

Regional Diversity of Sustainable Economic Development in Province Punjab of Pakistan

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Received: September 10, 2021

Revised: October 12, 2021

Accepted: December 15, 2021

Abstract: Preservation of long-term economic, social and environmental resources is the cornerstone of sustainable development. Without a fair distribution of resources, sustainable economic development is hardly possible. This study is designed to examine the Sustainable Economic Development scenario in three Zones of Province Punjab Pakistan. For this purpose, Sustainable Economic Development Index (SEDI) using Polychoric Principle Component Analysis was constructed in a view of Sustainable Development Goals (SDGs) 2030 by considering the economic, social and environmental aspects. Primary data of 950 households were collected through a well-structured questionnaire by employing a Multistage Stratified Cluster Sampling Technique from three regions i.e., Central, Southern, and Upper of Punjab. The Descriptive Statistics and ANOVA have been used to make the region's comparison. A significant regional diversity in selected SDGs indicators in Punjab is found. Central Punjab is found to have economically better position but needs more attention in capacity building to combat environmental challenges while Southern Punjab and Upper Punjab are found worse in social and economic aspects. The study provides guidelines to the policy makers in formulating appropriate policies at grass root level for eliminating diversity in sustainable economic development in different regions of Punjab and achieving SDGs speedily.

Keywords: SDGs; Punjab; Sub-Provincial Variation; Multistage Stratified Cluster Sampling

INTRODUCTION

Sustainability is an intra-generational equal efficient and distribution of resources by socio-economic operations within the constraint of the Finite Environment parameters (Stoddart, 2011). The concept of developing and preserving a sustainable economic, ecological, and social framework of human development is used by a variety of researchers, academics, and practitioners in the development literature (Mensah and Enu-Kwesi, 2018). According to Ben-Eli (2015), longevity is a delicate balance of interaction between the population and the environment that allows society to reach its full potential without irreversible negative impacts on the capabilities of its atmosphere. Sustainable practices continue to focus on human activity and their ability to fulfil human needs, and they seek to be

sustainable from this standpoint (Thomas, 2015). This encourages individuals to explore how to make use of ecological resources in their economic and social lives open to human progress.

Global transformation of a sustainable society, ecology, and economy is one of the most difficult problems confronting humanity today (Hák et al. 2016), since it must be accomplished within the limits of the earth's carrying capabilities. The World Bank (2017) advocates for novel methods to reality management. In support of this argument, DESA-UN (2018) contends that the ultimate goal of the sustainability concept is vital to ensuring appropriate social, economic, and environmental peace and balance regarding the regeneration capacity of the life sustaining planet's ecosystems.

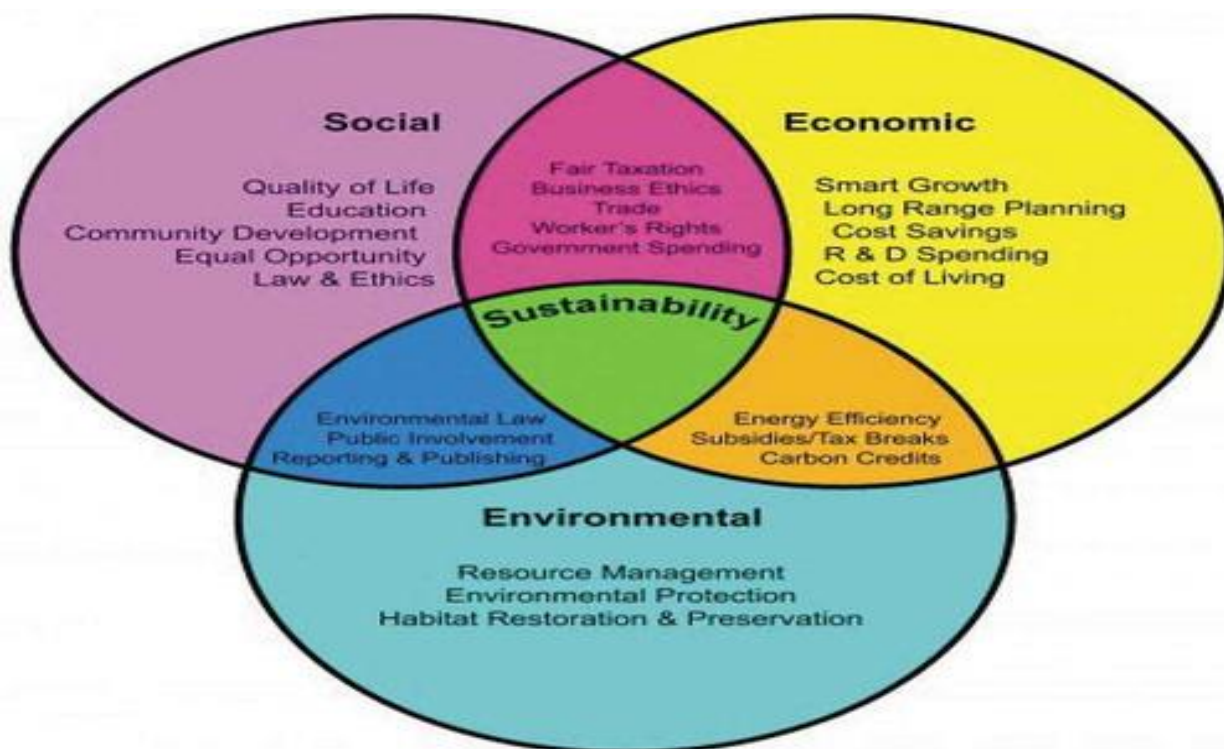
According to Gossling-Goidsmiths (2018), the focus of a meaningful definition of sustainability is a complicated concept. However, as Menschenah and Enu-Kwesi (2018) suggest, the concept of cross-generational equality should be emphasised since, while it is an essential concept, it has limitations in that it does not make it simpler to identify or assess the requirements of future generations. Existing sustainable development approaches are based on this premise, with the goal of prioritising social, environmental, and economic frameworks and combining them in ways that help mankind constantly overcome human issues (Hussain, et al. 2014). Environmental models are primarily concerned with biodiversity and ecological integrity, whereas social models strive, among other things, to improve and attain ongoing dignity and well-being.

