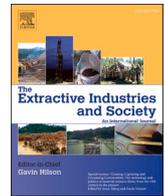




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Original article

Coastal residents' attitudes toward offshore oil and gas drilling in China

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ABSTRACT

This paper reports findings from research which surveyed coastal residents' attitudes toward offshore oil and gas drilling in China. An online survey was carried out in 22 coastal Chinese cities using a questionnaire aimed at collecting demographic information and measuring offshore drilling support, risk, and trust. The data reveal that coastal residents hold a low support, high risk-perception, and moderate trust over offshore oil and gas drilling. NIMBY (Not-In-My-Back-Yard) mentality shows up in citizens' support towards offshore drilling. Coastal residents hold different levels of confidence in offshore drilling claims, based on source and contents. People tend to trust scientific statements more from environmental groups than from the oil industry and have more trust in information according to which offshore drilling is riskier instead of safer than previously anticipated. In addition, demographic differences were captured on support for and trust in offshore oil and gas drilling. Gender, occupation, religious attitude, and dietary habits are uncovered to be predictors of offshore drilling support.

1. Introduction

Offshore oil and gas drilling provides societies with billions of dollars in profit, employs millions of people, and offers substantial tax income for governments (Mukherjee and Rahman, 2016; Taleghani and Tyagi, 2017). However, the sector simultaneously poses substantial risks of polluting the marine environment and threatening marine biodiversity (Kirkwood and Matura-Shepherd, 2011; Mukherjee and Rahman, 2016). Therefore, decisions about offshore drilling such as where to drill, how to operate, and who is qualified to drill create huge social controversies (Haavik, 2012; Smith and Garcia, 1995). Knowledge of human attitudes toward offshore drilling is of vital importance for making considered judgments and formulating long-term energy development strategies for both governments and the energy industry (Flin and Mearns, 1994; Mukherjee and Rahman, 2016; Smith and Garcia, 1995).

Current literature on citizens' attitudes toward offshore drilling mostly centers on three research themes. The first theme is public support to offshore drilling (Freudenburg and Gramling, 1993; Gramling and Freudenburg, 2006). This support has been found to be dependent on location. In the United States, offshore drilling is moderately accepted, more than other energy utilization methods such as hydraulic fracturing (Ceccoli, 2018; Lilley and Firestone, 2013; Mukherjee and Rahman, 2016). Studies of Southwest England have also uncovered more positive attitudes toward offshore oil drilling than toward nuclear

energy (Eiser et al., 1988; Eiser et al., 1989). However, other research finds less favorable attitudes. Acceptance of offshore drilling among residents of coastal California has sharply declined since 1980 (Freudenburg and Gramling, 1993; Michaud et al., 2008; Smith and Garcia, 1995). Residents of the Canary Islands have also expressed a similarly low acceptance of offshore drilling (Ruiz et al., 2018). Public support for offshore drilling has been found to be relatively stable over time. Large-scale environmental accidents, such as the Gulf of Mexico oil spill (2010), have no influence or merely transient influence on public acceptance of offshore drilling (Bishop, 2014; Lilley and Firestone, 2013; Mukherjee and Rahman, 2016). Other driving factors behind this public support include political ideology (Ceccoli, 2018; Lilley and Firestone, 2013), economic considerations (Mukherjee and Rahman, 2016; Ruiz et al., 2018), and basic demographics such as education (Freudenburg and Gramling, 1993; Smith and Garcia, 1995), age (Ceccoli, 2018; Mukherjee and Rahman, 2016), and gender (Michaud et al., 2008).

Some researchers have explored 'not in my back yard' (NIMBY) mentality concerning offshore drilling projects. NIMBY mentality refers to opposition from local communities to projects that are deemed to be necessary, but that are unwanted in one's own vicinity (Burningham et al., 2006; Dear, 1992). Several scholars support the position that proximity can influence public support of offshore drilling (Freudenburg and Gramling, 1993), while others reject this NIMBYism effect

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(Michaud et al., 2008; Smith and Garcia, 1995). In recent years, many social scientists have cast doubts on whether NIMBYism could encompass the motives of local opposition and adequately represent the multidimensional human perception (Bell et al., 2005; Devine-Wright, 2013; Wolsink, 2000; (Wolsink, 2006)). Alternatively, “place attachment” and “place protective action” have been proposed to conceptualize this public opinion and to address the site selection problem this public attitude reflects (Devine-Wright, 2009)(Petrova, 2013). NIMBY concept is employed in the present study because it sufficiently describes the attitude difference related to proximity and public acceptance in the social context (Carley et al., 2020; Konisky et al., 2020; Lindén et al., 2015) and it analyzes the significance that vicinity to offshore oil and gas drilling has in coastal China.

The second research theme of citizens’ attitudes toward offshore drilling is the risk perception of offshore oil and gas drilling among the public. Most literature in this theme focuses on investigating the risk perception of offshore drilling personnel (Rundmo, 1992; Sætren and Laumann, 2015), while some examine other social groups such as students (Mullet et al., 1998) and coastal residents (Michaud et al., 2008). People from different social groups largely possess a similar awareness of the fact that offshore drilling is highly risky (Michaud et al., 2008; Mullet et al., 1998; Ruiz et al., 2018). Offshore drilling operations and drilling impacts are often cited as two chief concerns. Offshore drilling crews recognize drilling operations, particularly the safety of facilities and accident-controlling systems, as the riskiest aspect (Rundmo et al., 1998). The same opinion is true for the spouses of offshore drilling workers (Parkes et al., 2005). Coastal residents identify the environmental impacts of offshore drilling as the main threat including the pollution of the marine environment, the possibility of a serious disaster, and the health risks to local citizens (Eiser et al., 1988; Michaud et al., 2008). University students also feel highly concerned over the health and environmental risks attached to oil and gas, as a previous study in Belgium and France uncovers (Mullet et al., 1998). Although some public risk perceptions may not be supported by scientific risk assessment (Michaud et al., 2008), they still signify public concerns regarding the risks associated with offshore drilling.

The third research theme is public trust in the source and content of information about offshore drilling (Carlisle et al., 2010; Conchie and Donald, 2006; Michaud et al., 2008). Existing literature shows that individuals have more confidence in information that offshore drilling is riskier rather than safer than they anticipated (Carlisle et al., 2010). This is congruent with the aforementioned high risks perceived by the public. Depending on the content, citizens will decide whether to trust the source and accept scientific claims as true (Carlisle et al., 2010; Michaud et al., 2008). For instance, Carlisle et al. (2010) demonstrate that for claims of offshore drilling being safer than anticipated, the public has more trust in environmental groups than the oil industry. To that end, personal political inclination and cultural values are significant in building individuals’ trust in offshore drilling statements (Carlisle et al., 2010; Michaud et al., 2008).

In China, oil and gas account for a combined 27.4% of total energy consumption, with annual growth rates of 5% and 18% respectively (British Petroleum, 2019). Offshore oil and gas drilling in China began modestly in the 1980s but became well-developed in both exploitation and production within decades (Weilin et al., 2016; Yuhong, 2018). Experts estimate that considerable oil and gas resources are reserved at the Chinese coasts and the South China Sea, a large share of which still remains untouched (Chen, 2011; Weilin et al., 2016). Despite the increasing magnitude of offshore oil and gas drilling in China, no research has been conducted that examines the attitudes of the Chinese citizens toward offshore drilling. In particular, there is no information about how coastal residents understand offshore oil and gas drilling in China. The public attitudes of Chinese coastal communities deserve scientific attention because not only do coastal communities directly benefit economically from offshore drilling but the environmental risks and their potentially disastrous impact on local residents, such as those

caused by the Penglai 19-3 oil spill (2011), are valid concerns.

Some previous research has probed public attitudes about issues related to offshore drilling in China. An earlier study among tourists in the Bohai Bay city of Yantai found that Chinese households feel deeply concerned over the oil spills and their subsequent damage to coastal resources, especially the environment and marine life (Liu et al., 2016). According to research about Chinese public attitudes toward nuclear power, the public generally considers environmental NGOs and nuclear power companies to have equal levels of trustworthiness (He et al., 2014). In contrast, more research has been conducted on NIMBYism effect in China. Research has studied how NIMBY protests are triggered, continued, and stopped, and those studies linked the protests to public policing and legislation development (Gu, 2016; Johnson, 2010; Wu and Dai, 2014). NIMBY mentality has been observed in local attitudes toward various energy forms like wind power (Guo et al., 2015), incineration power ((Huang and Yang, 2020); Huang et al., 2015), and nuclear power (Sun and Zhu, 2014). However, these findings are inadequate in depicting a general image of offshore drilling attitudes in China. Now that oil and gas drilling is conducted off the coast, understanding coastal residents’ attitudes toward offshore drilling is of vital importance. In comparison, how U.S. residents, particularly Californians, recognize offshore energy development has been well-documented. It remains unknown if any similarities exist between residents of coastal China and coastal California on the topic of offshore drilling.

