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IMPACT OF CLIMATE CHANGE ON AGRICULTURE AND RURAL WOMEN LIVELIHOOD IN SINDH, PAKISTAN.

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ABSTRACT

Women plays a vital role in every sphere of life with their men in society but a debate about gender is always remain under solved globally. However, women faces obstacles in case of climate change i.e feeding their families, letting of natural resources and main factor is limited knowledge. Climate disaster like flood puts a great pressure while they are fulfilling their responsibilities. The main objective of my research was to find out the perception of women regarding their livelihood options and their capacities to overcome climate change. So priority to minimize their vulnerability to adopt a variety of options. My research area was southern Punjab, Pakistan and Sindh district, it was selected the area was badly affected from flood. Owing to his women are more vulnerable in agriculture and livestock sector by climate changes. As a result, in Pakistan women has more affected by climate disaster then men. Climate disaster threatens the women livelihood in different ways I.e her frequency of flooding, sudden and long term flooding. However, women are facing extreme poverty due to loss of income and damaging crops. The result of this climate disaster is that vulnerability was growing day by day with alarming situation on agriculture and live stock sector. The impact of current flooding situation is imposing a ramification on these sectors directly or indirectly. Finally, it was clear from all these disasters that adaptation are more necessarily and urgently needed for the reducing women vulnerability. The result of my research was highlighted to understand a diverse impact of climate changes on women livelihood and vulnerability.

INTRODUCTION

Rural women play a pivotal roles in the eliminate the poverty and over come the starving and hunger situation. Practitioners and scholars was recognized the

effort of the rural women. The labour force has been admitted and acknowledge that women serve a critical role in the rural development, agricultural and livestock and subsistence farming in Punjab Pakistan, yet their central role in food security has been largely ignored, particularly in policy. Linked to this role is the challenge of dealing with rapidly changing climatic conditions. Women assume primary responsibility in fetching water and wood for meal preparation, and in tilling the ground. They are among the most vulnerable groups to climate change as a result of their precarious environmental livelihoods (Meyiwa,2014).

Climate change contributes to women s hardships because of the conjunction of the feminization of poverty and environmental degradation caused by climate change. Using data from a workshop with rural women to discuss climate change and qualitative interviews with rural women in selected rural communities in the selected sample area districts Sindh, Pakistan we explore the meaning, perceptions and attitude to adaptation regarding climate change (GLAZEBROOK, T. 2011).

The data show that the extreme weather events on women subsistence farmers and argue that women have knowledge to contribute to adaptation efforts. We report on the way climate change is understood, its effects on rural livelihoods and some responses to climate change problems experienced by the women in the rural communities. The women in the rural communities highlight that there are also social problems health, shelter, food and nutrition as well arisen from ground and surface water scarcity (Meyiwa,2014).

The agriculture and farmer communities has been challenged and threat of climate changes globally. The heat wave, whether pattern, summer and winter as well as monsoon rainfalls was a great shocks for agriculture and livestock sectors. To some extent some studies reveals that agriculture sector is responsible for climate change due to GHG. Climate change is also threatening Pakistan agriculture growth with frequent dry spell, heat waves, cold wave, erratic rainfalls, drought and floods. Besides, the changing rainfall patterns in the form of delayed onset or early withdrawal has adversely affected the cropping cycle and farm operations.
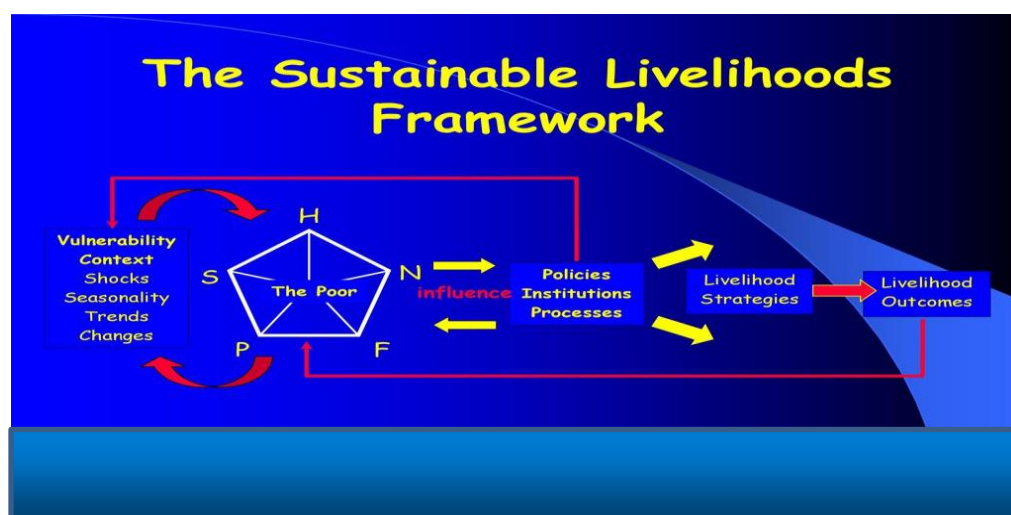
### *Agriculture Affecting Climate*

