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Socio-demographic Differences in Environmental Concern and Willingness to Pay for Addressing Global Climate Change in Pakistan

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Abstract

Previous research indicates that socio-demographic attributes are important predictors of environmental concern. However, this research mainly focused on Western societies, with minimal representation of non-Western contexts. In this article, we argue that a stronger representation of non-Western societies is necessary for a more global understanding of pro-environmentalism. On this basis, we explored socio-demographic differences in environmental concern and willingness to pay for addressing climate change in Pakistan. We aimed to assess demographic trends in public perceptions of environmental problems in the Pakistan, and their level of convergence with Western-derived theories of the social bases of environmental concern. Although our findings are largely congruent with trends previously observed in Western contexts, we found some divergent demographic patterns in environmental concern among Pakistanis that are likely the result of a number of contextual influences that prevail in Pakistan and other similar developing countries.

Keywords

environmental concern – climate change – willingness to pay – Pakistan – developing societies

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Introduction

Environmental problems currently rank among the most pressing global concerns. Factors such as human overpopulation, unsustainable natural resource consumption and an unhealthy dependence on fossil fuels have been identified as major drivers of unfavourable changes in the environment (Oskamp, 2000). Controlling these factors requires substantive changes in personal, social and cultural practices, as well as the enactment of policies that safeguard the integrity of ecological systems (Ehrlich and Erhlich, 2013). According to Weber (2006), people only take precautionary measures against risks about which they feel a level of concern or anxiety. Likewise, research in the environmental domain suggests that pro-environmental behaviour and support for pro-environmental policies are closely linked to levels of environmental concern (e.g., Bamberg, 2003; Hansla et al., 2008).

In environmental social science research, environmental concern has been operationalised in a variety of ways. However, its theoretical definition is rooted in attitude theory, i.e., environmental concern is considered a form of environmental attitude (Takács-Sánta, 2007). Drawing from a classical understanding of attitude as a tripartite construct, Schultz et al. (2004) describe environmental attitudes as comprising the beliefs, affect and behavioural intentions a person holds regarding environmental activities and issues. However, while Schultz et al. (2004) categorise environmental concern exclusively as the affective dimension of environmental attitudes, other researchers have used the term more broadly to describe factors including environment-related emotions, beliefs and value orientations (e.g., Fransson and Garling, 1999; Poortinga et al., 2004).

In the last few decades, researchers have been trying to understand the nature and determinants of environmental concern, and the conditions under which environmental concern functions as a determinant of environmental behaviour (e.g., van Liere and Dunlap 1980; Jones and Dunlap, 1992; Nickerson, 2003). This research indicates that environmental concern is predicted by two broad categories of social determinants. The first category, termed *social psychological* factors, comprises personal worldviews, identities and beliefs, etc., while the second category, termed *social structural* factors, includes demographic attributes, such as gender, age, political orientation, ethnicity, income and education (Dietz et al., 1998). In this article, we will be focusing on social structural factors and their influence on environmental concerns.

The effects of social structural factors, especially gender, education, age and political orientation, have been addressed widely in environmental attitude research, and these factors have been found to have consistent and significant influences on environmental concern (Jones and Dunlap, 1992; McMillan et al.,

1997; Poortinga et al., 2004; Xiao and McCright, 2012). The literature relating to this topic will be briefly reviewed in a subsequent section of this article. However, before proceeding to this review, we will present a short discussion of the background and aims of the current study.

Research Background and Objectives

Although academic interest in environmental concern/attitude research continues to burgeon, the sociocultural scope of work in this field has been largely limited to industrialised Western societies, while the representation of non-Western populations has remained marginal. A number of cross-national surveys conducted in the 1990s and early 2000s indicate that environmental problems are comparably salient concerns in developing and developed societies, and that individuals exhibit similar levels of engagement with environmental issues in both contexts (Leonard and Morell, 1981; Dunlap and York, 2008; Fairbrother, 2013). Although some researchers have interpreted these findings as evidence of the globalisation of environmental concern and pro-environmentalism (Brechin and Kempton, 1997), others have emphasised the need for research that addresses the qualitative differences in the nature and bases of environmentalism across cultural groups, and between societies at varying levels of economic development (Kim, 1999; Adeola, 1996). Further, some researchers have reported that the Western-derived theories that currently dominate environmental social science research, especially those relating to the social bases of pro-environmentalism, are often weakly or inconsistently supported in non-Western contexts (e.g., Furman, 1998; Pampel, 2014). These observations suggest that a geographically- and culturally-skewed understanding of environmental concern and its determinants may not readily lend itself to broadly generalisable explanations of the foundations of pro-environmentalism.

Many of the world's biggest environmental challenges, such as climate change and biodiversity loss, are of a trans-national and trans-regional nature. Resolving these challenges requires active contributions from individuals from diverse and disparate social, economic and cultural backgrounds. Consequently, taking a global perspective on pro-environmentalism and its determinants is an imperative for environmental social science research. To make our understanding of environmental concern truly global, there is a need to tackle the sociocultural imbalance that is clearly reflected in the existing literature on the subject, and a critical step in this process must involve channelling more effort into focused and rigorous assessments of the social aspects of environ-

mental issues in previously underexplored cultural contexts. In light of this, we present an investigation of individual differences in perceptions of environmental problems in Pakistan, a developing country. Our aims are to determine the effects of socio-structural factors on environmental concern in this societal context, and to explore the points of convergence and divergence between our observations and extant Western-derived theories of the social bases of environmental concern.

Who Cares about Environmental Problems? A Brief Review of Empirical and Theoretical Perspectives on the Social Structural Bases of Environmental Concern

According to Ronald Inglehart (1995) environmental concern in Western societies emerged as a result of a shift toward post-materialist values. Drawing from the hierarchy of needs theory, he argued that people exhibit post-materialist values, such as a desire for self-expression, personal identity and a higher quality of life, only after they have satisfied primary needs, such as economic and physical security. Inglehart's argument is supported by empirical evidence from a number of studies that have found positive links between post-materialist values and pro-environmentalism (e.g., Kidd and Lee, 1997; Olofsson and Öhman, 2006). However, in contrast to Inglehart's arguments, several studies have shown that many citizens of low-income countries, with strong materialist values, also exhibit high levels of environmental concern (e.g., Dunlap and York, 2008; Adeola, 1996). With support from data collected in 85 countries, Fairbrother (2013) argued that although richer people rank higher on some dimensions of environmental concern, environmental concern is generally higher in poorer countries. Other researchers have also found, following analyses of cross-national datasets, that national wealth may in fact be inversely related to some forms of environmental concern and support for environmental protection (e.g., Dunlap and Mertig, 1997; Gelissen, 2007; Sandvik, 2008).