Given the lack of literature about Chinese attitudes toward offshore oil and gas drilling, and judging by the existing knowledge from research into other countries, this study aims to fill this knowledge gap by answering the following research questions:

- 1 What attitudes do coastal residents hold regarding offshore oil and gas drilling in China? Especially, how much support do coastal residents in modern Chinese society have for offshore drilling? How much risk associated with offshore drilling do Chinese coastal residents perceive? How much confidence do these residents have in different scientific statements about offshore drilling?
- 2 Does NIMBY mentality also occur in coastal residents’ attitudes toward offshore oil and gas drilling?
- 3 What is the correlation between human demographics such as age, gender, education, occupation, etc., and coastal residents’ attitudes toward offshore oil and gas drilling?

As the first piece of research to investigate attitudes of offshore oil and gas drilling, this study will portray a general image of offshore drilling attitudes in coastal China and will explore the demographic predictors of such attitudes. By assessing coastal residents’ support, risk perception, and trust in offshore oil and gas drilling, a sequence of comparisons will be drawn to examine the similarities and differences between coastal Chinese residents and residents of coastal California. This research also serves as the first to associate offshore oil and gas drilling with NIMBY mentality as well as trust difference in China. The intended impact of this study is to increase scientific knowledge regarding coastal citizens’ attitudes toward offshore energy development in China.

2. Methodology

2.1. Survey

Research data came from an online survey that was conducted

between September 17th and October 8th, 2018 by Kurundata, a certified data company that has previously supported a series of scientific projects. Previous studies have demonstrated that data collected digitally are as valid as paper-based surveys (Knapp and Kirk, 2003). Twenty-two mainland coastal cities¹ were targeted as research sites to examine offshore drilling attitudes in coastal China. These cities were selected because of their proximity to the coast and each coastal province was represented by at least one city. Some of the chosen cities were even geographically close to existing or planned offshore drilling platforms. More importantly, since the late 1970s, central government policies have defined these cities as “Coastal Opening Cities” or “Special Economic Zones” to promote foreign investment and international trade², thus indicating their economic and political significance in modern Chinese society. These advantages make this study’s target cities ideal locations to survey coastal Chinese attitudes about offshore drilling. Survey data were collected in the following manner: A stratified random sampling procedure (Acharya et al., 2013) was performed inside Kurundata’s database, aimed at residents 18 years old and above in 22 selected cities. Then, an invitation with a hyperlink to the online questionnaire was sent to residents in each city that were randomly selected by the system. Participation in this survey was entirely voluntary. A forward and backward translation procedure (Tsang et al., 2017) was applied while translating the original English questionnaire into Chinese to guarantee reliable comprehensibility and consistency. In total, 1,459 invitation letters were distributed during the online survey.

2.2. Questionnaire

Preceded by an open letter, the questionnaire was composed of two independent sections which separately focused on demographics and attitudes about offshore drilling. The first section contained 20 items relating to respondents’ demographic details. Data gathered in this section included age, gender, occupation, educational background, residential location, religious beliefs, and average household income. In addition, respondents were asked to answer questions concerning their personal habits and environmental behaviors, such as meat consumption, car ownership, beach visiting frequency, oil price and clean energy news consumption. The collection of behavioral information was not only to help depict a full image of our participants but to also examine whether behavioral differences could explain different offshore drilling attitudes.

The second section of the questionnaire consisted of three sets of questions that were designed to elicit respondents’ attitudes regarding the support of offshore drilling, the risks associated with offshore drilling, and their trust in statements about offshore drilling. The construction of this section (14 items in total) was based on the three sets of core questions from Michaud et al. (2008) with modifications to suit the Chinese social context. Series A focused on the public support of offshore oil and gas drilling expansion, in respondents’ current residential city, in remote areas, or in or near National Marine Nature Reservation Areas (NMNRA). Two of these questions (support of drilling in respondents’ respective residential cities and remote areas) were specifically included to assess NIMBY mentality in coastal Chinese society. Series B addressed the potential oil spills and health risks associated with offshore drilling activities. To improve our understanding of the risk perception of the Chinese, one question was added in this series regarding the threats to marine life posed by large-scale oil spills. Respondents were requested to rate their perception of the frequency of large-scale oil spills, the threats

caused by large-scale oil spills to human life as well as marine life, and the chances of getting cancer by being in contact with raw oil. Series C focused on public trust in scientific claims made by both the oil industry and environmental groups. Participants were required to indicate their confidence in three individual statements made by scientists from environmental groups and the oil industry. The statements were regarding the health risks attached to living near drilling sites, and if modern technology makes drilling safer or riskier. All questions in this section used a four- or five-point Likert scale to indicate attitudes from negative to positive. Higher sum scores denoted higher positivity levels about offshore drilling. Participants were instructed to self-report based on their own judgments. The overall Cronbach’s alpha of this section reached 0.813, indicating good reliability of the questions (Taber, 2018). However, since series B obtained relatively lower credibility (Cronbach’s alpha = 0.595) than series A (Cronbach’s alpha = 0.791) and C (Cronbach’s alpha = 0.837), further investigation was not conducted for series B.

2.3. Statistical analysis

The statistical analysis was performed using the scientific software IBM SPSS 25. Given that the data in the present study were not normally distributed and could not be normalized, a string of nonparametric tests was carried out to determine coastal residents’ attitudes toward offshore drilling in China. To begin, the descriptive statistics function of SPSS was used to capture some basic attributes of the respondents such as mean age, educational level, and residential location distribution. The public attitudes of offshore drilling were subsequently examined in detail by applying a frequency analysis to each question in the drilling attitude section (support, risk, and trust). Then, a sequence of Wilcoxon Signed-Rank tests was utilized to detect NIMBY mentality in coastal Chinese society and the trust difference in statements from environmental NGOs and the oil industry. Lastly, depending on different types of variables, the Mann-White U test or the Kruskal-Wallis H test was conducted to identify the correlations between offshore drilling attitude and demographics as well as behavioral preferences. A Bonferroni correction was implemented to reduce type I errors when conducting post hoc tests (Hazel et al., 2011). Since no theoretical evidence supports which variable precedes another, simultaneous linear regression tests were conducted to examine the predictors of offshore drilling attitudes within basic demographic factors (age, gender, education, occupation, city, geographic area, residential location, income, religious attitude, and dietary habit). All variables were recoded as dichotomous variables (1-Yes, 0-No) before being adopted into the simultaneous regression tests.

3. Results

3.1. Basic information of respondents

The online survey yielded a sample that consisted of 500 (out of 550) valid responses. Some basic information of survey respondents is shown in Table 1. Judging by Table 1, participants of this survey research were relatively young ($M = 29.63$, $SD = 7.6$) and mostly urban residents. Since the urban-youth constituted the majority of Chinese ‘netizens’ (CNNIC, 2018), it is not surprising that the majority of respondents to this questionnaire were young people and urban residents. Please note that the statistics in Section 3.1 coincide with two other unpublished studies that use the same dataset (Chen and Martens, 2019; Chen and Martens, in press).

3.2. Public attitudes toward offshore drilling

Overall, the survey’s respondents expressed low support, high-risk perception, and moderate confidence in offshore oil and gas drilling in coastal Chinese society.

¹ The 22 coastal cities included in this study are: Dalian, Yingkou, Qinhuangdao, Tianjin, Yantai, Weihai, Qingdao, Lianyungang, Nantong, Shanghai, Ningbo, Wenzhou, Fuzhou, Xiamen, Shantou, Guangzhou, Shenzhen, Zhuhai, Zhanjiang, Beihai, Haikou, and Sanya.

² See different State Council documents in 1979, 1980, 1981, 1984, 1985, and 1988.

Table 1
Basic information of respondents

Demographics (N=500)	n (%)	Demographics	n (%)
Age group		Average household income/month (X)	
18-30	322 (64.4)	X ≤ 2,000 yuan/month	10 (2.0)
31-40	144 (28.8)	2,000 yuan/month < X ≤ 4,000 yuan/month	32 (6.4)
41 ≤	34 (6.8)	4,000 yuan/month < X ≤ 6,000 yuan/month	75 (15.0)
Gender		6,000 yuan/month < X ≤ 8,000 yuan/month	105 (21.0)
Female	295 (59)	8,000 yuan/month < X ≤ 10,000 yuan/month	129 (25.8)
Male	205 (41)	10,000 yuan/month < X	143 (28.6)
Educational background		No answer	6 (1.2)
Less than high school	2 (0.4)	Residential location	
High school	17 (3.4)	Urban area	463 (92.6)
Junior college program	63 (12.6)	Rural area	37 (7.4)
University bachelor degree	349 (69.8)	Geographic area (Qingling-huaihe boundary)	
Master degree and above	69 (13.8)	South China	300 (60)
Occupation		North China	200 (40)
Liberal Profession	36 (7.2)	Attitude to religion/spirituality	
Civil Servant/Public Institute	85 (17.0)	Important in life	338 (67.6)
Employee (Enterprises)	273 (54.6)	Not important in life	162 (32.4)
Self-employed	44 (8.8)	Dietary habit (meat-eating frequency)	
Retired	2 (0.4)	Vegetarian/Vegan	12 (2.4)
Student	50 (10.0)	Once a week	43 (8.6)
Social Welfare	1 (0.2)	2-3 days a week	100 (20.0)
Other	3 (0.6)	4-6 days a week	237 (47.4)
No Answer	6 (1.2)	Everyday	108 (21.6)