According to Cerin (2006) and Abubakar (2017), SD is a central idea in global development politics and agendas. It is a system that enables civilization to engage with the environment without jeopardizing future resources. SD employs resources as a strategy with the hope that (resources) would eventually become available to others for development (Mohieldin, 2017). SD strives for social advancement, environmental sustainability, and economic prosperity (Zhai and Chang, 2019). Ukaga et al. (2011) evaluated the SD's demands, emphasising the need to prohibit harmful social and economic behaviours and participate in beneficial environmental, economic, and social activities. United Nations Conference on Sustainable Development (UNCSD) focused on two themes: green economics and an institutional framework (Allen et al., 2018). The conference's outcome document 'The future we want' was dominated by reaffirmed commitment to SD so much that the word 'sustainable development.' The results of Rio included the development of new SDGs, which were to take effect since 2015 and promote oriented SD initiatives in all sectors of the global development agenda (Weitz, Carlsen, Nilsson & Skånberg, 2017). Sustainability continues to influence the scientific discourse of future development. Figure shows nexus among environmental, economic and social aspects of SD.

United Nations Conference on Sustainable Development (UNCSD) focused on two themes: green economics and an institutional framework (Allen et al., 2018). The conference's outcome document 'The future we want' was dominated by reaffirmed commitment to SD so much that the word 'sustainable development.' The results of Rio included the development of new SDGs, which were to take effect since 2015 and promote oriented SD initiatives in all sectors of the global development agenda (Weitz, Carlsen, Nilsson & Skånberg, 2017)

Sustainability continues to influence the scientific discourse of future development. Figure shows nexus among environmental, economic and social aspects of SD.

Figure 1: Relationships among Social, Environmental and Economic Sustainability



Source: Wanamaker (2018)

The diagram primarily depicts the relationship between the three pillars of sustainable development. Almost every human action has an impact on the environment, the economy, or culture, as well as on people's lives and health. According to Akin, these domains serve as the foundation for human decision-making and action to attain SD, as suggested by Wanamaker (2018). These definitions are linked. Yang (2019) agrees with the assertion that the number finally demonstrates that effective decisions on sustainable resource management will help to the growth of a sustainable society. Examples include land use decisions, surface water management, agriculture, infrastructure, development, resource management, and education.

The direction and development of sustainability may be meticulously tracked in quantitative or qualitative formats utilising indicator sets accessible at the global, national, regional, and local levels. However, measuring the ultimate aim of sustainable development in absolute terms is difficult. As a result, each country or society has its own set of metrics based on a specified framework, measuring degrees of progress toward sustainable development depending on national, regional, or local policies. Progress may be measured by gathering indications that allow strategies to be applied to identify key priorities and focus attention on the route to success.

Evidence of early successes, difficulties, and prospects would aid low- and middle-income countries (LMICs) in achieving sustainable development goals.