Greenhouse Gases

Agriculture was also effected climate in various ways, first way is farming, particularly,farming was release a specific amount of powerful gases which were methane and nitro oxide. These gases produces from preserved macro and waste in the landfills. The main source of the methane produced was livestock and its 44% emissions from the livestock. Almost 53% of the nitro oxide indirectly produce by the organic and minerals nitrogen polluted water which is very dangerous for aquatic ecosystem. Monoculture practices mean single crop cultivating is only responsible for climate changes and increase food security. Mainly, agriculture sector needs a suitable soil, water, heat and sunlight to grow the crops. On the other hands, the unavailability of water hampered the activity of crops badly. However, anthropologist activities like urbanization, industrialization, deforestation etc was the major causes of the emissions green house gases and it's a result of faster the climate changes. Studies significantly shows 95% varies in CO_2 due to human activities and population growth increasing three times more last seventy years. Climate change affecting crops yield and pest attacks.
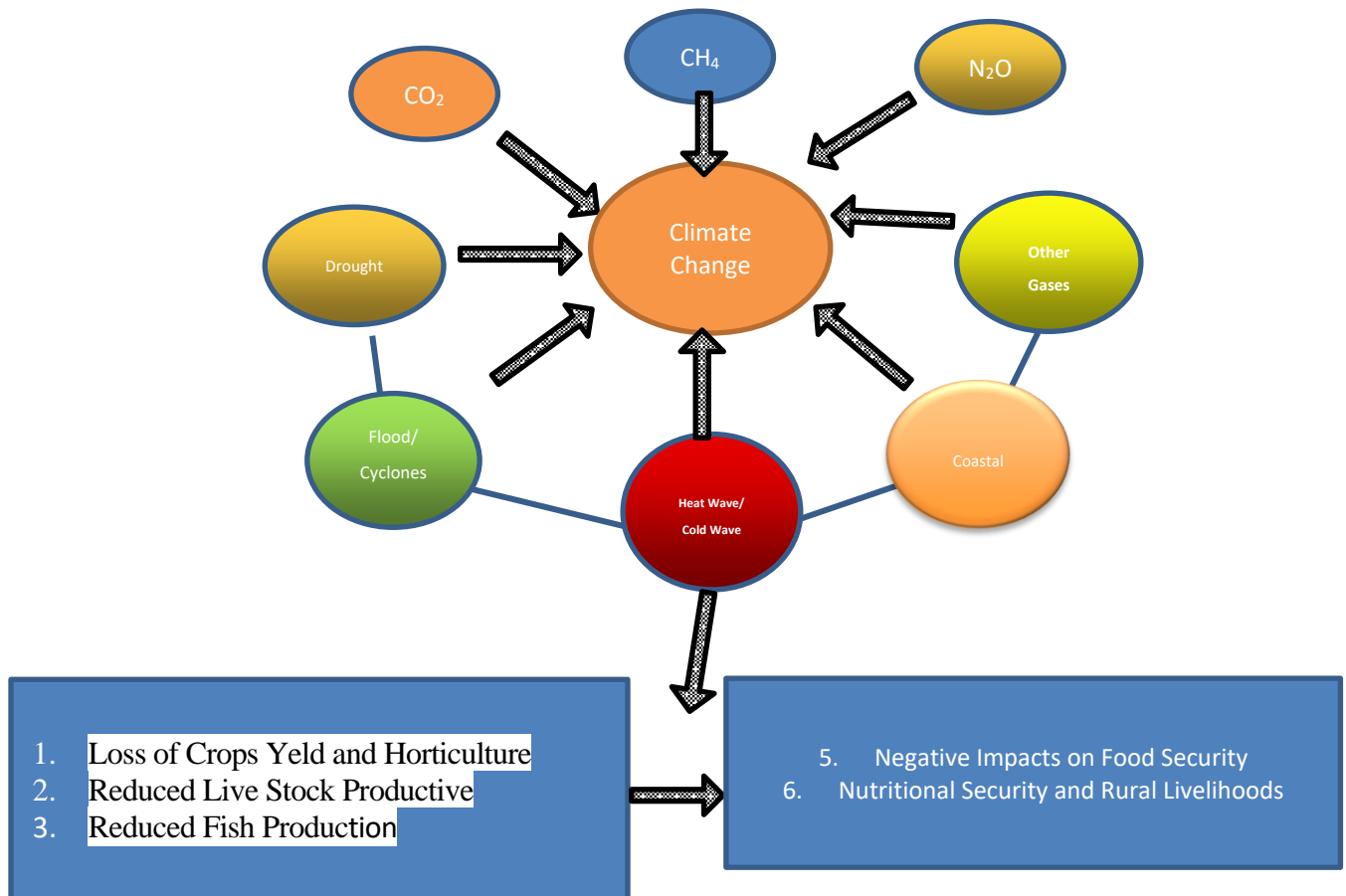
In this framework the different aspects i.e drought, flood, cyclones, heatwave, cold wave, smog, coastal and gases which causing to climate changes however,