Responses from participants revealed that coastal citizens' support for offshore oil and gas drilling was quite low. The mean and median of each question in series A were 2.59/3 (expanding offshore drilling), 2.27/2 (drilling in respondents' current residential city), 2.9/3 (drilling in remote areas), and 2.35/2 (drilling in or near National Marine Nature Reservation Areas). The average answers to all four questions fell into the range of 2 (disagree) to 3 (neither agree nor disagree). Fig. 1 summarizes responses to the questions in series A questions (shown in percentage). As Fig. 1 displays, there were more disapproval rates (strongly disagree and disagree) than approval rates (strongly agree and agree) on all four supporting issues targeted in this research. Among these topics, drilling in respondents' current residential city attained the highest level of disapproval (64%). A similar level of disapproval (62%) was associated with drilling in or near National Marine Nature Reservation Areas. Nearly half of the answers (48.4%) in response to questions about expanding offshore drilling in Chinese coastal areas were negative. About one-third of respondents (34.2%) were opposed to drilling in remote areas. In striking contrast, the most support for offshore drilling was associated with drilling in remote areas (28.4%), followed by drilling in/near NMNRAs (17.8%), expanding offshore drilling in Chinese coastal areas (15.4%), and drilling in respondents' current residential city (10.6%). In addition, the medians of drilling in respondents' current residential city and in or near NMNRAs were both within 2 (disagree), while the medians of expanding offshore drilling and drilling in remote areas were both 3 (neither agree nor disagree). This indicated that the public is in stronger objection to drilling in their current residential city and in or near NMNRAs than expanding offshore drilling and drilling in remote areas.

Data analysis also discovered that the risks associated with offshore oil and gas drilling were of deep concern to survey respondents. The mean and median of each question in series B were 2.38/2 (frequency of large-scale oil spills), 1.62/2 (threat to human life), 1.40/1 (threat to marine life), and 1.67/1 (risks of getting cancer). Nearly all the means and medians were in the range between 1 (serious risk) and 2 (moderate risk), implying strong negative feelings to the issues questioned in this series. Fig. 2 lists the results of participants' risk perception of offshore oil and gas drilling in China (shown in percentage). Over 60% of respondents (62.2%) felt that large-scale oil spills happened less than every ten years. Approximately half of the respondents felt that large-scale oil spill events would pose "a great deal" of threat to human life (49.8%) and that contact with unrefined oil would create a "serious risk"

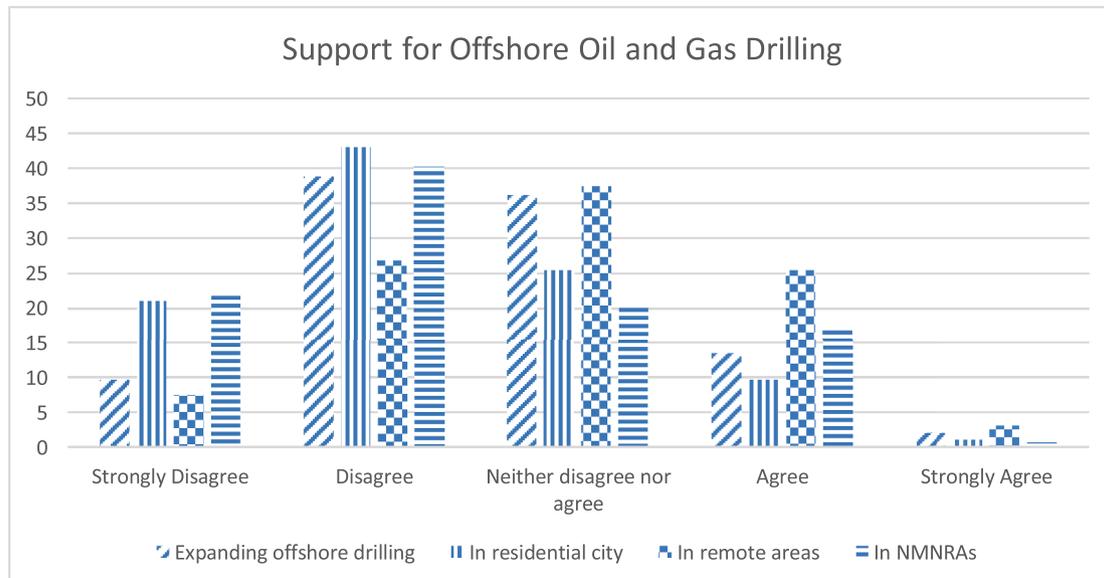


Fig. 1. Coastal residents' support for offshore oil and gas drilling.

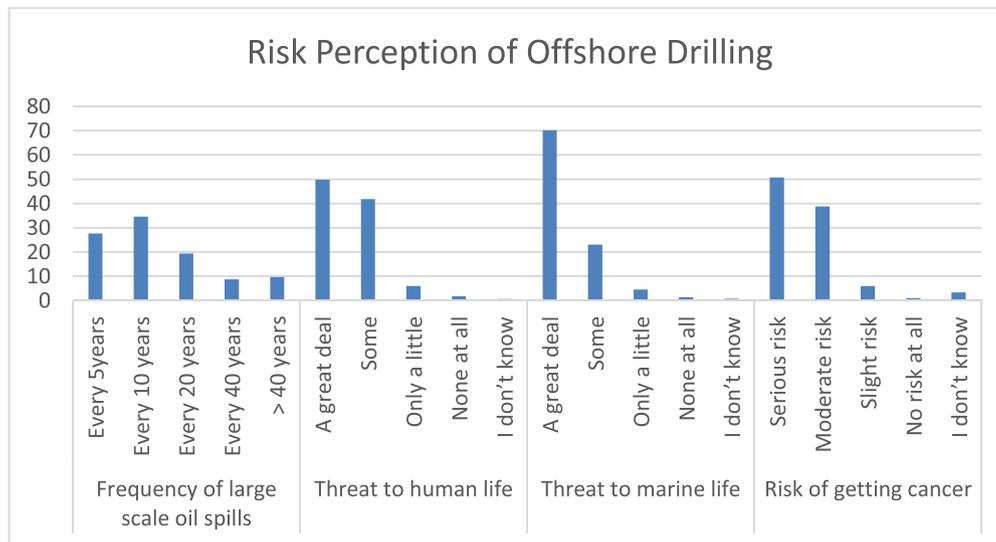


Fig. 2. Coastal residents' perception of risks associated with offshore oil and gas drilling.

of getting cancer (50.8%). Seventy percent of respondents believed that large-scale oil spills could bring about “a great deal” of threat to marine life.

However, scientific assessments of oil spill risks do not fully correlate with respondents' perceptions. Large-scale oil spill events caused by drilling platforms in Chinese coastal areas have occurred very rarely in recent history. For example, although 13 large marine oil spill events (>1000t spilled oil) have occurred off the coasts of China between 1971 and 2011, the majority of these spills were caused by tanker collisions, rather than offshore drilling (Gong et al., 2018). Regarding the threat of health risks, despite updated scientific research that has exposed the physical and psychological impacts that oil spills and cleanup operations may have on human life, there is no sufficient evidence to support the high risk of getting cancer or another lethal illness from coming into contact with raw oil (Aguilera et al., 2010; Laffon et al., 2016).

In terms of confidence in scientific claims about offshore oil and gas drilling, respondents to this survey displayed moderate trust toward these statements. The mean and median of each question in this section are shown in Table 2 (comparisons 2–4). All mean and median figures were located in the range of 2 (some confidence) to 3 (a moderate amount of confidence). Considering that questions in series C were designed on a 4-point Likert scale, this range represents a reasonable confidence in scientific claims. Figure 3 presents the results of coastal citizens' confidence in different scientific statements about offshore drilling (shown in percentage). As this diagram indicates, respondents provided more responses of “almost no confidence at all” and “only some confidence,” and less responses of “a moderate amount of confidence” and “a great deal of confidence” on each statement from the oil industry than they did on statements from environmental groups. Regardless of the statement's source, more responses of “a moderate amount of confidence” and “a great deal of confidence” and less responses of “almost no confidence at all” and “only some confidence” were given to “new technology makes drilling riskier than before” than the safer equivalent statement. In addition, “a moderate amount of confidence” was the most favored reply given by survey respondents for all six statements.