Pakistan has only accomplished Goal 13 on climate action while mostly remained major challenge. Pakistan's SDGs global index score is 57.72/100, and its rank is 129/165, which is lower than regional counterparts Bangladesh (109th rank and 63.5 score) and India (60.07 and 120th rank). (SDR, 2021).The achievement in goal 13 has been celebrated by the government, civic society, and ecologically

aware individuals. It is crucial to note, however, that this does not mean Pakistan is no longer vulnerable to climate change. Extreme weather events, as well as slow-onset disasters, are still doing havoc. The excellent outcome does not imply that Pakistan has done enough to combat climate change. There is hardly any study available to analyse regional performance and diversity in SDGs in Pakistan. Present research is conducted to fill the gap. There is also an urgent need for capacity building in order to preserve natural resources. So keeping in view these conditions this study is conducted to provide a detailed picture of each zone of Punjab regarding sustainable development goals to make an in-depth policy formulation in each zone for achievement of SDGs speedily. Furthermore the construction of sustainable economic development index at regional level to gauge the condition at grass root level in view of SDGs is great contribution. Measurement of regional diversity and degree of variability of sustainable development in perspective of geographical distribution Punjab is another important contribution of this study. Regional comparison provide an important insights to ensure sustainability in Punjab (Pakistan) by working on weak areas. Different strategies keeping in view the local condition will help in accelerating the achievement of SDGs.

SOURCES OF DATA AND RESEARCH METHODOLOGY

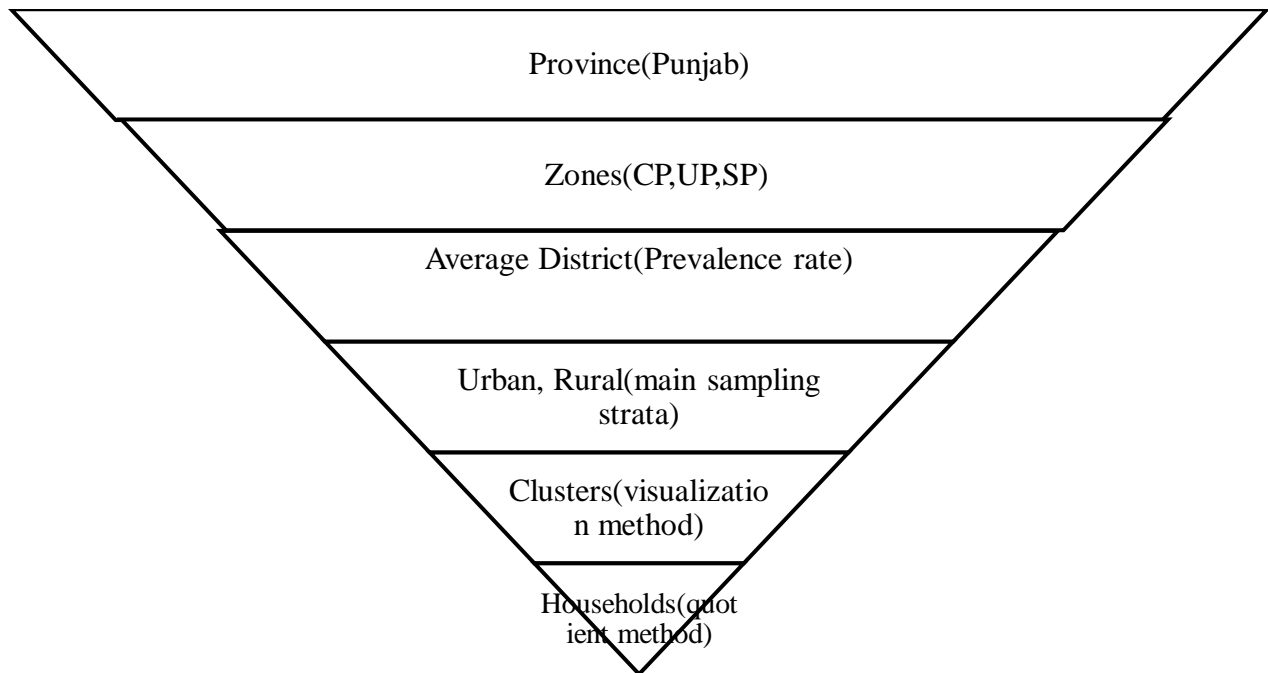
Sources of Data and Sampling Technique

The current study is based on primary data sources. For data collection, a detailed questionnaire was constructed. The Cronbach Alpha value was (0.727) of the questionnaire's. A multistage stratified cluster sampling technique has been employed. Data from three zones of Punjab was collected using this method. An average district from each zone has been selected with the prevalence rate of female literacy rate that is an important constituent of attaining SDGs and sustainability in Pakistan. Bahawalnagar from Southern Punjab, Sheikhpura from Central Punjab and Sargodha from Upper Punjab have been selected. The total sample size of present study is 950 households

$$n = Z^2 \cdot \delta^2 / \epsilon^2 \quad \text{Where } \delta^2 = Q(1-Q) \dots\dots\dots 1$$

P shows prevalence rate of female literacy rate. The number of households from selected regions were kept proportionate to rural urban proportion in each district. Following hierarchy (Figure 2) is followed for data collection.

