (sugarcane productivity). Similarly, at multi-variate analysis, both independent and dependent variables were indexed while socioeconomic status was used as background variable. Furthermore, before indexation, reliability analysis of the study scales was tested (see table 3). It is a statistical procedure which is used for testing internal consistency of an index. For this purpose, Cronbach's alpha test was used. A scale with an Alpha value of 0.6 and above was considered internally consistent and suitable for indexation (Ghazali, 2008).

Table 3 Reliability results of the Scale

Variables	**Cronbach's alpha**
Urbanization	.80
Sugarcane productivity	.87

Data collection

Data was collected from September 2020 to February 2021 using interview schedules/questionnaires by a team of researchers under the supervision of the core investigator.

Data analysis

The relationship between urbanization and sugarcane productivity was determined through chi-square test as given by Tai (1978), and tau-c (T^c) was used to determine the direction of the relationship. Similarly,Multivariate analysis was also carried out for variations in sugarcane productivity dueto urbanization to determine whether socioeconomic status had an impact, assuggested by Ullah et al. (2020).

Results and discussions

Association between urbanization and sugarcane productivity

Results in table 4 show that 22.3% of all those respondents who were of the view that more and more of their agricultural land was converted to urban area, earned above average net income from sale of sugarcane production compared to 47.5% of those who were of the view that their land was not converted into urban area and 32.3% of those who were uncertain to it. Conversion of agricultural land into urban area was a source of reducing sugarcane productivity as found from its significant and negative association ($p=0.001$; $T^c= -0.112$). Similarly, for all those respondents whose lands were becoming barren due to household and industrial wastes, 22% earned above average net income from sugarcane productivity compared to 46.7% of those whose lands were not becoming barren due to dumping of household and industrial wastes and 30.8% of those who were not sure that whether their lands were becoming barren due to wastes or not. Dumping of wastes in agricultural lands reduces the agricultural production and net income from sugarcane production as explained by a high significant ($p=0.000$) and negative association ($T^c= -0.159$). In the same line, for all those respondents, for whom infrastructure development led to conversion of agricultural land, 21.3% earned above average net income from sale of sugarcane production compared to 40.7% of those who were not facing the problem of conversion of agricultural land due to infrastructural development and 45.5% of those who were uncertain to it. Infrastructural development and its associated land change exhibited a significant and negative association with net income from sugarcane production ($p=0.001$; $T^c= -0.149$). Due to population growth, the process of urbanization is accelerated, resulting into expansion of cities and villages to the extent that some of the satellited villages are merging with the main cities. In some extreme cases, the high populous cities are engulfing small cities into it. Thus, vast agricultural area is converted into habitation or use for development of physical infrastructure like roads, bridges etc. Development of each connecting road provides an opening for construction of residencies and industries along these roads, converting more and more arable land into built environment. The process of loss to agricultural land does not stop here, as the wastes excreted from industries and residential areas is dumped in agricultural lands due to unplanned and poor management of urban areas. A combined effect

of land use change from agriculture to urban land use and dumping of wastes into agricultural land is negatively affecting the sugarcane productivity of such farmers. However, where such urbanization process is properly planned and managed, its negative effects on sugarcane productivity are effectively controlled (Deng et al., 2015).Malik and Ali (2015) also reported decrease in agricultural productivity due to haphazard urbanization process. However, a planned development of city, keeping in view the socioeconomic and environmental considerations and deployment of effective agricultural technologies, the target of urbanization and agricultural production could be achieved simultaneously (WB and DRC, 2014; Song and Pijanowski, 2014; Francis et al. 2013). Failing to which achievement of agricultural production goals in the era of rapid urbanization is hard to achieve (Malik and Ali, 2015; Wang et al., 2005; Deng et al., 2015) due to unprecedented shrinkage of agricultural land and enhanced pollution (Chen, 2007; Yang et al., 2003; MRP, 1976). Francis et al. (2013) found that the delicate balance needs to maintain an equilibrium between physical infrastructural development and enhanced agricultural production through implementation of rational policies. Otherwise, development of physical infrastructure and road networks triggers the process of conversion of agricultural lands into habitations and industries and adversely affect the agricultural production system as a whole (IFAD, 2012; Mandere et al., 2010).