3.3. Support and trust difference in offshore drilling attitudes

Throughout the descriptive analyses, many differences in public attitudes toward offshore drilling were identified, particularly in the support of different drilling locations and confidence in different scientific claims. A series of Wilcoxon Signed-Rank tests were performed to determine if these differences were statistically significant. Table 2

Table 2

Test results of support and trust differences in offshore drilling attitudes

Comparison	Mean	SD	Median	Z value	Sig (2-tailed)
1 Drilling in residential city	2.27	0.93	2	-13.352	$p < .001$
Drilling in remote areas	2.90	0.96	3		
2 Health risks on living near drilling sites from oil industry	2.44	0.81	3	-7.122	$p < .001$
Health risks on living near drilling sites from ENGOS	2.64	0.83	3		
3 New tech makes drilling safer than before from oil industry	2.44	0.74	2	-4.603	$p < .001$
New tech makes drilling safer than before from ENGOS	2.58	0.79	3		
4 New tech makes drilling riskier than before from oil industry	2.65	0.80	3	-3.310	$p = .001$
New tech makes drilling riskier than before from ENGOS	2.76	0.79	3		
5 New tech makes drilling safer than before from oil industry	2.44	0.74	2	-5.910	$p < .001$
New tech makes drilling riskier than before from oil industry	2.65	0.80	3		
6 New tech makes drilling safer than before from ENGOS	2.58	0.79	3	-4.635	$p < .001$
New tech makes drilling riskier than before from ENGOS	2.76	0.79	3		

All p values in the table represent asymptotic significances.

displays these tests' results regarding the support of different drilling locations and confidence in different scientific claims.

As Table 2 shows, participants rated “drilling in residential city” significantly lower than “drilling in remote areas,” indicating a more negative attitude toward drilling in their respective residential cities than in remote areas. Such negative feelings are strong evidence of the existence of NIMBY mentality on offshore drilling in coastal Chinese society. Test outcomes also proved that respondents' trust differences

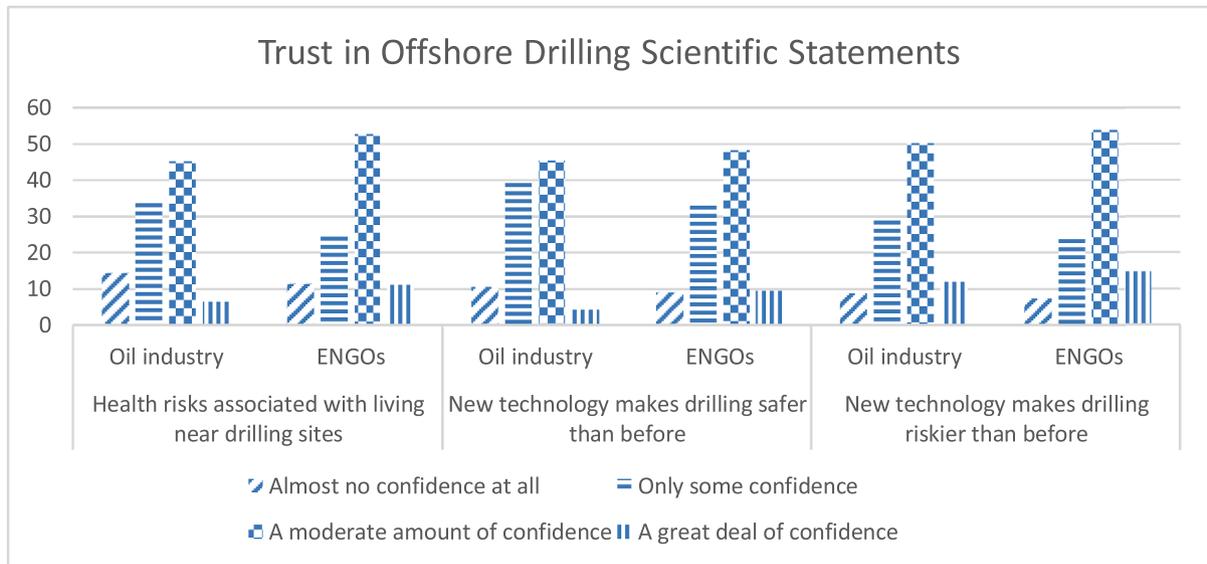


Fig. 3. Coastal residents' trust in scientific statements regarding offshore oil and gas drilling.

regarding scientific claims were statistically meaningful according to both source and content. Our respondents rated the validity of all three statements made by the oil industry significantly lower than statements made by environmental groups. Likewise, respondents graded all the claims that implied offshore drilling was safe significantly lower than claims that implied offshore drilling was risky.

3.4. Demographic differences and predictors of offshore drilling attitude

The next step of this study was to investigate the correlation between demographics and coastal residents' attitudes about offshore drilling. Before that, we examined if there were any demographic differences in offshore drilling attitudes. Table 3 shows the results of the Mann-Whitney U tests and the Kruskal-Wallis H tests that were performed on each series of questions. As indicated in Table 3, male respondents and respondents who believe religion/spirituality is important in life scored significantly higher than female respondents and people who believe religion/spirituality is not important in life. On the topic of confidence in scientific claims, vegetarians/vegans scored significantly lower than people who eat meat daily. Nevertheless, no significant differences were detected regarding respondents' city of residence, education level, occupation, or household income for offshore drilling support or trust scores.

This analysis further explored the predictors of offshore drilling attitude scores according to basic demographic factors. A simultaneous linear regression test uncovered that gender, occupation, religious attitude, and dietary habit are predictors of offshore drilling support scores. However, the correlation between demographic factors and offshore drilling risk as well as trust scores were both rejected by multiple linear

Table 3 Demographic differences on offshore drilling attitudes

Demographics	Series	Comparison	Mean	SD	Test Results
Gender	Support	Male	10.56	2.88	U (205,295) = 25782.500, Z = -2.820, p = .005
		Female	9.79	3.06	
Religion/Spirituality Attitude	Support	Important	10.35	3.12	U (338,162) = 23007.500, Z = -2.907, p = .004
		Not Important	9.59	2.68	
Dietary habit – Meat consumption	Trust	Vegetarians/vegans	12.17	5.06	H (4) =12.495, p = .014, Post-hoc p = .045
		Everyday	16.27	3.15	

All p values in the table represent asymptotic significances.

regression tests (both p > .05). The results of these multiple linear regression tests are reported in Table 4 (only significant correlations are listed).

4. Discussion

The present study aims to portray a general image of coastal residents' attitudes toward offshore oil and gas drilling in China. The results of the survey reveal that citizens maintain relatively negative perceptions of offshore oil and gas drilling in coastal China and that NIMBYism and trust differences do exist in their attitudes. In addition, some basic demographics, such as gender, occupation, religious attitudes, and dietary habit, are predictors of coastal residents' support for offshore oil and gas drilling.

4.1. Offshore drilling attitude in coastal Chinese society

This study determines that support for offshore oil and gas drilling in coastal Chinese society remains at a low level. Coastal residents' limited support is unvarying according to different drilling locations or an increase in future offshore drilling. As a potential result of this attitude, it would come as no surprise if future offshore drilling projects along Chinese coasts encounter civic protests. In fact, it is not difficult to comprehend why coastal residents are reluctant to support offshore oil and gas drilling in China. On one hand, traditional Chinese culture favors the harmonious coexistence of human beings and the environment. Confucianism promotes the concept of "tianren heyi," which refers to harmony between human society and nature (Xinzhong, 2014). Taoism

Table 4 Predictors of offshore drilling support

Offshore Drilling Support (df=48, F=1.455, R=0.366)	Unstandardized Coefficients B	Std. Error	Std. Coefficients Beta	t	p
Constant	9.999	0.861		11.615	<.001
Gender (female)	-0.632	0.296	-0.104	-2.133	.033
Occupation (self-employed)	1.288	0.521	0.122	2.474	.014
Religion/Spirituality (important)	1.017	0.316	0.159	3.221	.001
Dietary habit (vegetarian/vegan)	-2.292	0.915	-0.117	-2.505	.013

promotes a “wuwei” philosophy, which has no tolerance for human action that is against the laws of nature (Waistel, 2012). As two cornerstones of traditional Chinese culture, Confucianism and Taoism deeply engrain an environmental-friendly belief in the Chinese mindset. Offshore drilling will alter the appearance of nature and jeopardize the balance of the marine ecosystem, therefore contradicting the Chinese ideal of harmonious coexistence. On the other hand, past maritime disasters may have significantly decreased public support for offshore drilling (Lilley and Firestone, 2013; Smith and Garcia, 1995). This study considers that the limited support of coastal communities may result from a maritime disaster that happened in 2011: the Penglai 19-3 oil spill. This accident is the most serious offshore oil spill in China to date, contaminating 840 km² of water as well as causing a catastrophic economic loss in aquaculture (Liu et al., 2015). Likewise, continuous marine disasters from abroad, such as the Gulf of Mexico oil spill (2010) and Fukushima Daiichi nuclear accident (2011), may further deteriorate coastal residents’ already weak support of offshore drilling.

Throughout the data, a strong trend of risk perception regarding offshore drilling from the respondents was witnessed. As previously mentioned, coastal residents maintain deep concerns about the frequency and severity of offshore oil spills caused by drilling operations, even though this perception may be scientifically unfounded. A huge gap currently exists between the perceived risks associated with offshore drilling and the actual situation. When the results of this study were compared with the results of the California study (Michaud et al., 2008), both similarities and dissimilarities regarding coastal citizens’ risk perception were uncovered. Similar to coastal Chinese residents, respondents in the coastal California study were also apt to overstate the potential risks associated with offshore drilling. For example, 68% of respondents believed that oil spills posed “a great deal of” or “some” threat to human life. Fifty-two percent of those surveyed believed that contact with unrefined oil poses a “serious” or “moderate” risk of getting cancer. When the values of these percentages are compared between the two studies, offshore drilling risks were much more exaggerated by coastal Chinese residents than their Californian equivalents. An interesting finding of this comparison was that coastal Chinese residents’ deep concerns about the potential risks of offshore drilling incorporate impacts on both human health and the living conditions of marine life.