climate directly affected the agriculture and livestock. The data significant shows that low productivity Increase anthropogenis activities such as industrialization, urbanization, deforestation etc leads to emission of greenhouse gases owing to which the rate of climate change is much faster. A study concluded that 95% increase in CO2 is because of human activities. In the last 70 yeas, population all over the world has increase 3 times (Kellogg,2019) (Knapp,1996) (Crutzen,1974) (Zhang,2013) (Pongratz,2009) (Brierley,2009) (Srinivasan, 2008).

The long term climate risk index (CRI) Pakistan was 7th the most affected country from 1997 to 2016 in the world. With Rapid growth of population and need to enhance food production, one has to address the challenge of meeting the growing demand for food production while controlling and reducing the GHG emission from agriculture.
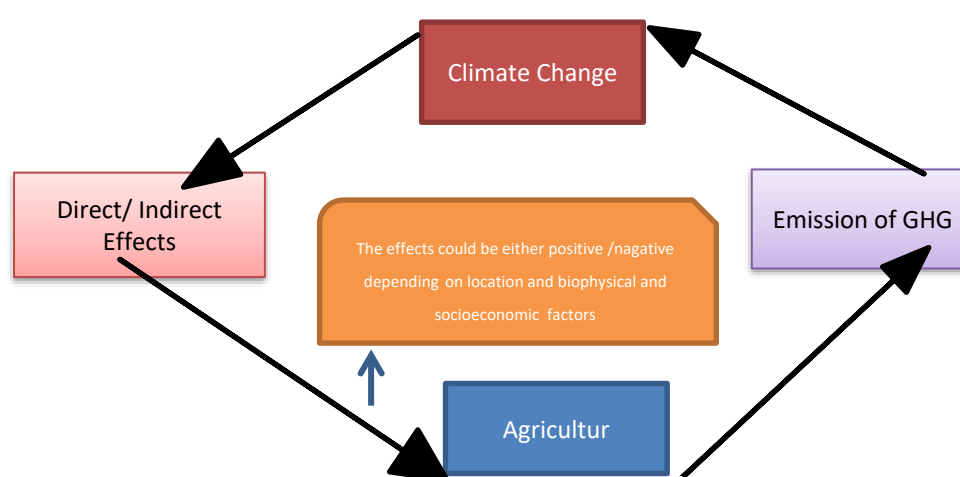
Climate change is one of the greatest global challenges of the twenty-first century. Its impacts vary among regions, generations, age, classes, income groups, and gender. Based on the findings of the Intergovernmental Panel on Climate Change (IPCC), it is evident that people who are already most vulnerable and marginalized will also experience the greatest impacts. The poor, primarily in developing countries, are expected to be disproportionately affected and consequently in the greatest need of adaptation strategies in the face of climate variability and change. Both women and men working in natural resource sectors, such as agriculture, are likely to be affected (ILO, 2008).