As a part of his post-materialist thesis, Inglehart (1995) argued that environmental concern in developing societies is a product of the direct experiences of environmental degradation and its social consequences. In response, Brechin (1999) reports that although citizens of poorer countries report higher levels of concern about local problems than citizens of wealthier countries, there is no significant difference in levels of concern about symbolic global environmental problems. Brechin (1999) concluded that the post-materialist thesis fails to adequately describe the basis of environmental concern at a wider cultural level, and global environmentalism is better understood as a complex social

phenomenon driven by multiple factors requiring careful specification and discussion. Kidd and Lee (1997) pointed out that neither high-income, nor low-income societies are characterised by a homogenous value orientation (i.e., materialist or post-materialist); rather, a significant variance in values exists among individuals in any society. In line with this, Gelissen (2007) reported that, among a sample of 50 countries, the amount of variance in environmental concern between countries was much smaller than among individuals within countries. Although contextual and national level social factors contribute to levels of public concern about various environmental problems, there is a considerable amount of conflict and incongruence among the studies that have mainly focused on understanding the antecedence of pro-environmentalism from this perspective. As an alternative, Milfont (2012) proposes that closer analyses of personal characteristics may offer a more progressive understanding of the basis of environmental concern.

At the individual level, socio-economic status has widely been found to have a significant influence on environmental concern (e.g., Shen and Saijo, 2008; Franzen and Meyer, 2010; Botetzagias and Malesios, 2012). In environmental attitude studies, relative income, education and occupation are the most commonly used indices of socio-economic status. Following an analysis of data from 96 nations, Pampel (2014) reported that socio-economic status has a significant positive relationship with environmental concern. However, he also found that the relationship between socio-economic status and environmental concern is stronger in higher-income countries than in lower-income countries, and education and occupation are generally better predictors of environmental concern than personal income. Pampel (2014) attributed the inconsistent effect of income on environmental concern to the difficulty of obtaining valid and reliable personal income measures for cross-national research.

Nevertheless, researchers have previously argued that, compared with other demographic characteristics, education generally has the most consistent relationship with environmental concern (e.g., van Liere and Dunlap, 1980). According to McMillan et al. (1992), this is because education exposes individuals to a broad range of ideas and beliefs and encourages a more liberal-minded perspective. Further, they argued that education may partly explain the relationship between income and environmental concern because wealthier individuals typically achieve higher levels of education. Since high-income white-collar jobs are often held by people with relatively higher levels of education, it seems likely that the relationship between occupation and environmental concern may similarly be explained by education.

Other research has also found consistent gender differences in levels of environmental concern (e.g., Steger and Witt, 1989; Zelezny et al., 2000). Females

often express greater levels of concern about environmental problems than males, and this has been attributed to a number of factors including females' sense of emotional empathy (Arnocky and Stroink, 2011), a stronger response to the harmful effects of deteriorating environmental conditions (Stern et al., 1993), and socialisation processes that promote female interdependence and an ethic of care (Zelezny et al., 2000). However, there is some evidence that this pattern of gender difference in environmental concern is not universal. In North America, Flynn et al. (1994) found that Caucasian females expressed greater concern about environmental health risks than Caucasian males, but there were no significant gender differences among other ethnic groups. Similarly, Greenberg and Schneider (1995) found that females had a higher level of environmental concern than males in American neighbourhoods with relatively low exposure to environmental hazards, but not in neighbourhoods exposed to multiple environmental stressors. In Nigeria, Ogunbode and Arnold (2012) found that, although males were more knowledgeable about environmental problems and more likely to encounter environment-related information than females, there was no significant gender difference in environmental concern.

Age has also been identified as an important determinant of environmental concern. However, the nature of the influence of age on environmentalism appears to be somewhat debatable. Some studies have found a positive relationship between age and environmental concern (e.g., Lyons and Breakwell, 1994; Ogunbode and Arnold 2012), while others have reported an inverse relationship (e.g., van Liere and Dunlap, 1980; Torgler and Garcia-Valiñas, 2007). According to Ogunbode and Arnold (2012), older individuals, especially those who have retired from full-time employment, may express greater environmental concern than younger individuals because they are less occupied with concerns about self-advancement. Conversely, Dietz et al. (1998) suggest that the relationship between age and environmental concern shows a distinct cohort effect, in which recent birth cohorts express a greater inclination toward pro-environmentalism than cohorts born earlier due to differences in socialisation. Generally, the effect of age on environmental concern appears to vary considerably, and may be subject to the influence of other intervening variables, such as place of residence, socioeconomic status and cultural values (e.g., Kanagy et al., 1994).

Place of residence, particularly urban versus rural dwelling, has also been found to have a significant effect in determining levels of environmental concern. According to Gifford and Nilsson (2014), the relationships between rural people and the natural environment differ significantly from those of their urban counterparts and it is widely assumed that rural dwellers are more

strongly connected to nature. However, empirical evidence from various countries indicates that urbanites more often express greater levels of concern about environmental issues (e.g., Yu, 2014; Chen et al., 2011; Hampel et al., 1995). According to McMillan et al. (1992), urban residents may be more concerned about the environment because they are exposed to greater levels of pollution and other urban environmental problems, and have a less utilitarian attitude toward nature than rural dwellers. In contrast to this argument, Huddart-Kennedy et al. (2009) found that Canadian rural residents place a greater priority on the environment than urban residents, and also engage in pro-environmental actions, such as recycling and environmental stewardship more often. They argued that place of residence plays a limited role in determining environmental concern, and that previously reported rural-urban differences in environmental concern and behaviour may be indicative of differences in levels of environmental awareness and availability of opportunities to engage in environmentally-supportive actions.

Based on the preceding reports, it is clear that there is still a significant amount of conflict in evidence regarding the role played by demographic factors in predicting levels of environmental concern, even in Western contexts. Consequently, we sought to assess the effects of some these factors on environmental concern in the Pakistani context. Specifically, we focused on the effects of gender, age, income, education and place of residence. In the next section, we present a brief description of the location and context of our study.

Environmental Challenges in Pakistan: Origins, Nature and Impacts

Pakistan is the seventh most populous country in the world (US CIA, 2014) and is currently faced with a variety of environmental challenges including deforestation, biodiversity loss, air pollution, lack of access to safe drinking water, and climate change (Pakistan EPA, 2005). According to Hasan and Ali (1992), although post-colonial development models have contributed to exacerbating anthropogenic environmental problems in Pakistan, most of these problems have their roots in resource management regimes instituted while the country was under British colonial rule. A major impediment to the resolution of Pakistan's environmental problems is poverty, and Hasan and Ali (1992) argue that this drives the enormous pressure on the country's limited natural resource base.

Only 5% of Pakistan's total land mass is forested. Due to corruption and poor management by the national forestry authorities, these forests have been over-exploited by commercial and private agents for several decades (Ali et al., 2005).