Whether or not perceived risks truly correspond to facts, it is clear that coastal Chinese residents identify offshore oil and gas drilling as very risky. This high-risk perception is an outcome of various factors, to which coastal environmental attitudes and the mass media contribute the most. Previous research has shown that coastal and urban citizens in China tend to hold an environmentally-friendly worldview (Liu and Mu, 2016; Xiao et al., 2013). They feel concerned not only about general environmental problems such as air and water pollution (Shen and Saijo, 2008) but also about the construction of large-scale chemical projects, such as para-xylene and nuclear power plants (Huang et al., 2013; Steinhart and Wu, 2016). Compared to citizens in other regions, coastal residents possess a more thoroughly developed sense of environmental awareness. Thus, concerns about environmental quality seem to influence their risk perception of offshore drilling. Another reason for such high-risk perception may derive from the mass media’s coverage of environmental disasters. For many people, media reports serve as the primary method of gaining disaster information, thereby shaping personal perception (Quarantelli, 1991; Yan and Bissell, 2018). Previous studies from western countries found that media narratives largely centered on the ongoing situations of disasters and their impacts upon physical health and economic growth while contributing poorly to the promotion of public understanding and the preparedness of environmental crises (Houston et al., 2012; Quarantelli, 1991). That is to say, mass media had the potential to properly reinforce public awareness of severe risks but insufficiently provided individuals with the whole image of an environmental disaster. Although it remains unclear whether this remains true for mass media in China, the pursuit of news values, by the journalism industry, particularly with eye-catching severe-risk stories, is

consistent worldwide.

Although public support and risk perception of offshore drilling are both negative, this study’s statistical analysis reveals a moderate amount of trust in offshore drilling statements. Overall, coastal Chinese citizens have moderate confidence in offshore drilling claims made by scientists regardless of their affiliations. It seems paradoxical that citizens lack support and sense the high risk associated with offshore drilling but have faith in statements about offshore drilling. However, citizens have confidence in the identity of scientists rather than in the sources of their claims. In this study’s questionnaire, these statements are specified as coming from scientists, which are highly trusted and esteemed in Chinese society because they represent troubleshooting, prestige, and professionalism (CRISP, 2010; Hongbin et al., 2008; Zhongliang, 1991). Such respect for scientists is irrespective of whom they are working for, as their judgments are deemed trustworthy. A second possible explanation is the lack of information about offshore drilling. Historically, coal, rather than oil and gas, has dominated the Chinese energy consumption market (British Petroleum, 2019; National Bureau of Statistics of China, 2019). Therefore, public interest in offshore oil drilling has hardly developed. Finally, as mentioned earlier, the media are inclined to report accidents instead of scientific knowledge because accidents are considered more newsworthy (Harcup and O’neill, 2017). Consequently, coastal citizens do not have many other options besides trusting claims from their only sources, i.e., the oil industry and environmental groups.

4.2. NIMBY mentality and trust differences in offshore drilling attitude

The present study discovered that coastal residents’ opposition varies upon different drilling places in China. Coastal citizens object to offshore drilling in their current residential city notably more than drilling in remote areas. This opposition difference turns out to be statistically significant. It is safe to say NIMBY mentality emerges in coastal residents’ attitudes toward offshore oil and gas drilling in China. A series of previous studies captured NIMBY mentality in public attitudes toward different kinds of energy projects in China (Gu, 2016; Huang and Yang, 2020). The present study confirms that NIMBY mentality also applies to offshore oil and gas drilling in coastal China. Although research about Americans’ attitudes toward energy demonstrated that NIMBY mentality does not usually influence citizens’ opposition to oil projects, researchers also discovered that public support decreases when oil projects are nearby (Konisky et al., 2020; Michaud et al., 2008). This mentality has been explained from various perspectives, ranging from the unbalanced distribution of costs and benefits, to the awareness of residential rights and identity, to the demand for more public participation (Johnson, 2010; Sun, 2015; Wu and Dai, 2014). In the context of offshore drilling, NIMBYism signifies a disconnect between coastal energy development and ocean conservation. For coastal residents, the emergence of NIMBY mentality proves their rejection of potentially-contaminating drilling projects but does not necessarily imply their concern for environmental quality. In many cases, environmental protection is used as an occasional argument to cover NIMBY considerations (Johnson, 2010; Michaud et al., 2008). In other words, ocean conservation is not the end but the means for resisting offshore drilling, as ocean conservation is deemed secondary to residential needs. NIMBY mentality may simply be the result of a collective need for better living conditions, whereas ocean conservation serves as an argument to justify residential rejection. Such a situation brings about challenges to the sustainable integration of coastal energy development and ocean conservation.

Aside from NIMBY mentality, coastal Chinese residents also cast different levels of doubt on scientific claims regarding offshore drilling. Compared with the oil industry, coastal citizens have more confidence in scientific messages from environmental groups, whether the message emphasizes safety or risk. This finding differs from Carlisle et al. (2010), who found that, in the American context, the source alone made no

difference in public trust, but the interaction between source and content could. When it comes to content, coastal citizens are more likely to believe negative news rather than positive news about the safety of drilling, irrespective of the source of the message. This is consistent with results from earlier studies that determined negative news about potential risks is more accepted by the public than positive news (Carlisle et al., 2010; Kraus et al., 1992). Both coastal Chinese and coastal Californians have more confidence in messages that indicate risks than safety, while the source of those messages only matters to coastal Chinese residents. This may be related to the different priorities that coastal Chinese and coastal Californians assign to the credibility of their sources. For coastal Chinese residents, the direct interests of oil companies in offshore drilling unavoidably impair the credibility of their messages, thereby causing individuals to find environmental groups more trustworthy. Moreover, the disappointing responses from ConocoPhillips to the Penglai 19-3 Oil Spill (Yin et al., 2015) could have also eroded public trust in statements from the oil industry. In contrast, Californians may consider that a source's credibility is secondary to one's core values or existing beliefs (Carlisle et al., 2010).

4.3. Demographics and offshore drilling attitude

This study also yields several findings regarding demographic differences in offshore drilling attitudes. Men and individuals who think religious beliefs are important tend to be more pro-offshore oil and gas drilling than women and those who think religious beliefs are less important in life. Trust difference in scientific claims relates to different dietary habits. Vegetarians/vegans have significantly less confidence in scientific statements than those who consume meat daily. In terms of predictors of offshore drilling attitude, this study determined that gender (female), occupation (self-employed), religious attitude (important in life), and dietary habits (vegetarian/vegan) are influential to citizens' support of offshore oil and gas drilling. Some of our predictors are consistent with findings from American cases, i.e., women in the United States are also found to be less supportive of offshore drilling than men (Michaud et al., 2008; Mukherjee and Rahman, 2016). Notably, two demographic factors that were uncovered to be predictors in the Californian study (Michaud et al., 2008), namely education and age, turn out not to be influential in this study. In fact, the connections between offshore drilling support and education or age are still far from clear. Despite some literature that discovered education and age to be influential in offshore drilling support, Ceccoli (2018) presented different results about education as a predictor. In the California study from Michaud et al. (2008), although education and gender were predictors of Californians' offshore drilling support, they were each only influential to one of the drilling locations, rather than all of them. Further research is still needed to better understand the correlation between offshore drilling support and education or age.

To some extent, the outcomes of this study were relatively expected. A robust body of literature has revealed that females are generally more aware of environmental protection than males (Domingues and Gonçalves, 2020; Mohai, 1992; Zelezny et al., 2000). Compare to men, women are more likely to view the world as a whole and to be aware of the harmful consequences of environmental degradation (Stern et al., 1993). As for the role of religion in offshore drilling attitude, existing literature suggests that religiosity is usually negatively correlated with concerns about the environment (Arbuckle and Konisky, 2015). In nearly all monotheistic religions, humans have the role of environmental stewardship and priority over nature (Wardekker et al., 2008). For people who deem religious beliefs to be important in life, it is necessary to take initiatives (human activities) to fulfill their sacred stewardship. Vegetarianism is connected to an environmentally-friendly outlook (Fox and Ward, 2008; Ruby, 2012) which conflicts with the practice of offshore oil and gas drilling. The low support of offshore drilling and low confidence in scientific statements from vegetarians/vegans may stem from this positive environmental link.

Interestingly, this study's data analysis revealed the self-employed occupation to be a predictor of support for offshore drilling. The decision to enter into self-employment usually signifies better tolerance of uncertainties in life and the preference for independency (Ahn, 2010; Douglas and Shepherd, 2002). It is plausible that these qualities of self-employed individuals facilitate a pro-offshore oil and gas drilling attitude.