The results further show that for all those respondents for whom the farmers were migrating to cities in search of better jobs, 20.7% earned above average net income compared to 39.7% of those who considered that the farmers did not prefer to get to cities in search of highly paid jobs and 31.3% of those who were uncertain to it. Preferring migration in search of highly paid jobs in cities over agriculture profession led to reduction in sugarcane productivity in terms of net income as show by significant and negative association ($p=0.040$; $T^c= -0.053$). Moreover, for all those respondents for whom the youth were impressed from urban lifestyle and did not want to become farmers, 18.4% earned above average net income from the sale of sugarcane production compared to 52.2% of those whose youth were not impressed from urban lifestyle and interested in farming profession and 33.7% of those who were uncertain to it. Diversion of youth from agricultural profession and their raised interest in urban lifestyle resulted into decline of net income from sugarcane production as clarified from a highly significant but negative association ($p=0.000$; $T^c= -0.137$). Declining farming profession and aging of farming profession are the two important issues discussed by the global communities in the context of increased food security to the growing population needs. Agriculture is a labor-intensive profession which needs a combination of technologies, skills, experiences and zeal to grow agricultural products efficiently. Experienced farmers are source of guidance to young farmers that actually utilize the energies of young farmers in the tiresome process of agricultural production. With the rise of urbanization, new better paid employment opportunities and quality living standards are emerging that are fascinating to all including the farming communities. The youth are generally more attracted to urban lifestyle and employment opportunities while the experienced farmers are fascinated with better paid jobs in the urban areas. The collective effect of economic and social pull form urban areas results into erosion of farming professionals and their settlements from rural into urban areas. Resultantly, a handful of experienced and zealous farmers are left for agricultural production that result into decline of agricultural productivity and net income from it. According to Holden and Chaudhary (2013) the farmers in developing countries are fed-up of with highly laborious, manual and low rewarding conventional agricultural practices. The literate youth and qualified elderly farmers are feeling difficulties in continuing such conventional agriculture, especially where comparably better paid jobs are available to them in urban markets. The response of young farmers for such change in profession is overwhelming where migration does not only, mean to them a change to a highly paid occupation but also a shift to better quality living standard in the urban areas. As a result, the farms are managed by low literate, aged and in some instances by female farmers who are unable to maintain the agricultural productivity and result into decline agricultural income (Iheke and Nwaru, 2014). Moreover, Watson (1974) and Grantham (1989) revealed that a shift of experienced and zealous farmers form agricultural profession to other urban based professions is not only costing communities in terms of low agricultural production but also increase the number of buyers demanding the low produced agricultural commodities. In such situation, it is necessary to bring all the financial and quality of living related charms to agriculture profession on one side, and to devise high producing agricultural technologies on the other side to retain the farmers in rural areas and enhance agricultural production (Li et al., 2010; Wang et al., 2013; Obonyo et al., 2016).

Likewise, for all those respondents facing the water shortage for irrigation due to huge among of water requirement for housing and industrial sector, 20% earned above average net income from the sale of sugarcane products compared to 43% of those for whom irrigation water shortage was not a problem and 32.1% of those who were uncertain in this respect. Scarcity of water for irrigation due to its diversion in construction and industrial purposes reduced the agricultural production and its related income as evident from their significant and negative association ($p=0.003$; $T^c= -0.085$). Water is the lifeline of agricultural production sector. Sufficient quantity and appropriate quality of irrigation water has proven ingredient of elevated agricultural production system all over the world. Due to population growth and urbanization, the per capita availability of water is declining along with degradation in its quality due to addition of pollutants in water. Shortage in supply of