Fig.2 Hierarchy for data Collection



We recognize that data collection at household level is a problem for a number of SDG indicators, particularly for SDG 9, SDG 10, SDG 12, and SDG 15. Some indicators selected for the present research of SDGs 1,3,6,9 and 13 will not completely provide the SDGs performance of the selected regions but will help a lot in accomplishing all sustainable development goals.

Sampling Frame

The Table 1 below shows the selected clusters from selected regions and sample size of each zone from urban and rural areas.

Table 1: Sample selection criteria of Southern, Central, and Upper Punjab

Region	District	Household	Clusters	P* (%)	z-value
Southern Punjab	Bahawalnagar	Rural	234	59.9	95% (1.96)
		Urban	136		
Central Punjab	Sheikhupura	Rural	160	78.9	95% (1.96)
		Urban	97		
Northern (Upper) Punjab	Sargodha	Rural	203	70.	95% (1.96)
		Urban	120		

P* = Prevalence rate

Description of Variables

Summary of selected variables in current study is gives as follows:

Variables	Description of variables
SEDI	Sustainable Economic Development Index Calculated by social, economic and environmental variables from SDGs using Polychoric Principal Component Analysis
PCI	Per capita income of household Income of household from all sources _____Rs./ Total number of people in your house _____
PHW	Place of hand-washing with soap and water = 1 if yes or = 0 if not
ADLVRY	Who assisted in delivery (i) Doctor (ii) Nurse/ Midwife (iii).LHV (iv) Lady Health Worker (v) Daai
LWRDW	Do you leave water running while dish washing by hand? = 1 if no or = 0 if Yes
HPBGS	Do you consider use of plastic bags is harmful for environment? = 1 if yes or = 0 if not
RENG	Do you try to reduce energy consumption at home? = 1 if yes or = 0 if not
KTFC	What kind of toilet facility do members of your household usually use? (i) flush (septic tank/ sewerage) (ii) open place (iii) compositing toilet
SANT	How many households in total use this toilet facility? (i) Less than 10 (ii) More than 10
HMOB	Does your household has mobile phone? = 1 if yes or = 0 if not Household has facility of mobile

Construction of the Sustainable Economic Development Index

According to the latest research, conventional PCA does not produce meaningful findings on ordinary data. Implications arise when the observed discrete-character variables are explicitly employed in normal PCA. The conventional PCA implies that the variable is normally distributed, implying that continuous data works best. Because the data in this situation contains ordinal variables, the Pearson correlation coefficient is insufficient. This assumption has been violated. Filmer and Pritchett (2001) proposed an approach for incorporating discrete data into PCA. Categorical variables are said to be split into a collection of dumb variables. The use of PCA dummy variables, on the other hand, results in spurious correlations, the loss of all ordinary data, favours the covariance structure, and lowers the proportion of explicit variances (Kolenikov and Angeles 2004, 2009). Kolenikov and Angeles, 2009) recently discovered a method for incorporating categorical variables into PCA using Polychoric Correlations. They find that this strategy is more trustworthy than others in terms of the proportion of explained variation. As a result, if the proportion of explicit variance is critical for study, Polychoric PCA should

be employed. Polychoric associations, like in the case of Likert papers (Basto and Pereira 2012), are to be employed in the handling of ordinal data or in the presence of significant biases or kurtosis, according to studies. Polychoric PCA is computationally intensive; nevertheless, the proportion of variance explained is computed consistently, whereas others offer downward-scaling approximations (Gannon and Roberts 2014). We choose Polychoric PCA since the variables in our current study are ordinal categorical in nature based on Polychoric correlations, as proposed by Kolenikov and Angeles (2009). These are computed with maximum probability, assuming that the latent variables at the core of the ordinary category data are normally distributed.

Before evaluating the PPCA findings, the Kaiser-Meyer-Olkin (KMO), sample adequacy measure, and Bartlett's Sphericity test were employed to ensure the validity of this analysis in this study sample. The following table-3 shows a Kaiser Meyer-Olkin (KMO) sampling adequacy measurement value of 0.637, indicating that the sample size of this study is adequate for the Polychoric Principal Components Review. The Bartlett's Test of Sphericity determines if an identity matrix is the correlation matrix of the variables in question. In Bartlett's Test of Sphericity, the values of chi-square statistics are also statistically significant. This validates the inter-correlation of the SED-relevant variables. As a result, the PPCA is an excellent approach for assessing the significance of the factors chosen to measure the sustainable economic development in Punjab.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.637
Bartlett's Test of Sphericity	Chi-Squares	96.839
	Df.	28
	Sig.	0.000

The detailed findings of the Polychoric Principal Component Analysis show the variation described by the components after extraction and after rotation in the initial situation. Three key components for all the research areas were considered in this study. The Polychoric key component describes that in Central Punjab 64 percent variation while Sargodha and Bahawalnagar account for 64 percent and 66 percent difference in the three components altogether.