However, the impact of climate change on gender is not the same. Women are increasingly being seen as more vulnerable than men to the impacts of climate change, mainly because they represent the majority of the world's poor and are proportionally more dependent on threatened natural resources. The difference between men and women can also be seen in their differential roles, responsibilities, decision making, access to land and natural resources, opportunities and needs, which are held by both sexes (Osman-Elasha, 2008). Worldwide, women have less access than men to resources such as land, credit, agricultural inputs, decision-making structures, technology, training and

extension services that would enhance their capacity to adapt to climate change (Aguilar, L., 2008).

"Climate impacts, especially extreme weather events, are affecting the roles of women and men around the world, particularly in rural areas," The impact of climate change has a significantly on rural livelihood. It ia s continue process which great impact on environment directly affected universal livelihood. Last 3 decade the situation were very alarming, Presently, the ramification of the climate on social economic and environmental. So the environmental causes so many harmful effects on the human even all sphere of society. Climate change on rural livelihood becoming the bigger threaten and devastating in the 21st century. This burning issues have a large scale of crisis, massive lost the crops , displaced communities , there livestock last few years.

According to national and international environmental scientists , Pakistan is consider the most affected country among the developing country owing to climate changes. In future climate changes will be hit hard by Pakistan among 20 countries. These climate changes increase in temperature, heat wave, melting glaciers, food security issues, water security even increase in migration. However, theses changes causes a domino effect which would eventually affected regional security issue for national as well as political issue. Climate change is happening due to global warming. Unfortunately , a myth regarding the climate and environment. Where as, environmental pollution is a water, air, land and plastic pollution are different from climate changes.

The Paris Agreement was adopted by more than 170 countries in 2015. The aim of this agreement is to constrain global warming to levels well below 2°C or even 1.5°C compared with per-industrial levels (UNFCCC, 2015; Rogelj et al., 2019). Under this agreement, many global regions have proposed specific targets for greenhouse gas (GHG) mitigation and stricter environmental polices (Liobikiene and Butkus, 2017; Sobrinho et al., 2020; Zhou et al., 2021). However, there is still a significant gap in achieving these climate targets. According to Emission Gap Report 2020, the world is still heading for a temperature rise in excess of 3°C by the end of the twenty-first century.

Countries Most Affected in the Period 1999–2018 Puerto Rico, Myanmar and Haiti have been identified as the most affected countries 57 in this twenty-year period. They are followed by the Philippines, Pakistan and Vietnam.The results significant shows the ten most affected countries in the last two decades with their average weighted ranking (CRI) climate rate index in Pakistan was ranked seventh which means country is most effected from 1997 to 2017 globally. The alarming situation of population growth and the need of food production increased with the population day by day. To meet and overcoming these challenges it is necessary to control the emissions of Gits which reducing the risk to save the agriculture.