irrigation water is not only a technical problem but also a socio-political and economic problem as well. Due to high demand and scarcity of water, various development sectors like construction, industries etc. are competing with agriculture sector. Moreover, a high political influence of rich industrialists and real estate builders, the water supply is cut down from agricultural sector and diverted to these wealthy sectors. Therefore, Yan et al. (2015) has correctly mentioned that distribution of water in various development sectors within a country is more a political problem than a technical one. The most powerful among competing sectors will, therefore, secure a substantial proportion of available water supply for their sector. Agriculture being less powerful in this tug of war, is slashed off from its actual share of water, resulting into low agricultural productivity and subsequently low net income from sugarcane produce (Zaidi et al., 2013). The scientists are, therefore, emphasizing on introduction of water use efficient technologies for irrigation of crops in addition to rationalization of proportion of irrigation water to agricultural sector according to the needs of this important sector (Watson, 1974; Grantham, 1989; Yang et al., 2003; Shehzad, 2012).

Conversely, the association of environmental pollution caused due to industries leading to soil contamination was non-significant with sugarcane production ($p=0.603$; $T^c= -0.030$). Dumping of industrial wastes into agricultural fields without providing appropriate treatment is a common agricultural and industrial problem of developing countries. It may lead to temporary or permanent barrenness of lands. However, this problem was somewhat unnoticed in the study area as shown in above non-significant association. Jabbar and Mallick (1994) also refuted the high level of agricultural production losses are high when damaging industrial wastes are dumped into agricultural fields. Moreover, dumping of mild damaging wastes require long time of regular dumping into agriculture fields to negatively influence agricultural production. For this purpose, the government must devise clear industrial waste treatment policies and its implementation in letter and spirit (Yang et al.,2003).

To sum up, the haphazard spread of urban areas, are shifting the agricultural land use into built environment. The reduced arable lands so left are attacked by another problem associated with urbanization known as land pollution. The urban wastes dumped in peripheries spread over the agricultural lands and degrade their productive capacity. Developmental activities in urban areas are not only consuming the agricultural land, but also eroding both young and experienced farming professional due to their migration to urban areas in charm of well-paid jobs and quality lifestyle. Furthermore, the urbanization is a serious source of depriving agriculture sector from its due share of irrigation water. Thus, in the scenario of squeezing agricultural lands, polluted farms, migrated farming professionals and reduced water supply due to urbanization is negatively affecting sugarcane productivity, for which technological, social and policy intervention are needed to limit and reverse agricultural land conversion, reclaim polluted and degraded fields and deploy qualified young farmers in agriculture profession.

Table 4 Association between urbanization and sugarcane productivity of the respondents

Attributes	**Attitude**	**Sugarcane productivity (in terms of net income)**				**Statistics** x^2 **(P-Value)** T^c
		Above average net income	**Average net income**	**Below average net income**	**Total**	
More and more agricultural land is converted to urban area	Yes	61 (22.3)	112 (41)	100 (36.6)	273 (100)	x^2 =19.810 (0.001) T^c=-0.112
	No	38 (47.5)	20 (25)	22 (27.5)	80 (100)	
	Uncertain	10 (32.3)	11 (35.5)	10 (32.3)	31 (100)	
Agricultural lands are becoming barren due to dumping of household/industrial wastes	Yes	59 (22)	102 (38.1)	107 39.9)	268 (100)	x^2 =25.567 (0.000) T^c=-0.159
	No	42 (46.7)	33 (36.7)	15 (16.7)	90 (100)	
	Uncertain	8 (30.8)	8 (30.8)	10 (38.5)	26 (100)	
Infrastructure development leads to conversion of agricultural lands	Yes	53 (21.3)	100 (40.2)	96 (38.6)	249 (100)	x^2 =18.737 (0.001) T^c=-0.149
	No	46 (40.7)	38 (33.6)	29 (25.7)	113 (100)	
	Uncertain	10 (45.5)	5 (22.7)	7 (31.8)	22 (100)	
Industries in rural areas cause environmental	Yes	57 (25.8)	87 (39.4)	77 (34.8)	221 (100)	x^2 =2.735 (0.603)
	No	23 (35.4)	20 (30.8)	22 (33.8)	65 (100)	