Table 4: Overall Variation in Sustainable Development Metrics Clarified at District Level by the Components

Extraction Method: Polychoric Principal Component Analysis					
		Variance	Proportion	Cumulative	Rho
Central Punjab	Comp 1	1.911	0.238	0.239	0.634
	Comp 2	1.618	0.202	0.441	
	Comp 3	1.544	0.193	0.634	
Upper Punjab	Comp 1	1.778	0.222	0.222	0.633
	Comp 2	1.709	0.214	0.436	
	Comp 3	1.573	0.197	0.633	
Southern Punjab	Comp 1	1.936	0.242	0.242	0.654
	Comp 2	1.678	0.210	0.452	
	Comp 3	1.615	0.202	0.654	

So SED is constructed with the weighted sum of component scores. Scores for each component were calculated by multiplying the variables with appropriate weights obtained through PPCA. We can see weight are shown in Table 5. Following variables are selected are per capita income, availability of hand-washing facility with soap and water, sanitation facilities, availability of mobile phone, assistance at the time of delivery, environmental awareness regarding conservation of water, use of plastic bags and efficient use of energy.

Table 5: Weights of selected SDGs Indicators through Polychoric Principle Component Analysis

Variables	Weights		
	UP	SP	CP
PHW	0.268	0.322	0.415
HPBGS	0.521	0.501	0.403
RENG	0.523	0.565	0.429
LPCI	0.414	0.361	0.397
ADLVRY	0.433	0.130	0.476
HMOB	0.392	0.418	0.392
SANT	0.339	0.419	0.507
LWTR	0.430	0.379	0.458

RESULTS AND DISCUSSION

Failure to develop infrastructure and to foster technological innovation might result in substandard health care, poor sanitation, and restricted educational opportunities. This situation will create difficulties in eradicating poverty and endorsing sustainable development. The right to water and sanitation is considered vital in order to realise all other human rights. Brown et al., (2016). However, 2.1 billion people worldwide lack access to safe drinking water at home, 2.3 billion lack basic sanitation, and 1 billion practice open defecation (WHO/UNICEF, 2015). Due to their demands during periods of increased sensitivity to infection surrounding menstruation and reproduction, women and girls are disproportionately affected by a lack of basic water, sanitation, and hygiene services. Women and girls also have a larger part in water, sanitation, and hygiene practices, as well as agriculture and household duties, as compared to males. Gender equality is a problem in this situation. Water, sanitation, and hygiene (SDG 6) are a crucial first step, with an emphasis on equitable sanitation and hygiene, as well as women's and girls' needs. Table 6 shows the percentage distribution of houses having soap and water hand-washing facilities. In the Punjab 950 research sample, 89.26% of respondent women had access to hand-washing facilities. Hand washing facilities with soap and water are available in 88.9% of sample houses in Punjab's Southern area. In Central Punjab, however, 93.8 percent of families have access to this service. In Upper Punjab, 86.1 percent of families have access to soap and water for hand-washing.

Table 6: Descriptive statistics of selected SDGs indicators in Southern, Central and Upper Punjab

Selected SDGs indicators	Southern Punjab (%)	Central Punjab (%)	Upper Punjab (%)	Total
Facility with soap and water				
Yes	329(88.9)	241(93.77)	278(86.07)	848(89.26)
No	41(11.01)	16(6.23)	45(13.93)	102(10.74)
Sanitation Facility				
More than 10	109(29.3)	50(19.46)	60(18.58)	219(23.05)
Less than 10	261(70.2)	207(80.54)	263(81.42)	731(76.94)
Plastic bags are harmful				
Yes	256(69.4)	199(77.43)	272(84.21)	729(76.74)
No	112(30.1)	58(22.57)	51(15.79)	221(23.26)
Women energy conservation behavior				
Yes	346 (93.51)	248 (96.50)	298(92.26)	892(93.90)
No	24 (6.49)	9 (3.50)	25(7.74)	58(6.10)
Water Preservation behavior				
Yes	253(68.38)	80(31.13)	252(78.02)	585(61.58)
No	117(31.62)	177(68.87)	71(21.98)	365(38.42)
Delivery method				