The intense exploitation of Pakistan's forests has a number of unfavourable consequences, and these include soil erosion, desertification of previously productive areas, and an increased risk of flooding in downstream locations due to silting-up of waterways (Biswas, 1987; Hasan and Ali, 1992). In 2010, catastrophic flooding in northern Pakistan resulted in a humanitarian disaster and an agricultural crisis that severely affected the national and regional economy. Although this disaster was primarily attributed to global climate change, prior levels of deforestation and the sparseness of land cover in the surrounding area is said to have played a role in intensifying its effects (Webster et al., 2011).

In urban Pakistan, water and air pollution are critical environmental and public health concerns. The majority of urban residents do not have access to proper sewerage and waste management facilities. Consequently, untreated domestic and industrial effluents are regularly discharged into water-bodies that serve as important sources of drinking water. Annually, 40% of deaths in Pakistan are linked to health conditions caused by the consumption of contaminated water (*Pakistan Today*, 2012), and studies have found that drinking water in many Pakistani cities have unsafe levels of biological and chemical contaminants (see Azizullah et al., 2011). The air in several cities in Pakistan also contains high concentrations of heavy metals and coarse particulates that pose a significant threat to public health (Parekh et al., 2001; Hussain et al., 2012). Reportedly, this is a consequence of inefficient energy use, accelerating urban population growth, an increase in the number of vehicles and rates of vehicular travel, uncontrolled emission by polluting industries and a widespread practice of openly burning solid waste material often including large amounts of plastic (Tahir et al., 2010; Purohit et al., 2013).

Although Pakistan contributes minimally to global CO₂ emissions, climate change poses serious socio-economic and environmental challenges to Pakistanis (Government of Pakistan, 2012). Following an analysis of the impacts of various climate scenarios on water resources and food production in Pakistan, Zhu et al. (2013) indicated that Pakistanis will likely face severe negative impacts on crop yield and agricultural productivity in the future as a consequence of climate change. Other scientists have also projected that a climate change-induced rise in temperatures will further aggravate water shortages across the country; this has especially severe implications for areas of Pakistan that are already experiencing water-stress (Farooqi et al., 2005).

Resolving Pakistan's environmental problems will require the combined efforts of its people and government. Although the government is best placed to develop and implement appropriate environmental policies and legislation, the effectiveness of these interventions will be determined by levels of public acceptance and support. In parts of Pakistan, citizens have already shown a

degree of willingness to aid efforts aimed at addressing environmental issues by providing the authorities with information regarding salient local environmental concerns (Arshad et al., 2013). This reflects significant potential for a broader and more substantive public engagement with environmental problems. However, realising this potential will require taking better account of citizens' perspectives on, and understanding of, environmental issues and policies, as well as facilitating stronger links between public opinion and the environmental policy development and implementation process.

Methods

The data analysed in this study were obtained from the PEW Global Attitudes Project. In the spring of 2010, researchers at the Pew Research Center surveyed a nationally representative sample of the Pakistani population ($N = 2,000$); the questions asked in this survey included some relating to public attitudes regarding environmental problems. A descriptive profile of the respondents is presented in Table 1. For the purpose of this research we analysed responses to four items included in the survey. These are three questions about the perceived seriousness of problems with access to drinking water (Q19c), pollution (Q19j) and climate change (Q45), and willingness to pay higher prices to address global climate change (Q46). Descriptive statistics for the responses to each of these items are presented in Table 2.¹

Prior to data analyses, we coded respondent gender categories as [Male] = 0 and [Female] = 1, and respondents' locations as [Rural] = 0 and [Urban] = 1. We also grouped the responses by age, education and monthly income categories which we coded as [18–30] = 0, [31–40] = 1, [41–50] = 2, [51–60] = 3 and [>60] = 4; [No formal education] = 0, [≤ 9 years formal education] = 1, [Up to 12 years formal education] = 2, [Graduate/Post-graduate education] = 3; [< 4,000 Rs] = 0, [4,000–10,000 Rs] = 1, [10,001–20,000 Rs] = 2, [20,001–30,000 Rs] = 3 and [>30,000 Rs] = 4. The data was weighted to address any possible effects of representation bias.

Due to the nature of the response scales used in the survey (nominal and ordinal), we used non-parametric statistics for our analyses. Specifically, we used Kruskal-Wallis' ANOVA and Jonckheere-Terpstra tests to assess trends and differences in perceptions of environmental problems and willingness to pay for addressing climate change across the socio-demographic categories, and

1 The data and questionnaire are available at: <http://www.pewglobal.org/category/datasets/>.

TABLE 1 *Descriptive profile of respondents' characteristics*

Demographic attributes	Frequency	
	N	Percent
Gender		
Male	1,023	51.1
Female	977	48.9
Missing	–	–
Age		
18–30	830	41.5
31–40	522	26.1
41–50	279	14.0
51–60	147	7.3
>60	103	5.1
Missing	119	6.0
Education		
No Formal	824	41.2
≤ 9 years Formal	595	29.7
Up to 12 years Formal	447	22.4
Graduate/Postgraduate	134	6.7
Missing	1	0.05
Employment status		
Unemployed (No Job)	140	7.0
Not Employed (e.g., Pensioner/Housewife)	1,005	50.2
Part-time Employed	72	3.6
Full-time/Self Employed	777	38.8
Missing	7	0.3
Income (Rs)*		
< 4,000	177	8.8
4,000–10,000	706	35.3
10,001–20,000	408	20.4
20,001–30,000	89	4.4
> 30,000	51	2.5
Missing	570	28.5

Demographic attributes	Frequency	
	<i>N</i>	Percent
Location		
Rural	1,304	65.2
Urban	696	34.8
Missing	–	–
Total	2,000	100

*₁ Pakistan Rupee (Rs) = 0.01165 USD at time of data collection (source: www.oanda.com).

TABLE 2 *Descriptive statistics of perceptions of environmental problems and willingness to pay for addressing global climate change in Pakistan*

Survey item	Frequency	
	<i>N</i>	Percent
Access to water		
Not a problem	95	4.8
Small problem	153	7.6
Moderate problem	310	15.5
Very big problem	1,422	71.1
Missing	21	1.0
Pollution		
Not a problem	40	2.0
Small problem	192	9.6
Moderate problem	400	20.0
Very big problem	1,252	62.6
Missing	117	5.9
Climate change		
Not a problem	219	10.9
Not too serious	278	13.9
Somewhat serious	563	28.1
Very serious	434	21.7
Missing	507	25.3

TABLE 2 Perceptions of environmental problems in Pakistan (cont.)