pollution, which leads soil contamination	Uncertain	29 (29.6)	36 (36.7)	33 (33.7)	98 (100)	T^c=-0.030
Farmers now a days due to industries in urban areas, go to cities in search of white-collar jobs	Yes	47 (22.7)	88 (42.5)	72 (34.8)	207 (100)	x^2 =10.017 (0.040) T^c=-0.053
	No	31 (39.7)	22 (28.2)	25 (32.1)	78 (100)	
	Uncertain	31 (31.3)	33 (33.3)	35 (35.4)	99 (100)	
The youth are impressed from urban lifestyle and so do not want to be farmers	Yes	40 (18.4)	94 (43.3)	83 (38.2)	217 (100)	x^2 =32.120 (0.000) T^c=-0.137
	No	36 (52.2)	14 (20.3)	19 (27.5)	69 (100)	
	Uncertain	33 (33.7)	35 (35.7)	30 (30.6)	98 (100)	
Due to use of huge amount of water for housing and industrial purposes in urban area, there is scarcity of water for irrigation	Yes	41 (20)	86 (43.2)	72 (36.2)	199 (100)	x^2 =16.226 (0.003) T^c=-0.085
	No	34 (43)	20 (25.3)	25 (31.6)	79 (100)	
	Uncertain	34 (32.1)	37 (34.9)	35 (33)	106 (100)	

Percentages are given in parenthesis

Associationbetween urbanization and sugarcane productivity (controlling socioeconomic status of the respondents)

Results in table 5 show that for those respondents from high socio-economic status who perceived high influence of urbanization, 35.1% earned above average net income from sugarcane sale compared to 58.8% of those who perceived moderate influence of urbanization and 31.2% perceiving low influence of urbanization. In addition, for all those respondents from middle socio-economic status who perceived high influence of urbanization, 8.6% earned above average net income from sugarcane sale as compared 24.6% of those who perceived moderate influence of urbanization and 41% with low urbanization influence. Furthermore, for all those respondents from low socio-economic status who perceived high influence of urbanization, 17.2% earned above average net income from sugarcane sale compared 27.8% of those who perceived moderate influence of urbanization and 31.8% perceiving low influence of urbanization. The association between urbanization and net income from sugarcane production was found non-significant (p=0.096) and positive (T^c= 0.003) for high socio-economic group. The association of these variables was highly significant and negative (P=0.000; T^c= -0.457) for middle socio-economic group. However, the association of the above said variables was non-significant and negative (P=0.148 & T^c= -0.247) for low-income group. Value of level of significance and T^c for entire table show highly significant and negative (P=0.000 & T^c= -0.293) association between land disputes and sugarcane productivity for all the three socio-economic groups. Variation in Kendal T^c and chi square significance values for all the three socio-economic groups indicated that association of land disputes and sugarcane productivity is spurious on the basis of socio-economic statuses of the respondents, where middle socio-economic status are worst effectees in terms of low sugarcane production followed by respondents from low and high socioeconomic status group respectively.

Urbanization is a process of spread of city due to population growth and migration. Due to the process of urbanization, the arable land is converted into built environment by construction of infrastructure like roads, markets, and shops etc. in addition to installation of factories and industries in sub-urbs and rural areas. The process of urbanization initiates a chain of reactions leading to rapid conversion of agricultural land into non-agricultural uses. Moreover, the urbanization process pulls out the agricultural labor and drain them to the cities. Consequently, reduced arable land area and insufficient labor supply cause huge fall in agricultural production. The negative consequences of urbanization on agricultural production are disproportionately high in middle and low socioeconomic status farmers than high socioeconomic farmers. Thus, a road or other infrastructures running through agricultural fields is more likely to consume the agricultural lands of middle and lower socioeconomic status farmers. Likewise. The middle and lower socioeconomic status farmers are stripped out of their free available labor-force as the family members of such farmers are more inclined to migrate to urban areas in search of jobs. Conversely, the arable land of big farmers is more secure, and they are in better position to replace the unskilled labor with innovative technologies and machineries to enhance their agricultural production. The same is the obvious reason of high negative influence of urbanization on sugarcane production by farmers from middle and low socioeconomic status than those of high socioeconomic status farmers. According to Qadeer (2013) the negative repercussions of urbanization are high for poor farming communities, as farming has become an uneconomical activity due to small landholdings, high input costs and low returns from the sale of agricultural products. The squeezed agricultural lands are insufficient to provide employment to the whole community resulting into migration of the manpower to urban areas after disposing of their small landholdings. Moreover, the encroachment of urban development over rural lands is overwhelming. The poor farmers are left with very few choices out of which selling of their agricultural lands seems most rational decision. Thus, the farmers wait for the best offer to sell their land instead of taking interest in agriculture (Nguyễn et al. 2016). Furthermore, success stories of farmers converted to other professions is additional factor