5. Conclusion

This research investigated coastal residents' attitudes toward offshore oil and gas drilling in China. The data have revealed that coastal residents maintain low levels of support, high risk-perception, and moderate trust in offshore oil and gas drilling. NIMBY mentality is apparent in coastal residents' support toward offshore drilling because residents object less to the drilling in remote areas than in their respective cities. Coastal residents tend to trust scientific statements from environmental groups more than from the oil industry and have more trust in information according to which offshore drilling is riskier instead of safer than previously anticipated. Gender, occupation, religious attitude, and dietary habit are predictors of support for offshore oil and gas drilling.

This research may help to promote a better understanding of a sustainable human-ocean relationship. Given the competing interests in offshore drilling, knowledge of citizens' attitudes is of vital importance to make considered judgments and to formulate long-term energy development strategies, both by governments and the energy industry. The findings of this study are beneficial to various stakeholders in China's coastal zone governance sector. Policy-makers can anticipate NIMBY mentality or even protests when planning future offshore drilling projects.

Finally, some limitations of this study must be mentioned. The online survey included few replies from rural areas and the elderly. This may explain why the data analysis section of this study showed no differences in results for the differentiation in age or for living in urban or rural areas. Furthermore, this research did not further investigate the reasons behind some demographic differences in coastal citizens' attitudes toward offshore drilling. Although this study discovered that religious attitude and occupation are predictors of offshore drilling support, it is inconclusive what religion or religious beliefs are influential and how exactly self-employment contributes to a pro-offshore drilling attitude. These outstanding issues remain to be investigated in more detail.

Questionnaire

This social survey is part of the research project "Human-Ocean relationship in Contemporary Chinese Society". The object of this social survey is to gain better understanding of public attitudes towards offshore oil and gas drilling in contemporary Chinese society. We aim at answering the questions of what are the underlying factors that shape these attitudes in coastal Chinese society. Thus, we would like to invite you to fill in this questionnaire. Based on your internal ideas and standing position, please indicate your perception regarding offshore oil and gas drilling. The results of this survey will be used for increasing the conservation for offshore resources, creating harmonious marine ecological environment, and proposing feasible suggestions for public and economic policies.

All the information you provided will be kept completely confidential. Your personal information will not be released to or viewed by anyone other than the researchers involved in this project. Results of this study will not include your name or any other identifying characteristics – unless you give the permission for that.

If you have any questions, during or after filling in this questionnaire, please contact us.

Thank you very much for your cooperation!

Part I: Personal Details

Personal Information

1. What is your birth year? ___ (eg. 1972)
2. What is your gender?
 - a. Male
 - b. Female
3. Which coastal city area do you currently live in?

Liaoning Province: a. Dalian b. Yingkou
 Hebei Province: c. Qinhuangdao
 Tianjin City: d. Tianjin
 Shandong Province: e. Yantai f. Weihai g. Qingdao
 Jiangsu Province: h. Lianyungang i. Nantong
 Shanghai City: j. Shanghai
 Zhejiang Province: k. Ningbo l. Wenzhou
 Fujian Province: m. Fuzhou n. Xiamen
 Guangdong Province: o. Shantou p. Guangzhou q. Shenzhen r. Zhuhai s. Zhanjiang
 Guangxi Province: t. Beihai
 Hainan Province: u. Haikou v. Sanya
4. What is your current residence place?
 - a. Urban areas (a geographical area constituting a city or town)
 - b. Rural areas (an area outside of cities or towns)
5. What is the highest level of education you have completed?
 - a. Less than high school
 - b. High school
 - c. Junior college program
 - d. University bachelor degree
 - e. Master degree and above
 - f. Other___
 - g. No answer
6. What is the average income (X) per month per person in your household?
 - a. $X \leq 2,000$ yuan/month
 - b. $2,000 \text{ yuan/month} < X \leq 4,000 \text{ yuan/month}$
 - c. $4,000 \text{ yuan/month} < X \leq 6,000 \text{ yuan/month}$
 - d. $6,000 \text{ yuan/month} < X \leq 8,000 \text{ yuan/month}$
 - e. $8,000 \text{ yuan/month} < X \leq 10,000 \text{ yuan/month}$
 - f. $10,000 \text{ yuan/month} < X$
 - g. No answer
7. What is your occupation?
 - a. Liberal profession
 - b. Civil servant/ Public institute
 - c. Employed (enterprise)
 - d. Self-employed
 - e. Retired
 - f. Student
 - g. Social welfare
 - h. Other___
 - g. No answer
8. Is religion/spirituality important in your life?
 - a. Yes
 - b. No (go to question 10)
9. (Follow 8) If yes, then what is your main source of inspiration (multiple answers possible)?
 - a. Buddhism
 - b. Taoism
 - c. Islam
 - d. Christianity
 - e. Catholicism
 - f. Judaism
 - g. Other___
10. Do you belong or donate to an organization or charity involved in or concerned with (multiple answers possible):
 - a. Improving the welfare of animals
 - b. Conservation of the natural environment
 - c. Improving human rights or health
 - d. Not belong or donate to any organization mentioned above
11. Do you own a (at least 1) pet(s)?
 - a. Yes
 - b. No (go to question 13)
12. (Follow 11) If yes, what pet do you have (multiple answers possible)?
 - a. Cat(s)
 - b. Dog(s)
 - c. Fish
 - d. Bird(s)
 - e. Reptile(s)
 - f. Rodent(s)
 - g. Chickens, pigeon, geese (or other poultry)
 - h. Ponies, horses
 - i. Other___

(continued on next column)

(continued)

13. How often do you eat meat (including fish) every week?
 - a. I do not eat meat, I am a vegetarian/vegan
 - b. Once a week
 - c. 2-3 days a week
 - d. 4-6 days a week
 - e. Every day
14. How often do you visit a zoo or aquarium?
 - a. Once a month or less than a month
 - b. Once a half-year
 - c. Once a year
 - d. Once two years or more than two years
 - e. Never
15. How often do you visit the beach?
 - a. Everyday
 - b. Once or twice a week
 - c. Once or twice a month
 - d. Once or twice a half-year
 - e. Once a year
 - f. Once two years or more than two years
 - g. Never (go to question 17)
16. While visiting the beach, which of the following options is the most important to you?
 - a. Natural environment (waves, sunshine, sands, etc.)
 - b. Beach sports (swimming, surfing, diving, etc.)
 - c. Leisure atmosphere (free of pressure, cute girls or boys around, etc.)
 - d. Recreational activities (photographing, barbecue, painting, etc.)
 - e. Others:___
17. Do you own a (at least 1) car?
 - a. Yes
 - b. No
18. Except for the necessity factors (distance, time, speed), which factor is more important to you when choosing transport means (car, metro, train, bus, bicycle, etc.)?
 - a. Environmental factor (waste gas emission, climate change, etc.)
 - b. Economic factor (oil price, ticket price, high-speed road fee, etc.)
 - c. Personal preference (more free space, need of privacy, showing social status, etc.)
 - d. Others:___
19. Which of the following statements best describes your reading habit of oil and gas prices related news reports?
 - a. I never read these news reports even if they appear directly on TV or Internet news.
 - b. When they appear directly on TV or Internet news, I read these news reports roughly.
 - c. When they appear directly on TV or Internet news, I read these news reports carefully.
 - d. I actively search for and pay close attention to these news reports.
 - e. Other:___
20. Which of the following statements best describes your reading habit of clean energy (wind, solar power, etc) related news reports?
 - a. I never read these news reports even if they appear directly on TV or Internet news.
 - b. When they appear directly on TV or Internet news, I read these news reports roughly.
 - c. When they appear directly on TV or Internet news, I read these news reports carefully.
 - d. I actively search for and pay close attention to these news reports.
 - e. Other:___

Part II: Offshore drilling attitude

Listed below are 14 statements or questions about offshore drilling attitude. Please give your answers towards each item. There are no right or wrong answers. We are interested in your reaction to such matters of opinion.

1. Oil companies should be allowed to drill more oil and gas wells in offshore areas along Chinese seacoasts.

a = Strongly disagree; b = Disagree; c = Neither agree or disagree; d = Agree; e = Strongly agree
2. Suppose a new offshore oil drilling platform were planned to be built off the coast of your city, near the area you are currently living in. Would you support or oppose its construction?

a= Strongly oppose; b = Oppose; c = Neither oppose or support; d = Support; e = Strongly support
3. Suppose a new offshore oil drilling platform were planned to be built in a remote area off the coast of your city? Would you support or oppose its construction?

a = Strongly oppose; b = Oppose; c = Neither oppose or support; d = Support; e = Strongly support

(continued on next page)

(continued)