Survey item	Frequency	
	N	Percent
Willingness to pay for addressing climate change		
Disagree	914	45.7
Agree	396	19.8
Missing	690	34.5
Total	2,000	100

we used the Mann-Whitney U-test for post-hoc comparisons. We also used Friedman's ANOVA and the Wilcoxon Signed Rank test to assess differences in the perceptions of access to water and pollution compared with global climate change. To address the possibility of comparison-wise error, we used corrected significance criteria calculated with Holm's procedure in all our post-hoc analyses (Holm, 1979; Field et al., 2012: 429–430). We chose this procedure over the *Bonferroni* method because of its greater statistical power. Using the Holm's procedure, the significance criterion was set at 0.0063 for comparisons across the income and age categories and 0.0125 for comparisons across the education categories. All of our statistical tests were conducted with SPSS version 17.

Results

In preliminary analyses, we found significant differences in perceptions of the seriousness of problems with access to drinking water, pollution and climate change using Friedman's ANOVA ($\chi^2(2) = 752.37, p < 0.001$). We investigated this result further with Wilcoxon Signed Rank tests and found that climate change ($Mdn = 3$) was ranked as a less serious problem than access to drinking water ($Mdn = 4; z = -19.70, p < 0.001, r = -0.49$) and pollution ($Mdn = 4; z = -21.42, p < 0.001, r = -0.53$), but there was no significant difference in the perceived seriousness of access to drinking water and pollution ($z = -0.57, p = 0.57$). Within the sample, we also found that the female gender was negatively correlated with age ($r_s = -0.16, p < 0.001$), education ($r_s = -0.24, p < 0.001$) and urban residence ($r_s = -0.06, p = 0.008$). Age was negatively correlated with education ($r_s = -0.13, p < 0.001$) and income ($r_s = -0.07, p = 0.006$). Education was positively cor-

TABLE 3 *Comparison of perceived seriousness of environmental problems and WTP* for addressing global climate change across gender categories*

Measure	Mean rank					
	Males	Females	<i>U</i>	<i>Z</i>	<i>p</i>	<i>r</i>
Access to water	1,048.30	1,092.71	547878.5	-2.13	.033	-0.05
Pollution	985.99	1,063.57	480934.0	-3.59	<.001	-0.08
Climate change	756.16	900.50	273758.5	-6.43	<.001	-0.16
WTP	729.16	717.58	248114.5	-0.65	.518	-

*WTP = Willingness to pay

TABLE 4 *Comparison of perceived seriousness of environmental problems and WTP* for addressing global climate change between place of residence categories*

Measure	Mean rank					
	Urban	Rural	<i>U</i>	<i>Z</i>	<i>p</i>	<i>r</i>
Access to water	1,083.64	1,062.16	519650.0	-0.99	.322	-
Pollution	1,052.65	1,004.01	468804.5	-2.19	.029	-0.05
Climate change	906.19	761.76	267341.0	-6.36	<.001	-0.16
WTP	746.06	709.33	241256.0	-2.06	.040	-0.05

*WTP = Willingness to pay

related with income ($r_s = 0.34, p < 0.001$) and urban residence ($r_s = 0.38, p < 0.001$), and income was positively correlated with urban residence ($r_s = 0.23, p < 0.001$).

In the main analyses, we found that gender had a significant effect on perceptions of the seriousness of access to drinking water, pollution and climate change but not on willingness to pay higher prices to address global climate change (Table 3). Pakistani females had higher ratings of the perceived seriousness of the three named environmental problems than males. We also that found urban dwellers rated the severity of pollution and climate change more highly than rural dwellers and were more willing to pay higher prices to address climate change than the latter (Table 4). However, there was no significant difference between both residence categories in perceptions of access to drinking water.

TABLE 5 Comparison of perceived seriousness of environmental problems and WTP* for addressing global climate change across age categories

Measure	Mean rank					H(4)	p
	18-30	31-40	41-50	51-60	>60		
Access to water	1,008.73	978.28	1,071.79	1,028.15	904.00	14.54	.006
Pollution	967.68	916.84	1,006.57	989.75	955.72	8.55	.073
Climate change	767.01	735.00	829.21	757.18	767.97	7.75	.101
WTP	678.56	648.83	691.06	680.87	693.57	3.54	.472

*WTP = Willingness to pay

Age had a significant effect on perceptions of access to drinking water, but not on perceptions of the seriousness of pollution and climate change or willingness to pay higher prices to address climate change (Table 5). Jonckheere's test indicated that there was no significant trend in the differences in perceptions of access to drinking water across age categories, i.e., there was no evidence that the perceived seriousness of this problem had a direct relationship with age ($J = 707597.5$, $z = 0.008$, $p = 0.993$). However, Mann-Whitney tests revealed that individuals aged 41-50 rated access to drinking water as a more serious problem than those aged 31-40 ($U = 76994.5$, $p = 0.003$, $r = -0.1$), and those aged over 60 ($U = 13997.0$, $p = 0.001$, $r = -0.17$). No other significant differences were found between age groups in perceptions of access to drinking water.

Education appeared to have a stronger impact than age, urbanity and gender, as there were significant differences in perceptions of the seriousness of all three environmental problems, and willingness to pay higher prices to address global climate change among the sample (Table 6). We found no significant trend in perceptions of access to drinking water in relation to education ($J = 810931.0$, $z = 1.42$, $p = 0.155$). However, we found that individuals with nine years of formal education or less perceived access to drinking water as a less serious problem than those with up to 12 years formal education ($U = 143622.5$, $p = 0.003$, $r = -0.09$) or graduate/post-graduate education ($U = 43626.5$, $p < 0.001$, $r = -0.12$). No other significant difference was found in perceptions of access to drinking water across levels of education.

Interestingly, there was a significant positive trend in perceptions of pollution across categories of educational achievement ($J = 777550.0$, $z = 3.79$,

TABLE 6 Comparison of perceived seriousness of environmental problems and WTP* for addressing global climate change across categories of educational achievement

Measure	No formal	Mean rank			$H(3)$	p
		≤9 yrs Formal	Up to 12 yrs Formal	≥Graduate		
Access to water	1,075.62	1,013.47	1,100.49	1,167.54	17.37	.001
Pollution	967.17	1,041.96	1,075.36	1,042.51	16.85	.001
Climate change	763.11	781.96	904.38	926.89	35.44	<.001
WTP	687.58	714.71	770.85	755.44	14.48	.002

*WTP = Willingness to pay

$p < 0.001$). In this regard, we found that respondents with no formal education perceived pollution to be a less serious problem in Pakistan than individuals with nine years of formal education or less ($U = 223973.0$, $p = 0.005$, $r = -0.08$) and those with up to 12 years of formal education ($U = 166497.5$, $p < 0.001$, $r = -0.11$). However, there were no other significant differences across educational achievement categories in perceptions of this problem. Similarly, there was a significant trend in perception of the seriousness of climate change across educational achievement categories ($J = 534810.0$, $z = 5.49$, $p < 0.001$). We found that individuals with no formal education rated the seriousness of climate change lower than those with up to 12 years of formal education ($U = 95922.5$, $p < 0.001$, $r = -0.15$) or graduate/post-graduate education ($U = 32197.0$, $p < 0.001$, $r = -0.15$). Individuals with nine years of formal education or less also rated the seriousness of climate change lower than those with up to 12 years formal education ($U = 94397.5$, $p < 0.001$, $r = -0.14$) or a graduate/post-graduate education ($U = 31782.0$, $p = 0.001$, $r = -0.13$), but there were no significant differences between the two lower and the two higher categories. Willingness to pay higher prices to address global climate change also appeared to be directly related to educational achievement ($J = 399755.5$, $z = 3.60$, $p < 0.001$). However, we only found a significant difference between individuals with no formal education and those with up to 12 years formal education ($U = 77647.5$, $p < 0.001$, $r = -0.12$). Other comparisons of differences in willingness to pay for addressing global climate change across categories of educational attainment were not statistically significant.