that constrains farmers, especially those from middle and low socioeconomic status, to opt for alternate employment opportunities than low returning agricultural profession (Mughal, 2019). Those middle and low socioeconomic status farmers who struggle to survive in their agricultural profession on the pace of urbanization. They faced the indirect problem of urbanization in terms of pollution, reduced irrigation water supply, theft of agricultural produce and approach of agricultural machinery to their lands which are made inaccessible by surrounding buildings (Deng et al., 2015; Malik and Ali, 2015) and result into their low agricultural productivity (Malik and Ali, 2015). Balancing the negative effects of urbanization through planning eco-friendly cities, however, is an efficient solution to maintain the size of rural areas, meet the developmental needs of urbanization and enhance agricultural production (Francis et al., 2013). For high socioeconomic farmers, the agriculture is relatively a high earning and stable profession. Their high economic status and huge landholding makes agriculture a high status and economically feasible task. Moreover, their educational and professional levels are the additional factors to enhance their agricultural production on the pace of rapid urbanization and high population growth (Iheke and Nwaru, 2014; Obonyo et al., 2016; Wang et al., 2013).

Table 5 Association between influence of urbanization and sugarcane productivity (controlling socio-economic status of the respondents)

Socio-economic status	**Relationship with urbanization**	**Net Income**				**Statistics x^2 (P-Value) T^c=**	**Level of significance for the entire table**
		Above average net income	**Average net income**	**Below average net income**	**Total**		
High socioeconomic status	High	13 (35.1)	16 (43.2)	8 (21.8)	37 (100)	x^2 =7.892 (0.096) T^c=0.003	x^2 =50.747 (0.000) T^c=-0.293
	Moderate	20 (58.8)	6 (17.6)	8 (23.5)	34 (100)		
	Low	5 (31.2)	5 (31.2)	6 (37.5)	16 (100)		
	Total	38 (43.7)	27 (31)	22 (25.3)	87 (100)		
Middle socioeconomic status	High	8 (8.6)	25 (26.9)	60 (64.5)	93 (100)	x^2 =66.711 (0.000) T^c=-0.457	
	Moderate	14 (24.6)	28 (49.1)	15 (26.3)	57 (100)		
	Low	32 (41)	40 (51.3)	6 (7.7)	78 (100)		
	Total	54 (23.7)	93 (40.8)	81 (35.5)	228 (100)		
Low socioeconomic status	High	5 (17.2)	7 (24.1)	17 (58.6)	29 (100)	x^2 =6.774 (0.148) T^c=-0.247	
	Moderate	5 (27.8)	6 (33.3)	7 (38.9)	18 (100)		
	Low	7 (31.8)	10 (45.5)	5 (22.7)	22 (100)		
	Total	17 (24.6)	23 (33.3)	29 (42)	69 (100)		

Percentages are given in parenthesis

Conclusions and recommendations

It is concluded from the study that urbanization was noticed as an important contributing factor influencing agricultural activities in the study area. Vast agricultural lands are converted into residential and industrial areas due to both demographic and economic reasons. Farmers, especially the youth, switched to business and other professions by selling their small fragments of land or migrated to urban areas in search of white-collar jobs with negative repercussions on agricultural productivity. It is recommended that through bringing the housing policies in subordination to agricultural policy, by reversing the process of conversion of productive agricultural lands into habitation and by stopping the dumping of residential and industrial waste on agricultural lands, we can save agricultural lands and increase agricultural productivity of crops like sugarcane.

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