4. The Chinese central government should allow oil drilling in or near the National Marine Nature Reservation Areas.
a = Strongly disagree; b = Disagree; c = Neither agree or disagree; d = Agree; e = Strongly agree
5. In your opinion, how often would a large-scale oil spill happen in Chinese coastal areas?
a. Every 5 years; b. Every 10 years; c. Every 20 years; d. Every 40 years; e. More than 40 years
6. In your opinion, if a large-scale oil spill occurs, how much threat does it pose to human life?
a. A great deal; b. Some; c. Only a little; d. None at all; e. I don't know
7. In your opinion, if a large-scale oil spill occurs, how much threat does it pose to marine life?
a. A great deal; b. Some; c. Only a little; d. None at all; e. I don't know
8. In your opinion, how much risk does contacting with raw, unrefined petroleum cause of getting cancer?
a. Serious risk; b. Moderate risk; c. Slight risk; d. No risk at all; e. I don't know
9. How much confidence do you have in statements made by oil industry scientists about potential health risks associated with living near an oil drilling site?
a. Almost no confidence at all; b. Only some confidence; c. A moderate amount of confidence; d. A great deal of confidence
10. How much confidence do you have in statements made by environmental group scientists about potential health risks associated with living near an oil drilling site?
a. Almost no confidence at all; b. Only some confidence; c. A moderate amount of confidence; d. A great deal of confidence
11. A team of oil industry scientists recently reported the results of their research showing that because of new technology, offshore oil drilling is far safer than previously thought. How much confidence do you have in that claim?
a. Almost no confidence at all; b. Only some confidence; c. A moderate amount of confidence; d. A great deal of confidence
12. A team of oil industry scientists recently reported the results of their research showing that because of new technology, offshore oil drilling is far riskier than previously thought. How much confidence do you have in that claim?
a. Almost no confidence at all; b. Only some confidence; c. A moderate amount of confidence; d. A great deal of confidence
13. A team of environmental group scientists recently reported the results of their research showing that because of new technology, offshore oil drilling is far safer than previously thought. How much confidence do you have in that claim?
a. Almost no confidence at all; b. Only some confidence; c. A moderate amount of confidence; d. A great deal of confidence
14. A team of environmental group scientists recently reported the results of their research showing that because of new technology, offshore oil drilling is far riskier than previously thought. How much confidence do you have in that claim?
a. Almost no confidence at all; b. Only some confidence; c. A moderate amount of confidence; d. A great deal of confidence

Declarations of Competing Interest

None.

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References

- Acharya, A.S., Prakash, A., Saxena, P., Nigam, A., 2013. Sampling: Why and how of it. *Indian J. Med. Specialties* 4 (2), 330–333.
- Aguilera, F., Méndez, J., Pásaro, E., Laffon, B., 2010. Review on the effects of exposure to spilled oils on human health. *J. Appl. Toxicol.* Int. J. 30 (4), 291–301.
- Ahn, T., 2010. Attitudes toward risk and self-employment of young workers. *Labour Econ.* 17 (2), 434–442.
- Arbuckle, M.B., Konisky, D.M., 2015. The role of religion in environmental attitudes. *Soc. Sci. Q.* 96 (5), 1244–1263.
- Bell, D., Gray, T., Hagggett, C., 2005. The 'social gap' in wind farm siting decisions: explanations and policy responses. *Environ. Polit.* 14 (4), 460–477.
- Bishop, B.H., 2014. Focusing events and public opinion: Evidence from the deepwater horizon disaster. *Polit. Behav.* 36 (1), 1–22.
- British Petroleum, 2019. BP Statistical Review of World Energy 2019/68th edition. BP Statistical Review of World Energy, London. Retrieved from. <https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economy>

- cs/statistical-review/bp-stats-review-2019-full-report.pdf. (Accessed December 2019).
- Burningham, K., Barnett, J., Thrush, D., 2006. The limitations of the NIMBY concept for understanding public engagement with renewable energy technologies: a literature review. School of Environment and Development, University of Manchester.
- Carley, S., Konisky, D.M., Atiq, Z., Land, N., 2020. Energy infrastructure, NIMBYism, and public opinion: a systematic literature review of three decades of empirical survey literature. *Environ. Res. Lett.* 15 (9), 093007.
- Carlisle, J.E., Feezell, J.T., Michaud, K.E., Smith, E.R., Smith, L., 2010. The public's trust in scientific claims regarding offshore oil drilling. *Public Understand. Sci.* 19 (5), 514–527.
- Ceccoli, S., 2018. Explaining Attitudes Toward US Energy Extraction: Offshore Drilling, the Keystone XL Pipeline, and Hydraulic Fracturing. *Soc. Sci. Q.* 99 (2), 644–664.
- Chen, M., Martens, P., 2019. Environmental Concern and Public Attitudes towards Marine Life in Coastal China. Maastricht Sustainability Institute, Maastricht University [Manuscript submitted for publication].
- Chen, W., 2011. Status and challenges of Chinese deepwater oil and gas development. *Pet. Sci.* 8 (4), 477–484.
- Chen, M., Martens, P., n.d. Ethical Ideology and Public Attitudes towards Marine Life in China. *Society & Animals*. In press.
- CNNIC, 2018. Statistical report on internet development in China (January 2018). China Internet Network Information Center, Beijing. Retrieved from. <https://cnnic.com.cn/IDR/ReportDownloads/201807/P020180711391069195909.pdf>. (Accessed July 2019).
- Conchie, S.M., Donald, I.J., 2006. The role of distrust in offshore safety performance. *Risk Anal.* 26 (5), 1151–1159.
- CRISP, 2010. The Survey of Public Scientific Literacy 2010: Main Findings of Public Knowledge, Approach, Interest, and Attitude regarding Science & Technology. China Research Institute for Science Popularization, Beijing. Retrieved from. http://www.crsip.org.cn/pdf/csi_2010.pdf. (Accessed July 2019).
- Dear, M., 1992. Understanding and overcoming the NIMBY syndrome. *J. Am. Plann. Assoc.* 58 (3), 288–300.
- Devine-Wright, P., 2013. Explaining "NIMBY" objections to a power line: The role of personal, place attachment and project-related factors. *Environ. Behav.* 45 (6), 761–781.
- Devine-Wright, P., 2009. Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *J. Commun. Appl. Soc. Psychol.* 19 (6), 426–441.
- Domingues, R.B., Gonçalves, G., 2020. Assessing environmental attitudes in Portugal using a new short version of the Environmental Attitudes Inventory. *Curr. Psychol.* 39 (2), 629–639.
- Douglas, E.J., Shepherd, D.A., 2002. Self-employment as a career choice: Attitudes, entrepreneurial intentions, and utility maximization. *Entrepreneurship Theory aPract.* 26 (3), 81–90.
- Eiser, J.R., Spears, R., Webley, P., 1988. Predicting attitudes to oil and to nuclear energy. *J. Environ. Psychol.* 8 (2), 141–147.
- Eiser, J.R., Van der Pligt, J., Spears, R., 1989. Local residents' attributions for nuclear decisions. *Basic Appl. Soc. Psychol.* 10 (2), 141–148.
- Flin, R., Mearns, K., 1994. Risk Perception and Safety in the Offshore Oil Industry. SPE Health, Safety and Environment in Oil and Gas Exploration and Production Conference, Jakarta. <https://doi.org/10.2118/27259-MS>.
- Fox, N., Ward, K., 2008. Health, ethics and environment: A qualitative study of vegetarian motivations. *Appetite* 50 (2–3), 422–429.
- Freudenburg, W.R., Gramling, R., 1993. Socioenvironmental factors and development policy: Understanding opposition and support for offshore oil. *Sociological Forum* 8 (3), 341–364.
- Gong, Y., Zhao, P., Lan, D., Zhu, R., Xu, Y., Bao, C., Yu, C., 2018. Characteristics and Trend Analysis of Marine Oil Spill Accidents in China. *Ocean Dev. Manage.* 11.
- Gramling, R., Freudenburg, W.R., 2006. Attitudes toward offshore oil development: A summary of current evidence. *Ocean Coast. Manage.* 49 (7–8), 442–461.
- Gu, H., 2016. NIMBYism in China: Issues and prospects of public participation in facility siting. *Land Use Policy* 52, 527–534.
- Guo, Y., Ru, P., Su, J., Anadon, L.D., 2015. Not in my backyard, but not far away from me: Local acceptance of wind power in China. *Energy* 82, 722–733.
- Haavik, T.K., 2012. Challenging controversies: A prospective analysis of the influence of new technologies on the safety of offshore drilling operations. *J. Contingencies Crisis Manage.* 20 (2), 90–101.
- Harcup, T., O'Neill, D., 2017. What is news? News values revisited (again). *Journalism Stud.* 18 (12), 1470–1488.
- Hazel, S.J., Signal, T.D., Taylor, N., 2011. Can teaching veterinary and animal-science students about animal welfare affect their attitude toward animals and human-related empathy? *J. Vet. Med. Educ.* 38 (1), 74–83.
- He, G., Mol, A.P., Zhang, L., Lu, Y., 2014. Nuclear power in China after Fukushima: understanding public knowledge, attitudes, and trust. *J. Risk Res.* 17 (4), 435–451.
- Hongbin, G., Wei, H., Chao, Z., 2008. Chinese Public Understanding of Science and Attitudes towards Science and Technology 2007. *Sci. Popularization* 6.
- Houston, J.B., Pfefferbaum, B., Rosenholtz, C.E., 2012. Disaster news: Framing and frame changing in coverage of major US natural disasters, 2000–2010. *Journalism Mass Commun. Q.* 89 (4), 606–623.
- Huang, X., Yang, D.L., 2020. NIMBYism, waste incineration, and environmental governance in China. *China Information* 34 (3), 342–360.
- Huang, L., Zhou, Y., Han, Y., Hammit, J.K., Bi, J., Liu, Y., 2013. Effect of the Fukushima nuclear accident on the risk perception of residents near a nuclear power plant in China. *Proc. Natl. Acad. Sci.* 110 (49), 19742–19747.
- Huang, Y., Ning, Y., Zhang, T., Fei, Y., 2015. Public acceptance of waste incineration power plants in China: Comparative case studies. *Habitat Int.* 47, 11–19.