Income also had significant effects on perceptions of the seriousness of environmental problems and willingness to pay higher prices to address global

TABLE 7 Comparison of perceived seriousness of environmental problems and WTP* for addressing global climate change across monthly income categories

Measure	Mean rank					<i>H</i> (4)	<i>p</i>
	< 4000 Rs	4,000–10,000 Rs	10,001–20,000 Rs	20,001–30,000 Rs	>30,000 Rs		
Access to water	754.41	742.28	831.98	879.38	818.26	28.61	<.001
Pollution	672.90	734.93	755.88	834.22	805.76	15.94	.003
Climate change	556.89	574.41	621.80	741.65	765.06	35.01	<.001
WTP	548.50	527.42	566.33	587.61	619.06	10.90	.028

*WTP = Willingness to pay

climate change (Table 7). Unsurprisingly, we found a significant trend in perceptions of the seriousness of problems with access to drinking water across income categories ($J = 431034.0$, $z = 4.74$, $p < 0.001$). Post-hoc analyses revealed that individuals with a monthly income lower than 4,000 Rs rated the seriousness of the problem lower than those who earned between 20,000 and 30,000 Rs ($U = 7546.5$, $p = 0.004$, $r = -0.18$). Individuals with a monthly income between 4,000 and 10,000 Rs rated the seriousness of problems with access to drinking water lower than those with monthly incomes ranging between 10,000 to 20,000 Rs ($U = 154932.0$, $p < 0.001$, $r = -0.12$) or 20,000 to 30,000 Rs ($U = 32113.5$, $p < 0.001$, $r = -0.12$). No other significant differences were found in perceptions of access to drinking water across income categories.

There was also a significant trend across income categories in perceptions of the seriousness of pollution ($J = 385025.0$, $z = 3.63$, $p < 0.001$). However, in post-hoc tests, we only found a significant difference between individuals with incomes less than 4,000 Rs and those with incomes between 20,000 and 30,000 Rs ($U = 6992.5$, $p = 0.001$, $r = -0.21$). Similarly, there was a significant trend in ratings of the seriousness of climate change across income categories ($J = 273794.5$, $z = 5.20$, $p < 0.001$). In this regard, we found that ratings of the seriousness of climate change was significantly higher among individuals with a monthly income ranging over 30,000 Rs than among those with incomes less than 4,000 Rs ($U = 2214.5$, $p = 0.001$, $r = -0.25$), and those with incomes ranging between 4,000 and 10,000 Rs ($U = 10111.0$, $p < 0.001$, $r = -0.16$), as well as those with an income between 10,000 and 20,000 Rs ($U = 6675.0$, $p = 0.002$, $r = -0.15$). Individuals with monthly incomes between 20,000 and 30,000 Rs also had significantly higher ratings of the seriousness of climate change than those with

incomes less than 4,000 Rs ($U = 4072.5$, $p < 0.001$, $r = -0.24$), those with incomes between 4,000 and 10,000 Rs ($U = 18816.5$, $p < 0.001$, $r = -0.17$), and those with incomes between 10,000 and 20,000 Rs ($U = 1239.5$, $p = 0.001$, $r = -0.15$). There were no significant differences between the two higher income categories, and between the two lower categories, in perceptions of the seriousness of climate change. Although Jonckheere's test indicated that there was a significant trend in willingness to pay higher prices to address global climate change across income categories ($J = 212243.5$, $z = 2.65$, $p = 0.008$), we did not find any significant differences between groups in our post-hoc analyses.

Discussion and Conclusion

The aim of this study was to examine the effects of social structural factors on environmental concern in Pakistan, and explore the level of support for Western-derived evidence of the social bases of environmental concern in this context. Overall, our findings are partly in line with previous observations in Western societies. We found that female Pakistanis rate the seriousness of access to drinking water, pollution and climate change more highly than males. However, interestingly, females reported no greater willingness to pay higher prices for addressing climate change than males. Indeed, even though the difference in mean rank was not significant, males appeared to be slightly more inclined to agree with the notion of paying higher prices to address global climate change than females (Table 3).

We propose two plausible explanations for these findings. Firstly, researchers have previously argued that biographical availability, which is defined as the absence of personal constraints that may increase the costs and risks of participating in social movements, potentially offsets women's environmental beliefs and attitudes (Tindall et al., 2003). In Pakistan, women earn far less than men and are less likely to hold salaried jobs (Government of Pakistan, 2012; Sarwar and Abbasi, 2013). Additionally, cultural norms dictate that women's finances are controlled by their husbands or male relatives. Consequently, even though females may have higher levels of concern about environmental problems than males, the likelihood that these will translate into pro-environmental actions, especially actions that involve financial expense, is subject to strong cultural and socio-economic constraints.

Secondly, the absence of significant differences between gender categories in willingness to pay higher prices to address climate change may be partly explained by the pervasiveness of institutional corruption and the generally low level of institutional trust in Pakistan. A recent survey conducted in Pak-

istan revealed that the majority of respondents (over 70%, $N = 4,128$) had little or no confidence in the government's ability to take the actions necessary to address climate change (Zaheer and Colom, 2013). Kemal (2003) argues that public disenchantment with government expenditure and budgeting has contributed to the increase in tax evasion and the expansion of the 'underground' economy in Pakistan. In the current study, approximately 46% of respondents opposed the prospect of paying higher prices to address climate change and 35% did not respond to this item. Taken together, these observations suggest that Pakistanis, regardless of their level of concern about environmental problems, may be generally disinclined to support tax-based pro-environmental actions given that these would entail entrusting their financial resources to institutions that they perceive to be corrupt and unaccountable.