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Midwife (Daai)	86(23.24)	29(11.28)	73(22.60)	188(19.79)
Lady health worker	34(9.19)	17(6.61)	2(0.62)	53(5.58)
LHV	60(16.22)	14(5.45)	61(18.89)	135(14.21)
Nurse/midwife	50(13.51)	37(14.00)	62(19.20)	149(15.68)
Doctor	140(37.84)	160(62.26)	125(38.70)	425(44.74)
Does your household has mobile				
Yes	351(94.86)	242(93.77)	315(97.52)	908(95.58)
No	19(5.14)	15(6.23)	8(2.48)	42(4.42)
Does your household has internet				
Yes (%)	144(38.92)	134(52.14)	152(47.06)	430(45.26)
No (%)	226(61.08)	123(47.86)	171(52.94)	520(54.74)
Total	370	257	323	950

Source: Author's own calculations

SDG6 focuses on providing universal access to clean water and sanitation, as well as long-term management. By 2030, all people will have access to appropriate and equitable sanitation and hygiene facilities, and open defecation will be abolished, with a special focus on the needs of women and girls, as well as those in vulnerable positions, according to indicator 6.2.

Indicator 6.2.1 demonstrates various social and economic benefits of investing in sanitation. WHO and UNICEF custodian to watch the performance of this indicator. Primary data or primary information of households is crucial to show the actual situation of facility that people use at their premises. "No sanitation facility" means if the toilet is shared by more than 10 people, and "presence of sanitation facility" if the toilet is shared by less than 10 people.

The Table 6 depicts that in a given sample of 370 in Southern Punjab, 70.2% sample households have sanitation facility, while 29.3% sample households still have not safely managed sanitation services. In Central Punjab, 80.54% sample households have, while 19.46% sample households have not safely managed sanitation services. The third column expresses the situation in Upper Punjab 81.42% sample households have, while 18.58% sample households have not safely managed sanitation services in their households.

Taking the time to participate in local conservation initiatives is a fantastic approach to help against climate change (Few & Tompkins, 2007). Not only do women constitute the majority of Pakistan's population, but they also educate future generations. The questions about environmental concerns in order to test the sustainability awareness of sample respondents awareness, the Table 6 also shows the opinion of women regarding use of plastic bags, whether use of the plastic bags are harmful for the environment or not? The responses are measured in binary form. In Southern Punjab, 69 %, in central regions 77% and in northern region 84% sample respondents are of the opinion that use of plastic bags is not environmental friendly. Findings revealed that women's environmental knowledge in Punjab has to be enhanced in order to combat climate challenges.

Women's energy conservation behaviour is exhibited when they strive to minimize energy use at home (Yang et al. 2012). Only 6.10 percent of female respondents do not strive to minimize energy usage at home, whereas the majority of females (93.51 percent) do. The sample respondents deliberately behave in terms of energy use, although the situation in Central Punjab is considerably better. 93.51 percent of women in Southern Punjab, 96.50 percent of women in Central Punjab, and 92.26 percent of women in Upper Punjab attempt to minimize their energy usage.

Inappropriate management of fresh water resources creates obstacles for sustainability (Karthé et al. 2015). As reducing water consumption is necessary for sustainable economic development. In this regard current study examined that whether sample respondents attempt to prevent wasting water while doing various household activities. Approximately 40 percent women do not intentionally make effort to save water while performing different household chores.

According to the data, just 31% of women in Central Punjab avoid wasting water, compared to 68.38% in Southern and 78 percent in Upper Punjab. The situation in central Punjab is quite bleak. It gives a pretty gloomy image. To minimize future water scarcity issues, capacity training about effective use of fresh water resources is critical at the household level, particularly in central Punjab.

In poor nations, women are also confronted with a slew of socio-cultural issues that wreak havoc on their physical well-being and access to proper health care. Institutional, economic, and educational barriers impact and reduce their level of living when compared to their male counterparts. All residents across the globe should have access to health care, but this is not yet the case in many industrialized nations, particularly in rural regions. Furthermore, in underdeveloped nations like Pakistan, where gender-biased societal conventions still persist, women find it difficult to access health care unless the treatments provided are culturally appropriate. SDG3 is "assure that all people of all ages enjoy healthy lives and promote well-being. To achieve this objective, the global maternal death rate must be reduced to less than 70 per 100,000 live births. The scenario of indicator 3.1.2 i.e. proportion of live births attended by skilled health personnel is analyzed in upper, central and southern Punjab.