Mali, a country where half of the population engaged in agriculture are female, agriculture is a key sector to lift women out of poverty. But the increasing degradation of land and natural resources caused by climate change is making women more vulnerable.

In addition, adapting to climate change can result in opportunities for women to access more resources and participate in decision-making due to shifting gender norms, which is why taking a gender-responsive approach to developing climate policy is crucial.

Women's vulnerability to climate change stems from a number of factors -- social, economic and cultural. Seventy per cent of the 1.3 billion people living in conditions of poverty are women. In urban areas, 40 per cent of the poorest households are headed by women. Women predominate in the world's food production (50-80 per cent), but they own less than 10 per cent of the land.

Women represent a high percentage of poor communities that are highly dependent on local natural resources for their livelihood, particularly in rural areas where they shoulder the major responsibility for household water supply and energy for cooking and heating, as well as for food security. In the Near East, women contribute up to 50 per cent of the agricultural workforce. They are mainly responsible for the more time-consuming and labour-intensive tasks that are carried out manually or with the use of simple tools. In Latin America and the Caribbean, the rural population has been decreasing in recent decades. Women are mainly engaged in subsistence farming, particularly horticulture, poultry and raising small livestock for home consumption.

Women have limited access to and control of environmental goods and services; they have negligible participation in decision-making, and are not involved in the distribution of environment management benefits. Consequently, women are less able to confront climate change.

REVIEW OF LITERATURE
Pakistan is developing country and 6th most largest populated country and its GDP depends on agriculture. Therefore, people do not have the resource to protect themselves from the impact of climate change.The northern areas of Pakistan, Gilgit-Baltistan and the Chitral region, have more than 7200 glaciers. Their length expand more than 60 miles. Theses glaciers are also facing the effects of global warming which is why they are melting fast. Now when they melt, they form lakes as the water starts collecting and when this water travels southward, this outburst brings a lot of debris and boulders and causes massive destruction to development and causes massive destruction to development infrastructure, roads bridges, etc. These disasters are called GLOF (Glacial Lake Outburst Floods) so, these GLOF (Glacial Lake Outburst Floods) are very intensive floods which can destroy entire village.They are melting due to rise in the global temperature.s

Zhongming, 2020 reveals that 25 mega cities produce 52%of the GHG emissions. The carbon level were same past eight thousand years ago i.e 415 parts per million in the atmosphere. We can say that 0.04 % of the atmosphere is carbon dioxide whereas before it was 0.03%. The human evolution came into existence around 2-4 million year ago, CO2 level did not get so high as to how much however, the CO2 levels will be increasing in the upcoming 100 years.Unfortunately, there was a lack of interest the Govt and researchers did

not observe that the CO2 are so high and what will be its consequences on human and planet earth.

Eckstein, (2017). Global climate risk index 2018 Most of the affected countries in the Bottom 10 of the long-term index have a high ranking due to exceptional catastrophes. Over the last few years another category of countries has been gaining relevance: Countries like Haiti, the Philippines and Pakistan that are recurrently affected by catastrophes continuously rank among the most affected countries both in the long term index and regularly in the index for the respective year.

 Rena, Ravinder and N. Narayana (2007) indicated that during extreme weather such as droughts and floods, women tend to work more to secure household livelihoods. This will leave less time for women to access training and education, develop skills or earn income. In Africa, female illiteracy rates were over 55 per cent in 2000, compared to 41 per cent for men. When coupled with inaccessibility to resources and decision-making processes, limited mobility places women where they are disproportionately affected by climate change.

Davis, I. et. al. (2005). reveals that many societies, sociolect-cultural norms and childcare responsibilities prevent women from migrating or seeking refuge in other places or working when a disaster hits. Such a situation is likely to put more burden on women, such as travelling longer to get drinking water and wood for fuel. Women, in many developing countries suffer gender inequalities with respect to human rights, political and economic status, land ownership, housing conditions, exposure to violence, education and health. Climate change will be an added stressor that will aggravate women's vulnerability. It is widely known that during conflict, women face heightened domestic violence, sexual intimidation, human trafficking and rape.