We also found that urban residence had a positive effect on perceptions of the seriousness of pollution and climate change, and willingness to pay higher prices for addressing climate change. However, there were no significant differences in perceptions of the seriousness of access to drinking water between rural and urban residents. Contrary to the arguments made by Huddart-Kennedy et al. (2009) in relation to environmental concern in rural Canada, it is unlikely that differences in levels of environmental awareness are a major cause of rural-urban differences in perceptions of environmental problems among Pakistanis. Current research indicates that public understanding of environmental problems, especially climate change, is poor in both rural and urban Pakistan (Zaheer and Colom, 2013). The nature of the differences observed in this study suggests that direct experience of, and the accessibility of evidence regarding, specific environmental problems may account for rural-urban differences in environmental concern in Pakistan. Problems, such as water scarcity, which affect large parts of Pakistan are similarly experienced by both rural and urban dwellers and are consequently highly salient in both contexts. However, the effects of pollution are more prominent in urban environments, and this makes pollution a more significant and accessible concern for urban residents. Further, evidence from previous research indicates that pro-environmental inclinations in a specific attitudinal or behavioural domain can have spill-over effects on other domains (e.g., Whitmarsh and O'Neill, 2010). Hence, although knowledge of climate change is similarly low in both rural and urban Pakistan, concerns about pollution, especially air pollution, may have a spill-over effect on attitudes toward climate change in urban areas.

In contrast to other studies that have reported age differences in environmental attitudes in both Western and non-Western contexts (e.g., Parizanganeh et al., 2011; Alibeli and Johnson, 2009; Torgler and Garcia-Valiñas, 2007), we found no systematic differences in perceptions of the severity of access to

drinking water, pollution or climate change across age categories in Pakistan. However, education appeared to have a pronounced effect on Pakistanis' perceptions of the seriousness of environmental problems, especially pollution and climate change. In line with previous research (Gelissen, 2007; Givens and Jorgenson, 2011), our findings reiterate the importance of education as a facilitator of environmental awareness and concern. Recently, efforts have been made to incorporate environmental education into the curriculum in schools across Pakistan, which is a positive development and one that may give rise to birth cohort differences in environmental concern among Pakistanis in the future.

We also found that income had a positive effect on Pakistanis' perceptions of environmental problems. Gelissen (2007) argues that personal income is positively associated with pro-environmental attitudes because higher incomes reduce the opportunity costs of serious engagement with environmental concerns. In Pakistan, the distribution of personal incomes is extremely unequal, especially in urban areas. However, Janjua and Kamal (2011) indicate that education is the most significant contributor to poverty alleviation across the country. In addition to its contribution to poverty alleviation, we believe that education may also partly explain the relationship between income and environmental concern among Pakistanis. In Nigeria, Ogunbode and Arnold (2012) found that education is positively associated with income and high-level employment, and Nigerians with intermediate to high levels of formal education who hold skilled or white-collar employment are more likely to encounter environment-related information, have more environmental knowledge and maintain higher levels of environmental concern than their counterparts with a lower socioeconomic status. It seems likely that the same is true of the Pakistani population. In this context, we conclude that although high incomes can facilitate increased environmental concern by enabling individuals to engage with issues beyond the challenges of satisfying basic material needs, a level of formal education is necessary for fostering a substantive appreciation of the broader significance and consequences of environmental problems.

Overall, the demographic trends in perceptions of the severity of environmental problems we observed in Pakistan are congruent with some empirical evidence and theoretical arguments, regarding the social bases of environmental concern in Western contexts. The effect of rural-urban residence on perceptions of environmental problems and willingness to pay for addressing global climate change indirectly supports Inglehart's (1995) argument about the influence of direct experience of environmental problems on environmental concern in developing societies. Ogunbode and Arnold (2012) found that people are more concerned about issues such as air pollution and solid waste manage-

ment than other less visible problems like global warming and biodiversity loss in Nigeria. This suggests that in the absence of a wide-ranging dissemination of environment-related information, as is the case in most Western societies, experiential evidence of environmental problems may be the primary informational basis of environmental attitudes and beliefs in developing societies. Unfortunately, the evidence for some critical environmental problems, such as climate change and biodiversity loss, is not directly observable by lay individuals and more efforts need to be channelled into helping citizens of developing societies identify the links between visible local problems and more abstract overarching environmental issues.

The gender differences in perceptions of environmental problems we observed among our sample of Pakistanis also concur with Stern et al.'s (1993) suggestions that women respond more strongly to the deterioration of the environment than men. Unlike, the other demographic categories we assessed in this study—income, education and urban residence—the effect of gender on environmental perceptions is unlikely to simply be the result of personal experience, since gender by itself does not influence individuals' exposure to environmental problems. However, the lack of gender differences in willingness to pay higher prices for addressing climate change in this context indicates that females' inclinations toward pro-environmentalism may be suppressed by unfavourable social, cultural or economic conditions. We believe that factors such as the generally low level of institutional trust and belief in the efficacy of the government and other agents to administer public contributions toward the resolution of critical environmental issues are significant barriers to Pakistanis' support for monetary or tax-based pro-environmental policies. The implementation of many national environmental programmes across the globe involves large budgets that are often partly or fully funded by taxpayers. The continuity of these programmes largely depends on public confidence that citizens' contributions are being used for the intended purpose. As is the case in Pakistan, corruption, lack of transparency and undemocratic governance are critical challenges in many developing countries. Managing the constraints these challenges impose on the resolution of environmental problems requires taking a step beyond educating the public about environmental issues. More effort needs to be directed at building public trust in the efficacy of the institutions responsible for tackling environmental concerns and making these institutions accountable to the public.

Finally, based on the effect sizes of the demographic attributes we analysed in this study, we believe that other intervening variables may also account for differences in environmental concern in Pakistan than were measured in the survey. Previous research indicates that social psychological factors,

such as attitudes, norms and worldviews, moderate and/or mediate the effects of demographic factors on environmental concern (e.g., Gifford and Nilsson, 2014). Therefore, to better understand the role of demographic factors as bases for pro-environmentalism in Pakistan, it is necessary to explicitly examine the social psychological processes by which demographic factors give rise to differences in environmental concern (Rasool, 2013).