By 2030, the world's goal is to reduce maternal mortality to fewer than 70 per 100,000 live births. It is critical that trained medical staff attend all deliveries. The first column shows the many types of skilled health workers (MICS, 2014). The situation in Southern Punjab is depicted in the second column. The third column depicts the replies of the respondents, while the fourth column depicts the situation in Central and Upper Punjab. The last column depicts the general status of Punjab in terms of competent attendants at the time of delivery. Only 44.74 percent of the 950 women in the study have live deliveries attended by doctors. The births of 15.68 percent of the sample respondents are attended by a nurse/midwife. The LHV attend 14.21 percent of deliveries, whereas Daai attends 19.79 percent of births of sample women, which is not always a secure source. Doctors attend 62.26 percent of sample women's live deliveries, 14.40 percent by nurse/midwife, 5.45 percent LHV, 6.61 percent Lady Health Worker (LHW), and 11.28 percent by Daai in Central Punjab. In Upper Punjab, 38.70 percent of sample women used a doctor during their birth, compared to 15.68 percent who used a nurse/midwife, 14.21 percent who used an LHV, 5.58 percent who used a Lady Health Worker, and 19.79 percent who used a Daai.

The household economic position is measured by per capita income of households. The data reveals the detailed picture of households have different income categories. (Table 2 in appendix). In comparison to Southern and Upper Punjab, households in Central Punjab have a higher income level. A better

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economic position in central regions, but a lack of environmental expertise, makes it necessary to examine SDGS indicators at the regional level in order to attain sustainability.

SDG9 is build reliable infrastructure, promote inclusive and sustainable industrialization, and promote innovation. Economic and social development and climate actions also heavily depends on technological progress, sustainable industrial development and developed infrastructure. The GOAL 9C significantly emphasizes on increasing the access to information and communication technology and universal and affordable access to internet in least developed countries by 2020.the situation of indicator 9c1 in Punjab (Pakistan) depicts that 96% households in Punjab (95% in SP, 94%CP and 98% UP) have availability of mobile phones but regarding availability of internet situation is not encouraging

Failure to develop infrastructure and foster technological innovation might result in substandard health care, poor sanitation, and restricted educational opportunities. This situation will create difficulties in eradicating poverty and endorsing sustainable development.

The use of technology is essential for economic innovation and progress(Yakovleva et al., 2015). The internet is a valuable resource for building a knowledge-based economy and has a beneficial impact on SED. While access to information and communication facilities are mentioned in the home communication facilities. In Punjab, 94.9 percent of households have access to a cell phone. In Punjab, 51.4 percent of the respondent households have internet facilities available (Table 6). The internet provides an opportunity for many women to work from their homes. Just through dealing with clients over the internet are many business women making millions. Most women have developed Facebook pages to sell their handmade jewelry, clothing or food products, etc. It gives the ability for them to benefit for themselves. The availability of internet facility and digital market trainings would contribute a lot in eradicating poverty.

In Southern Punjab, 38.92 percent of homes have access to internet, compared to 52.14 percent in Central Punjab and 47.06 percent in Northern Punjab.

Furthermore analysis of variance has been used to further test that there exists significant difference among the regions of Punjab regarding sustainable economic development. Statistically significant results confirms the diversity in Upper, Central and Southern Punjab.

Table 7:ANOVA results for measuring regional diversity in sustainable economic development

Response	Df	SSQ	MSQ	F statistics	Pr>F
SUSTAINABLE ECONOMIC DEVELOPMENT INDEX					
Region	2	35.48	17.741	26.455	6.614e-12 ***
Residuals	946	634.38	0.6706		
SSQ = Sum of square		df = Degree of freedom			
MSQ = Mean square		FV = F value		Pr = Probability	

0***

CONCLUSION AND POLICY IMPLICATIONS

One of the most difficult problems people face today is transformation of a sustainable society, environment, and economy on a global scale. Sustainable development is a central idea in the politics and agenda of global development. It's a way for civilization to engage with the environment without jeopardizing future resources. Progress may be measured by gathering indicators which can be used to build strategies for identifying key issues at regional levels and focusing attention on the route to attaining future sustainable development goals. Across various sustainable development goals in the country, there is significant regional diversity, demonstrating the necessity of addressing regional variation in addition to national variation. In addition to national measures, our execution demonstrates the need of subnational reporting on sustainable development goals.

The SDGs are working right now to make the correct decision for future generations to have a better life in a sustainable way, in the spirit of teamwork and pragmatism. They provide particular recommendations and plans for each country to address its very own priorities as well as global environmental issues. Pakistan has only accomplished Goal 13 out of seventeen proposed sustainable development objectives by 2030, with the rest being a major challenge. Measuring progress using a well-defined set of indicators and an optimization approach was critical in determining the levels of achievement at regional level.