Daddy, .1. (2002) depict that global warming is the most serious environmental issue of the twenty first century. As a result of climate change, women have seen their workload increase in many activities which have traditionally been women's responsibilities. In times of climate disasters. like floods and a lot of pressure is put on women whose responsibility is still that of keeping families together and feeding them. Up until now, a gender perspective has been mainly lacking from the international debate on climate change. But the different ways in which women and men treat the environment and are affected by its changes must be taken into account in order for effective and sustainable climate change programmes.

IPCC (2007) report focused on Women and Climate Change in Pakistan

 Problem statement

Most of the researches reveals that in rural society women have unequal position owing to limited access to land , food and financial resources. The main factors was the education, protection from violence and healthcare facilities. In the flip of the other side they were also more dependent on natural resources Whenever, they were looking after their families they are more exposed to climate shocks

and have some resources which protect their own lives. Therefore, women were severely effected by climate changes than men in different ways. Massive studies significantly shows that the vulnerability of the women and comparatively women was caused by climate change, due to climate changes it was not possible to reduce poverty specially poor and affected rural women . This obstacle also engulf the natural resources, technology and lack of financial resources. Climate disasters also becomes more vulnerable for seasonal and episodic weather of the rural women.

Justification

Poverty was a major factors which is caused by climate change , due to climate changes it is not possible to reduce poverty particularly poor and highly affected rural women is one of the greatest obstacles to ending poverty and one of the gravest equity challenges of our time. Not all poor people will be affected equally. Poor women also lack access to and control over natural resources, technologies, and credit. poor and affected rural women . This obstacle also engulf the natural resources, technology and lack of financial resources. Climate disasters also becomes more vulnerable for seasonal and episodic weather of the rural women.

 Women are most socially visible as victims in Pakistan, a naturally occurring event made all the more destructive by succeeding years of flood. Persistent poverty and economic insecurity. the gendered division of domestic labor, reproductive and health differences. exposure to violence, disparate educational and social opportunities, and secondary political status combine to put women at high risk, particularly those who support households alone, the aged and disabled, and women marginalized by caste or religion. Their long-term recovery from the compound effects of these disasters will certainly be complicated by this climate change context

The general objectives is the broad objective of this study is to understand of women's perspective related to their livelihoods subjected to climate change. The specific objective are

Identify the livelihood of rural women in the research area.

* ❖   Assess the rural women's understanding of climate change.
* ❖   To link the threat of climate change with their livelihood activities
* ❖   Determine the impacts climate change has on their livelihood pattern.
* ❖   Examine how rural women of Sindh manage the impacts climate change has on their livelihood.

The significance of the research

This research will help to take adaptation action to reduce women's livelihood vulnerability in research area and invest in making development efforts climate proof.

Limitation of the research

This research is not conducted with all specific villages in the study area. Only flood is considered but river erosion and other man made hazards are not identified. The research is focused on agricultural livelihood options but in the study area other existing livelihood options.

Hypothesis
H1 Rural women are participate in the community development.
H0 Rural women are unaware about the phenomena of the climate changes.
H1 Rural women are aware about the phenomena of the climate changes.
H0 Climate changes do not not affected rural women's livelihood.
H1 Climate changes does affected the rural women's livelihood

METHODOLOGY
The present study was focused on finding out the Impact of Climate Change On Agriculture And Rural Women Livelihood in Sindh, Pakistan. The current study was conducted in Sindh province. The research was conducted through Qualitative and quantitative to understand how climate change impacts on rural women   livelihood.Singh District of   Pakistan was selected   purposely. Interview schedule to access the assets required for improving the livelihood of rural women affected by climate changes.The multistage sampling technique was used for data collection. At first, three high district which was highly affected by flood, Sindh, Pakistan was selected purposely. At the second, one tehsil from each district was selected randomly. At the third, 2 UCs was chosen from each tehsils through Simple random sample. 120 Sample size was determining by using an online tool (surveysystem.com).   Proportionate sampling technique was be used to measure the proportion of sample. At last respondents was chosen by systematic random sampling technique. The data were collected through an interview schedule keeping in view the objectives of the study. Collected data were analyzed by using computer software (SPSS). Descriptive and inferential statistical techniques will be used for data analysis.