References

- Adeola, Francis O. (1996) "Environmental contamination, public hygiene, and human health concerns in the third world the case of Nigerian environmentalism". *Environment and Behavior* 28(5): 614–646.
- Ali, Jawad, Tor A. Benjaminsen, Ahmed A. Hammad and Øystein B. Dick (2005) "The road to deforestation: An assessment of forest loss and its causes in Basha Valley, Northern Pakistan." *Global Environmental Change* 15(4): 370–380.
- Alibeli, Madalla A. and Chris Johnson (2009) "Environmental concern: A cross national analysis". *Journal of International and Cross-Cultural Studies*, 3(1): 1–10.
- Arnocky, Steven and Mirella L. Stroink (2011) "Gender differences in environmental concern and cooperation: The mediating role of emotional empathy". *Current Research in Social Psychology* 16(9): 1–14.
- Arshad, Sana, Adila Shafqat, Asad A. Khan and Quaratulain Safdar (2013) "Youth environmental complaints in Bahawalpur city, Pakistan: An informational intervention for local environmental governance". *Human Geographies—Journal of Studies and Research in Human Geography*, 7(1): 71–80.
- Azizullah, Azizullah, Muhammad N.K. Khattak, Peter Richter and Donat-Peter Häder (2011) "Water pollution in Pakistan and its impact on public health—a review". *Environment International* 37(2): 479–497.
- Biswas, Asit K. (1987) "Environmental concerns in Pakistan, with special reference to water and forests". *Environmental Conservation* 14(04): 319–328.
- Botetzagias, Iosif and Chrisovaladis Malesios (2012) "The influence of economic affluence and environmental conditions on an individual's concern for the environment: A Greek case study (2005–2007)". *Local Environment* 17(1): 93–113.
- Brechin, Steven R. and Willett Kempton (1997) "Beyond postmaterialist values: National versus individual explanations of global environmentalism". *Social Science Quarterly* 78(1): 16–20.
- Chen, Xiaodong, M. Peterson, Vanessa Hull, Chuntian Lu, Graise D. Lee, Dayong Hong and Jianguo Liu (2011) "Effects of attitudinal and sociodemographic factors on pro-environmental behaviour in urban China". *Environmental Conservation* 38(01): 45–52.

- Dietz, Thomas, Paul C. Stern and Gregory A. Guagnano (1998) "Social structural and social psychological bases of environmental concern". *Environment and Behavior* 30(4): 450–471.
- Dunlap, Riley E. and Angela G. Mertig (1997) "Global environmental concern: An anomaly for postmaterialism". *Social Science Quarterly* 78(1): 24–29.
- Dunlap, Riley E. and Richard York (2008) "The globalization of environmental concern and the limits of the postmaterialist values explanation: Evidence from four multi-national surveys". *Sociological Quarterly* 49(3): 529–563.
- Ehrlich, Paul R. and Anne H. Ehrlich (2013) "Can a collapse of global civilization be avoided?" *Proceedings of the Royal Society B: Biological Sciences* 280(1754): 20122845.
- Fairbrother, Malcolm (2013) "Rich people, poor people, and environmental concern: Evidence across nations and time". *European Sociological Review* 29(5): 910–922.
- Farooqi, Anjum A., Azmat H. Khan and Hazrat Mir (2005) "Climate change perspectives in Pakistan". *Pakistan Journal of Meteorology* 2(3): 11–21.
- Field, Andy, Jeremy Miles and Zoë Field (2012) *Discovering Statistics Using R*. London: Sage Publications.
- Flynn, James, Paul Slovic and Chris K. Mertz (1994) "Gender, race, and perception of environmental health risks". *Risk Analysis* 14(6): 1101–1108.
- Fransson, Niklas and Tommy Gärling (1999) "Environmental concern: Conceptual definitions, measurement methods, and research findings". *Journal of Environmental Psychology* 19(4): 369–382.
- Franzen, Axel and Reto Meyer (2010) "Environmental attitudes in cross-national perspective: A multilevel analysis of the ISSP 1993 and 2000". *European Sociological Review* 26(2): 219–234.
- Furman, Andrzej (1998) "A note on environmental concern in a developing country results from an Istanbul survey". *Environment and Behavior* 30(4): 520–534.
- Gelissen, John (2007) "Explaining popular support for environmental protection: A multilevel analysis of 50 nations". *Environment and Behavior* 39(3): 392–415.
- Gifford, Robert and Andreas Nilsson (2014) "Personal and social factors that influence pro-environmental concern and behaviour: A review". *International Journal of Psychology* DOI: 10.1002/ijop.12034.
- Givens, Jennifer E. and Andrew K. Jorgenson (2011) "The effects of affluence, economic development, and environmental degradation on environmental concern: A multi-level analysis". *Organization and Environment* 24(1): 74–91.
- Government of Pakistan (2012) *Progress Toward Achieving MDG Target 1B: Full and Productive Employment and Decent Work For All*. Statistics Division/Pakistan Bureau of Statistics/Ministry of Economic Affairs and Statistics.
- Greenberg, Michael R. and Dona F. Schneider (1995) "Gender differences in risk perception: Effects differ in stressed vs. non-stressed environments". *Risk Analysis* 15(4): 503–511.

- Hampel, Bill, Roger Holdsworth and Jennifer Boldero (1995) "Urban/rural differences in environmental consciousness among adolescents". *Rural Society* 5(4): 13–27.
- Hansla, André, Amelia Gamble, Asgeir Juliusson and Tommy Gärling (2008) "The relationships between awareness of consequences, environmental concern, and value orientations" *Journal of Environmental Psychology* 28(1): 1–9.
- Hasan, Arif and Ameneh A. Ali (1992). "Environmental problems in Pakistan: Their origins and development and the threats that they pose to sustainable development." *Environment and Urbanization* 4(1): 8–21.
- Holm, Sture (1979) "A simple sequentially rejective multiple test procedure". *Scandinavian Journal of Statistics* 6: 65–70.
- Huddart-Kennedy, Emily, Thomas M. Beckley, Bonita L. McFarlane and Solange Nadeau (2009) "Rural-Urban Differences in Environmental Concern in Canada". *Rural Sociology* 74(3): 309–329.
- Hussain, Majid, Pierre Madl and Khan Alam (2012) "Ambient air quality with emphasis on roadside junctions in metropolitan cities of Pakistan and its potential health effects". *The Health* 3(3): 79–85.
- Inglehart, Ronald (1995) "Public support for environmental protection: Objective problems and subjective values in 43 societies". *Political Science and Politics* 28(01): 57–72.
- Janjua, Pervez Z. and Usman Ahmed Kamal (2011) "The role of education and income in poverty alleviation: A cross-country analysis". *The Lahore Journal of Economics* 1: 143–172.
- Jones, Robert E. and Riley E. Dunlap (1992) "The social bases of environmental concern: Have they changed over time?" *Rural Sociology* 57(1): 28–47.
- Kanagy, Conrad L., Craig R. Humphrey and Glenn Firebaugh (1994) "Surging environmentalism: Changing public opinion or changing publics?" *Social Science Quarterly* 75(4): 804–819.
- Kemal, Ali M. (2003) "Underground economy and tax evasion in Pakistan: A critical evaluation". Pakistan Institute of Development Economics, Islamabad, Pakistan. Research Report 184.
- Kidd, Quentin and Lee Aie-Rie (1997) "Postmaterialist values and the environment: A critique and reappraisal". *Social Science Quarterly* 78(1): 1–15.
- Kim, Doo-Sik (1999) "Environmentalism in developing countries and the case of a large Korean city". *Social Science Quarterly* 80(4): 810–829.
- Leonard, H. Jeffrey and David Morell (1981) "Emergence of environmental concern in developing countries: A political perspective". *Stanford Journal of International Law* 17: 281.
- Lyons, Evanthis and Glynis M. Breakwell (1994) "Factors predicting environmental concern and indifference in 13- to 16-year-olds". *Environment and Behavior* 26(2): 223–238.