Present study collected the data of 950 households by employing multistage stratified cluster sampling technique in Upper, Central and Southern Punjab. Polychoric Principal Component Analysis has been used to develop the sustainable economic development index. Detailed descriptive statistics, as well as an analysis of variance, were utilized to quantify subnational variation in a number of indicators of long-term economic development. In comparison to Central Punjab, Southern Punjab and Upper Punjab demand more focus in terms of socioeconomic and infrastructure development, whereas Central Punjab requires special attention in terms of developing capacity to combat climate change.

Various diseases occur due to absence of WASH. In comparison to other regions, Southern Punjab requires greater attention in Sustainable Development Goal 6. The aim of homes having a hand-washing facility with soap and water has almost been met. In Upper Punjab, 14 percent of houses still lack place of hand washing with soap and water, necessitating further vigilance. Failure to develop infrastructure and to foster technological innovation might result in substandard health care, poor sanitation, and restricted educational opportunities. Ending poverty will become difficult. To accomplish the goal of excellent health and well-being, the government should pay heed to supplying and motivating people to utilize trained and better medical resource at the time of delivery especially in southern and northern parts of Punjab. In this context, the Punjab Health Care Commission's anti-quackery measures should be effectively integrated.

Taking the time to get involved in conservation efforts in your area is a great way you can help fight climate change for especially in CP. Ignoring women's contributions to resource management can exacerbate disparities and complaints over natural resource rights, access, and control, which have been proved to be potent triggers for violence. Women's capacity building is especially important for water conservation and environmental awareness in Punjab's central regions. Academic institutions and active citizenship services can help with all of this.

The internet is a valuable tool for establishing a knowledge-based economy, learning digital marketing skills and online business. All regions of Punjab especially southern and northern parts needs special attention in this regard.

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At the length it may be convenient to say that the task of achieving SDGs is not an easy task rather it requires monitoring at regional level .Due to a paucity of time and resources, the research was limited to Punjab and a few key indicators from Goals 3, 6, 9, and 13. Researchers might also look for subnational variance in other SDGs and other provinces to help speed up accomplishment of SDGs.

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APPENDIX

Table: 1 Rotated Component Matrix of Sustainable Development Index

Variable	Central Punjab			Southern Punjab			Northern Punjab		
	Comp1	Comp2	Comp3	Comp1	Comp2	Comp3	Comp1	Comp2	Comp3
PHW	0.574	0.094	0.023	0.357	0.179	0.203	0.279	0.168	0.409
HPBGS	0.087	-0.173	0.501	0.694	-0.116	-0.110	-0.088	0.648	-0.063
EFENG	0.593	-0.312	-0.003	-0.075	0.038	0.656	-0.068	-0.023	0.718
LPCI	-0.047	0.281	0.493	0.175	0.541	-0.169	0.502	0.035	-0.039
ADLVRY	0.089	0.606	0.202	-0.085	0.566	0.024	0.027	-0.027	0.2166
HMOB	0.541	0.278	-0.066	0.549	0.169	0.128	0.034	0.542	0.363
SANT	-0.054	-0.021	0.630	-0.154	0.423	0.426	0.583	-0.121	-0.005
WTRCB	-0.079	0.583	-0.251	0.148	-0.365	0.539	0.057	0.491	-0.419

Source: Author' Calculation

2. Distribution of Households according to the Total income of Household Southern Punjab, Central Punjab and Upper Punjab

Income	Southern Punjab (%)	Central Punjab (%)	Upper Punjab (%)	Total
1-5000	8 2.16	10 3.91	10 3.10	28 2.95
5001-10000	85 22.97	16 6.25	35 10.84	136 14.32
10001-15000	67 18.11	31 12.11	43 13.31	141 14.84
15001-20000	82 22.16	43 16.80	68 21.05	193 20.32
20001-25000	21 5.68	18 7.03	26 8.05	65 6.84
25001-30000	37 10.00	32 12.50	30 9.29	99 10.42
30001-35000	6 1.62	7 2.73	7 2.17	20 2.10
35001-40000	21 5.68	27 10.55	18 5.57	66 6.95

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40001-45000	3 0.81	5 1.95	5 1.55	13 1.37
45001-50000	17 4.59	30 11.72	33 10.22	80 8.42
50001-60000	6 1.62	2 0.78	12 3.72	20 2.10
60001-70000	3 0.81	7 2.73	10 3.10	20 2.21
70001-80000	5 1.35	8 3.13	2 0.62	15 1.58
80001-90000	2 0.54	4 1.56	7 2.17	13 1.37
90001-100000	4 1.08	5 1.95	11 3.41	20 2.10
Greater than 100000	3 0.81	12 4.67	6 1.86	21 2.21
Total	370	257	323	950

Source: Author's own calculations