RESULTS
Te results from surveyed rural women in Sindh can be seen in.

Table 1: Demographic characteristics of the participants (n = 120)

Demographic characteristics	Category	f	%
Age	Up to 35	28	23.3
	>35-45	59	49.2
	>45	33	27.5
Education	Illiterate	24	20.0
	Primary-Middle	37	30.8
	Matric	41	34.2
	Above matric	18	15.0
Marital status	Unmarried	17	14.2
	Married	83	69.2
	Widow	16	13.3
	Divorced/separated	4	3.3

Occupation	Housewife	19	15.8
	Labour (in agriculture)	77	64.2
	Working women	24	20.0
Income	Up to 20000	62	51.7
	20001-30000	37	30.8
	>30000	21	17.5

Table 1 shows that the demographic characteristics of the respondents . Firstly the age distribution of the sample area was on half i.e 49.2 percent respondents was aged between 35 to 45 years old, while more than one forth respondents i.e 27.5 percent grater than 45 year old, and rest of respondents 23.3 percent was less than 35 year old However, the 25-45 age group of rural women were more porductive population. The data significant shows that the literacy rate particularly was very low one fifth i.e 20 percent of the respondents was illiterate and about one third i.e 30.8 percent was primary and middle level of education and also one third I.e 34.2 percent respondent were the matric and just 15 percent of the respondents were their above matric. However it is suggested that a major population of rural areas they were schooling not at all. Majority of the respondents more than two third i.e 69.2 were married and 13.3 percent was widow where as the that indicated that productive rural women were the additional task such as caring of children, family, responsibility of kitchen and socialization of children and living in extended and joint families system, the rural women were highly involved in a form of livelihood. The result shows that more than two third I.e 64.2 percent were busy in agriculture work labour force and 15.8 percent respondents were as a house wife and one fifth I.e 20 percent were working women. Half of the respondents I.e 51.7 percents were less than 20000 thousand it is very cumbersome to conclude that rural women their education were affected their skill and ability to earn a livelihood. however, their assertions are valid.

Table 2: Rural women's perception of climate change (*n* = 120)

Understanding	Low		Medium		High		Mean	Rank
Increase in temperature	7	5.8	18	15.0	95	79.2	2.73	1
Decrease in temperature	70	58.3	39	32.5	11	9.2	1.51	6
Increase in rainfall amount	58	48.3	33	27.5	29	24.2	1.76	5
A decrease in rainfall amount	8	6.7	46	38.3	66	55.0	2.48	3
Increase in fog	12	10.0	55	45.8	53	44.2	2.34	4
Increase in smog	9	7.5	38	31.7	73	60.8	2.53	2

In the light of the women's perception about climate changes, most of the participants noticed that the increase in temperature (2.73) and smog (2.53) were major factors of climate changes and ranked 1st and 2nd, respectively. However, a decrease in rainfall amount (2.48), increase in fog (2.34), increase in rainfall

amount (1.76) and decrease in temperature (1.51) were ranked as 3rd to 6th, respectively.

Table 3: Regularity of source of livelihood

Regularity	f	%
Daily	22	18.3
Weekly	11	9.2
Monthly	39	32.5
Seasonally	48	40.0
Total	120	100.0

Table 3 investigate the regularity with which rural women acquire a livelihood, the respondents were indicates that 18.3% of them earn a daily income, while two fifth I.e 40 % have a seasonal income, whereas 9.2% of them have a weekly income, and 32.5% claim to have a livelihood that yields monthly returns. This implies that the majority of the respondents engage in farming and the petty trade of their farm produce, this explains the claims of those who say that they earn a seasonal livelihood as the harvest season is the period in which they earn returns from the sale of their surplus farm produce.