- McMillan, MaryBe, Thomas J. Hoban, William B. Clifford and Margaret R. Brant (1997) "Social and demographic influences on environmental attitudes". *Southern Rural Sociology* 13(1): 89–107.
- Milfont, Taciano L. (2012) "Cultural differences in environmental engagement", in Susan Clayton (ed.) *Handbook of Environmental and Conservation Psychology*. Oxford: Oxford University Press.
- Nickerson, Raymond (2003) *Psychology and Environmental Change*. Mahwah: Lawrence Erlbaum Publishers.
- Ogunbode, Charles A. and Kate Arnold (2012) "A study of environmental awareness and attitudes in Ibadan, Nigeria". *Human and Ecological Risk Assessment* 18(3): 669–684.
- Olofsson, Anna and Susanna Öhman (2006) "General Beliefs and Environmental Concern Transatlantic Comparisons". *Environment and Behavior* 38(6): 768–790.
- Oskamp, Stuart (2000) "Psychological contributions to achieving an ecologically sustainable future for humanity". *Journal of Social Issues* 56(3): 373–390.
- Pakistan Environmental Protection Agency (2005). *State of Environment Report*. Islamabad: Ministry of Environment.
- Pakistan Today* (2012) "Polluted water causes 40 % of deaths in Pakistan annually". Available at: <http://www.pakistantoday.com.pk/2012/04/17/national/polluted-water-causes-40-of-deaths-in-pakistan-annually/> (accessed on 22 March 2014).
- Pampel, Fred C. (2014) "The varied influence of SES on environmental concern". *Social Science Quarterly* 95(1): 57–75.
- Parekh, Pravin P., Haider A. Khwaja, Adil R. Khan, Ronaq R. Naqvi, Abdul Malik, Sajjad A. Shah, Khalid Khan and Ghazanfar Hussain (2001) "Ambient air quality of two metropolitan cities of Pakistan and its health implications". *Atmospheric Environment* 35(34): 5971–5978.
- Parizanganeh, Abdolhossein, V. Chris Lakhan, Mahmoud Yazdani and Sajid R. Ahmad (2011) "Modelling categorical data to identify factors influencing concern for the natural environment in Iran". *Journal of Environmental Management* 92(10): 2836–2843.
- Poortinga, Wouter, Linda Steg and Charles Vlek (2004) "Values, environmental concern, and environmental behavior: A study into household energy use". *Environment and Behavior* 36(1): 70–93.
- Purohit, Pallav, Tahira Munir and Peter Rafaj (2013) "Scenario analysis of strategies to control air pollution in Pakistan". *Journal of Integrative Environmental Sciences* 10(2): 77–91.
- Rasool, Faiz (2013) "The environmental behavior research in Pakistan: Why it is needed? And what questions it should address?" *Mediterranean Journal of Social Sciences* 4(6): 285–293.
- Sandvik, Hanno (2008) "Public concern over global warming correlates negatively with national wealth". *Climatic Change* 90(3): 333–341.

- Sarwar, Farhan and Abdus Sattar Abbasi (2013) "An in-depth analysis of women's labour force participation in Pakistan". *Middle East Journal of Scientific Research* 15(2): 208–215.
- Schultz, P. Wesley, Chris Shriver, Jennifer J. Tabanico and Azar M. Khazian (2004) "Implicit connections with nature". *Journal of Environmental Psychology* 24(1): 31–42.
- Shen, Junyi and Tatsuyoshi Saijo (2008) "Re-examining the relations between socio-demographic characteristics and individual environmental concern: Evidence from Shanghai data". *Journal of Environmental Psychology* 28(1): 42–50.
- Steger, Mary Ann E. and Stephanie L. Witt (1989) "Gender differences in environmental orientations: A comparison of publics and activists in Canada and the US". *The Western Political Quarterly* 627–649.
- Stern, Paul C., Thomas Dietz and Linda Kalof (1993) "Value orientations, gender, and environmental concern". *Environment and Behavior* 25(5): 322–348.
- Takács-Sánta, András (2007) "Barriers to environmental concern". *Human Ecology Review* 14(1): 26–38.
- Tahir, Naeem A., M. Rafique and Abdulaziz Alaamer (2010) "Biomass fuel burning and its implications: Deforestation and greenhouse gases emissions in Pakistan". *Environmental Pollution* 158: 2490–2495.
- Tindall, David B., Scott Davies and Celine Mauboules (2003) "Activism and conservation behavior in an environmental movement: The contradictory effects of gender". *Society and Natural Resources* 16(10): 909–932.
- Torgler, Benno and Maria A. Garcia-Valiñas (2007) "The determinants of individuals' attitudes towards preventing environmental damage". *Ecological Economics* 63(2): 536–552.
- United States of America Central Intelligence Agency (2014) *The World Factbook*. Available at: <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2119rank.html> (accessed on 17 April 2014).
- van Liere, Kent D. and Riley E. Dunlap (1980) "The social bases of environmental concern: A review of hypotheses, explanations and empirical evidence". *Public Opinion Quarterly* 44(2): 181–197.
- Weber, Elke U. (2006) "Experience-based and description-based perceptions of long-term risk: Why global warming does not scare us (yet)". *Climatic Change* 77(1–2): 103–120.
- Webster, Peter, Violeta E. Toma and Hyemi Kim (2011) "Were the 2010 Pakistan floods predictable?" *Geophysical Research Letters* 38, L04806, doi:10.1029/2010GL046346.
- Whitmarsh, Lorraine and Saffron O'Neill (2010) "Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours". *Journal of Environmental Psychology* 30(3): 305–314.

- Xiao, Chenyang and Aaron M. McCright (2012) "Explaining gender differences in concern about environmental problems in the United States". *Society and Natural Resources* 25(11): 1067–1084.
- Yu, Xueying (2014) "Is environment a city thing in China? Rural-urban differences in environmental attitudes". *Journal of Environmental Psychology* 38: 39–48.
- Zaheer, Khadija and Anna Colom (2013) "Pakistan: How the people of Pakistan live with Climate Change and what communication can do". BBC Media Action, London. Available at: <http://downloads.bbc.co.uk/rmhttp/mediaaction/pdf/climateasia-reports/ClimateAsiaPakistanReport.pdf>.
- Zelezny, Lynnette C., Poh-Pheng Chua and Christina Aldrich (2000) "New ways of thinking about environmentalism: Elaborating on gender differences in environmentalism." *Journal of Social Issues* 56(3): 443–457.
- Zhu, Tingju, Claudia Ringler, M. Mohsin Iqbal, Timothy B. Sulser and M. Arif Goheer (2013) "Climate change impacts and adaptation options for water and food in Pakistan: Scenario analysis using an integrated global water and food projections model". *Water International* 38(5): 651–669.