- Johnson, T., 2010. Environmentalism and NIMBYism in China: promoting a rules-based approach to public participation. *Environ. Politics* 19 (3), 430–448.
- Kirkwood, F.G., Matura-Shepherd, A., 2011. Offshore Oil vs 3E's (Environment, Economy and Employment). *Fisheries Centre Res. Rep.* 19 (6), 3–7.
- Knapp, H., Kirk, S.A., 2003. Using pencil and paper, Internet and touch-tone phones for self-administered surveys: does methodology matter? *Comput. Hum. Behav.* 19 (1), 117–134.
- Konisky, D.M., Ansolabehere, S., Carley, S., 2020. Proximity, NIMBYism, and Public Support for Energy Infrastructure. *Public Opin. Q.*
- Kraus, N., Malmfors, T., Slovic, P., 1992. Intuitive toxicology: Expert and lay judgments of chemical risks. *Risk Anal.* 12 (2), 215–232.
- Laffon, B., Páscaro, E., Valdíglesias, V., 2016. Effects of exposure to oil spills on human health: Updated review. *J. Toxicol. Environ. Health, Part B* 19 (3–4), 105–128.
- Lilley, J., Firestone, J., 2013. The effect of the 2010 Gulf oil spill on public attitudes toward offshore oil drilling and wind development. *Energy Policy* 62, 90–98.
- Lindén, A., Rapeli, L., Brutemark, A., 2015. Community attachment and municipal economy: Public attitudes towards wind power in a local context. *Environ. Sci. Policy* 54, 10–14.
- Liu, X., Meng, R., Xing, Q., Lou, M., Chao, H., Bing, L., 2015. Assessing oil spill risk in the Chinese Bohai Sea: a case study for both ship and platform related oil spills. *Ocean Coast. Manage.* 108, 140–146.
- Liu, X., Mu, R., 2016. Public environmental concern in China: Determinants and variations. *Global Environ. Change* 37, 116–127.
- Liu, X., Pan, G., Wang, Y., Yu, X., Hu, X., Zhang, H., Tang, C., 2016. Public attitudes on funding oil pollution cleanup in the Chinese Bohai Sea. *J. Coast. Res.* 74 (sp1), 207–213.
- Michaud, K., Carlisle, J.E., Smith, E.R., 2008. Nimbyism vs. environmentalism in attitudes toward energy development. *Environ. Polit.* 17 (1), 20–39.
- Mohai, P., 1992. Men, women, and the environment: An examination of the gender gap in environmental concern and activism. *Soc. Natl. Resour.* 5 (1), 1–19.
- Mukherjee, D., Rahman, M.A., 2016. To drill or not to drill? An econometric analysis of US public opinion. *Energy Policy* 91, 341–351.
- Mullet, E., Bouazza, M.B., Dupont, V., Bertrand, A., 1998. Risk perception and energy production. *Human Ecol. Risk Assess.: Int. J.* 4 (1), 153–175.
- National Bureau of Statistics of China, 2019. *China Statistical Yearbook 2019*. China Statistics Press, Beijing. Retrieved from. <http://www.stats.gov.cn/tjsj/ndsj/2019/indexeh.htm>. (Accessed July 2020).
- Parkes, K.R., Carnell, S.C., Farmer, E.L., 2005. Living two lives' Perceptions, attitudes and experiences of spouses of UK offshore workers. *Commun., Work Family* 8 (4), 413–437.
- Petrova, M.A., 2013. NIMBYism revisited: public acceptance of wind energy in the United States. *Wiley Interdiscip. Rev. Clim. Change* 4 (6), 575–601.
- Quarantelli, E.L., 1991. Lessons from research: Findings on mass communication system behavior in the pre, trans, and postimpact periods of disasters. *Disaster Research Center, University of Delaware*. <https://udspace.udel.edu/handle/19716/532>. (Accessed January 2020).
- Ruby, M.B., 2012. Vegetarianism. A blossoming field of study. *Appetite* 58 (1), 141–150.
- Ruiz, C., Marrero, R., Hernández, B., 2018. Influence of emotions on the acceptance of an oil drilling project. *Environ. Behav.* 50 (3), 324–349.
- Rundmo, T., 1992. Risk perception and safety on offshore petroleum platforms—Part I: Perception of risk. *Saf. Sci.* 15 (1), 39–52.
- Rundmo, T., Hestad, H., Ulleberg, P., 1998. Organisational factors, safety attitudes and workload among offshore oil personnel. *Saf. Sci.* 29 (2), 75–87.
- Saetren, G.B., Laumann, K., 2015. Effects of trust in high-risk organizations during technological changes. *Cogn., Technol. Work* 17 (1), 131–144.
- Shen, J., Saijo, T., 2008. Reexamining the relations between socio-demographic characteristics and individual environmental concern: Evidence from Shanghai data. *J. Environ. Psychol.* 28 (1), 42–50.
- Smith, E.R., Garcia, S.R., 1995. Evolving California opinion on offshore oil development. *Ocean Coast. Manage.* 26 (1), 41–56.
- Steinhardt, H.C., Wu, F., 2016. In the name of the public: environmental protest and the changing landscape of popular contention in China. *China J.* 75 (1), 61–82.
- Stern, P.C., Dietz, T., Kalof, L., 1993. Value orientations, gender, and environmental concern. *Environ. Behav.* 25 (5), 322–348.
- Sun, C., Zhu, X., 2014. Evaluating the public perceptions of nuclear power in China: Evidence from a contingent valuation survey. *Energy Policy* 69, 397–405.
- Sun, Y., 2015. Facilitating generation of local knowledge using a collaborative initiator: A NIMBY case in Guangzhou, China. *Habitat Int.* 46, 130–137.
- Taber, K.S., 2018. The use of Cronbach's alpha when developing and reporting research instruments in science education. *Res. Sci. Educ.* 48 (6), 1273–1296.
- Taleghani, N.D., Tyagi, M., 2017. Impacts of major offshore oil spill incidents on petroleum industry and regional economy. *J. Energy Res. Technol.* 139 (2).
- Tsang, S., Royse, C.F., Terkawi, A.S., 2017. Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. *Saudi J. Anaesthesia* 11 (Suppl 1), S80.
- Waistel, J., 2012. The way of environmental preservation and restoration. *Buddhist Virtues in Social and Economic Development Conference*.
- Wardekker, J.A., Petersen, A.C., Van Der Sluijs, J.P., 2008. Religious positions on climate change and climate policy in the United States. In: *Proceedings of Communicating Climate Change: Discourses, Mediations and Perceptions*. Centro de Estudos de Comunicacao e Sociedade, Universidade do Minho, Braga, pp. 53–72.
- Weilin, Z., Gongcheng, Z., Kai, Z., 2016. Oil and gas exploration progress of China National Offshore Oil Corporation during the 12 th Five-Year Plan and the prospect during the 13 th Five-Year Plan. *China Petrol. Exploration* 21 (4), 1–12.
- Wolsink, M., 2000. Wind power and the NIMBY-myth: institutional capacity and the limited significance of public support. *Renewable Energy* 21 (1), 49–64.
- Wolsink, M., 2006. Invalid theory impedes our understanding: a critique on the persistence of the language of NIMBY. *Trans. Inst. Br. Geographers* 31 (1), 85–91.
- Wu, Y., Dai, X., 2014. China's not-in-my-backyard protest in the process of urbanization. *Urban China in the new era*. Springer, Berlin, Heidelberg, pp. 85–101.
- Xiao, C., Dunlap, R.E., Hong, D., 2013. The nature and bases of environmental concern among Chinese citizens. *Soc. Sci. Q.* 94 (3), 672–690.
- Xinzhong, Y., 2014. An eco-ethical interpretation of Confucian Tianren Heyi. *Front. Philos. China* 9 (4), 570–585.
- Yan, Y., Bissell, K., 2018. The sky is falling: Predictors of news coverage of natural disasters worldwide. *Commun. Res.* 45 (6), 862–886.
- Yin, J., Feng, J., Wang, Y., 2015. Social media and multinational corporations' corporate social responsibility in China: The case of ConocoPhillips oil spill incident. *IEEE Trans. Prof. Commun.* 58 (2), 135–153.
- Yuhong, X., 2018. New progress and prospect of oil and gas exploration of China National Offshore Oil Corporation. *China Petrol. Exploration* 23 (1), 26–35.
- Zelezny, L., Chua, P., Aldrich, C., 2000. Elaborating on gender differences in environmentalism-statistical data included. *J. Soc. Issues* 56 (3), 443–445.
- Zhongliang, Z., 1991. People and science: public attitudes in China toward science and technology. *Sci. Public Policy* 18 (5), 311–317.