Table 4: Percentage impact of climate change on rural women's livelihood

Impact	f	%
Negative	64	53.3
No impact	10	8.3
Positive	15	12.5
Both (Positive & negative)	31	25.8
Total	120	100.0

Table 4 The questionnaire survey also corroborated the chisquare analysis as a majority of the women agree that climate change has impacted their livelihood. In Sindh,pakisatn 24% of the women noted that climate change has impacted their livelihood, 53% claimed it has had both positive and negative impact. In Sindh, 5%3.3 of women said climate change has negative impacts, 1ss2.5% suggested positive outcomes while 30% stated it has positive and negative impacts while 15% noted that it has no effect at all, whereas in Alenuboro 33.75% alleged positive impacts, 26.25% said it had negative results, 23.75% claimed both and 16.25 noted no effect. In ileapa, 35% suggested that climate change has no effect, 20% alleged negative impacts, 24% supposed there were positive outcomes and 21% maintained that it has had negative and positive results, as shown in Fig. 2. The subsequent section discusses how rural women mitigate the effects of climate change.

DISCUSSION

Primary and secondary data were reviewed existing research on the impacts of climate change on rural women livelihood (Agriculture and livestock), it is suggested that how DFID sustainable livelihood framework will discuss relevant case studies and introduce the sustainable livelihood framework suggests that how to boost the livelihood of rural women.

Summery, Conclusion

Most of the women in rural society plays a pivotal roles in most of the activities like generating income improving their livelihood , foods and nutrition security and overall well being.

Rural women participate whit their men in home and also into fields ,. Moreover, rural women spend money many times in the reproductive and household work in which included caring of children , kitchen activities and providing water and fuel for their household. Studies shows that in an area of Malwigrila spend over three times more than boys fetching and water majority.

Women as a agent of change

As a survival of the communities women's knowledge regarding managing the water shortage becomes critical. Rural women has limited knowledge about saving their houses from wind and heavy rain, preserving seeds and improving soil quality. Women are also a limited knowledge about safe drinking water, facing food shortage, advance breeding in crop etc. Which was more important to overcome climate changes.

Pakistani rural women Women economically depended on their livestock. They are following animal husbandry are very beneficial for uplifting the life style of rural women and livelihoods such as goat, sheep, cow, buffalo's, camel and hen or chicken. The livestock farming have massive benefits as socially, economically, physical and mentally relaxation and mitigate the arrogance. After one year when these livestock sell particularly goat, sheep and camel in the religious festivals. She earned sufficient amount earned majority rural people says that withdraw the committee.

Rural women play a key role in supporting their households and communities in achieving food and nutrition security, generating income, and improving rural livelihoods and overall well-being. They contribute to agriculture and rural enterprises and fuel local and global economies. ural women spend more time than urban women and men in reproductive and household work, including time spent obtaining water and fuel, caring for children and the sick, and processing food. This is because of poor rural infrastructure and services as well as culturally sassigned roles that severely limit women's participation in employment opportunities. aced with a lack of services and infrastructure, rural women carry a great part of the burden of providing water and fuel for their households UNIFEM (now UN Women). 2009.

Women are involved with economic sector and also as Agents of Change. During water shortages, women's knowledge of managing and maintaining water sources becomes critical to communities' survival. Women's traditional knowledge about building wind-resistant housing. planting trees to mitigate erosion. preserving seeds, composting to improve soil quality, and conserving safe drinking water have protected generations of communities from the worst effects of flooding. In many communities, women hold the most reliable knowledge about promoting food security. preserving threatened food supplies.

and ensuring their family's survival in the face of shortages. Women's knowledge of and experience in maintaining bio-diversity through the conservation and domestication of wild edible plant seeds and through food crop breeding is key to adapting to climate change more effectively [FAO, IFAD, ILO. 2010]. [FAO. 2011].

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