

# Perceptions of Quality of Life and Pollution among China's Urban Middle Class: The Case of Smog in Tangshan

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## Abstract

After decades of rapid economic development, China is facing severe environmental problems. In particular, smog in urban areas has recently attracted a great deal of scientific and media attention both domestically and internationally. Our focus in this article is on public perceptions of smog in the northern city of Tangshan, which is routinely ranked as one of the urban areas with the worst air quality in the nation. In this article, we present the results of qualitative interviews and quantitative surveys with 341 urban residents. We examine how these residents perceive and weigh the importance of various aspects related to quality of life, including their experience with air pollution. Study participants considered environmental quality an issue of lower priority than many others; however, they surprisingly ranked it over economic concerns such as jobs and income. Their responses suggest that, for many urban residents, environmental problems like smog are fundamentally linked to basic quality of life concerns such as physical health and family well-being. We interpret our findings in the context of literature on the rise of China's middle class, the rise of environmental consciousness, and the role of gender in mediating perceptions of pollution and family health. We also consider the implications of these findings for the control and remediation of air pollution in China today.

**Keywords:** smog; public perceptions; quality of life; environmental quality; environmental consciousness; middle class; gender; China

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In the nearly four decades since the launch of Reform and Opening (*gaige kaifang* 改革开放), China's economic rise on the global stage has been remarkable, yet the environmental price of this economic boom is proving to be exorbitant. According to the Ministry of Environmental Protection and the Ministry of Land Resources, about 60 per cent of China's groundwater, and one-third of its

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surface water, has been rated unfit for human use. A nationwide investigative report on soil pollution, released in 2014, found that nearly 20 per cent of all cultivated land has been seriously contaminated, and that desertification and soil erosion also threaten China's long-term future.<sup>1</sup> But perhaps no single environmental challenge has garnered as much domestic and international attention as widespread public concern about smog (*wumai* 雾霾).

Although a variety of terms are commonly used to describe air pollution in China, depending on seasonality, climate and variation across spatial scales,<sup>2</sup> for the sake of clarity and consistency this article adopts the widely used term "smog" to refer to the phenomenon. Experts generally recognize the amount of effort the Chinese government has put into developing and improving legal frameworks for environmental protection, although implementation and enforcement often remain weak.<sup>3</sup> In 2013, China's State Council pledged to tackle smog by releasing the National Action Plan on Air Pollution (*Daqi wuran fangzhi xingdong jihua* 大气污染防治行动计划), which aims to reduce the concentration of respirable particulate matter by at least 10 per cent in prefecture-level cities by 2017 in comparison with 2012 levels, and to reduce the concentration of respirable particulate matter in Jingjinji (Jing Jin Ji 京津冀) (by 25 per cent),<sup>4</sup> the Yangtze River Delta (*Changjiang sanjiaozhou* 长江三角洲) (by 20 per cent), and the Pearl River Delta (*Zhujiang sanjiaozhou* 珠江三角洲) (by 15 per cent). Public perceptions of air pollution have become a prominent topic in policy circles and in the media, as evidenced by the documentary film "Under the Dome" (*Qiongdong zhixia* 穹顶之下), released by journalist Chai Jing in 2015 and viewed by millions of people before it was blocked by government censors.

Tangshan, located in Hebei province, is routinely ranked as one of the most polluted cities in China. As one of the major cities in the so-called Jingjinji region, the city has reduced levels of particulate matter by 12.2 per cent in recent years; however, the Chinese media has recently discovered that several industrial enterprises in Tangshan have been fabricating their emissions data in order to meet standards, calling into question the reliability of pollution measures throughout the region.<sup>5-6</sup> The rising demand for electricity generation and the inherent conflict between pursuing GDP growth and tackling the smog problem are two fundamental barriers cited by local Environmental Protection Bureau officials that hinder their ability to implement the National Action Plan on Air Pollution.<sup>7</sup> Meanwhile, in nearby Beijing, this decisive new plan so far has not

1 Ministry of Environmental Protection Report 2014.

2 Aunan, Hansen and Wang 2017 (this issue); Zhang and Samet 2015.

3 Shapiro 2012, 66–67.

4 Jingjinji, or Jing-Jin-Ji (JJJ) also known as Beijing-Tianjin-Hebei, is the national capital region of China and is the biggest urbanized region in Northern China that includes an economic region surrounding Beijing, Tianjin and Hebei, along the coast of Bohai Sea.

5 Hebei Provincial Leaders Office of Air Pollution July 2015.

6 [http://www.thepaper.cn/newsDetail\\_forward\\_1555149](http://www.thepaper.cn/newsDetail_forward_1555149). Accessed 4 November 2016.

7 Ahlers and Shen 2017 (this issue) describe similar barriers faced by environmental bureau officials in

proven very effective; Beijing residents have experienced several “red alerts,” indicating air pollution so severe that it can cause acute health problems.

While official statistics and government pronouncements have been widely circulated and discussed via social media, the perceptions and reactions of people who deal with smog on a daily basis remain poorly understood. How do people in urban China perceive the environmental crisis they face? How do they understand environmental pollution in the context of their daily lives? How do they balance the relationship between environmental quality and overall quality of life? This article aims to examine how middle-class urban residents perceive air pollution in the context of various aspects of quality of life in Tangshan.

Our analysis draws upon data collected via qualitative interviews and a standardized, quantitative survey questionnaire with 341 residents undertaken in August and September of 2014 in Tangshan, Hebei province. We focus in particular on the complex tradeoffs between environmental quality and other aspects of quality of life, such as personal health, children’s health, jobs and income, children’s education, and family harmony. These themes emerged from qualitative interviews with study participants as the most important aspects of quality of life for our study sample. We examine quantitatively how study participants ranked the importance of these themes relative to one another, and we interpret the results in the context of qualitative data and narratives from study participants about their everyday experiences with air pollution. We also contextualize these findings by drawing on several key interviews with officials within the municipal Environmental Protection Bureau of Tangshan.

## Economic Development and Environmental Pollution in Tangshan

Tangshan 唐山 is a heavily industrialized prefecture-level city in northeastern China’s Hebei province. It is located on the North China Plain along the Bohai coast, in the central section of what is often called the Bohai Bay Economic Rim<sup>8</sup> (*Huan Bohai jingji quan* 环渤海经济圈), and borders Beijing and Tianjin to the west. In many ways, Tangshan can be seen as a perfect illustration of China’s dilemma regarding economic growth and environmental degradation, especially air pollution. As a heavy industry-oriented city, Tangshan has long been known for its host of large iron and steel plants, coal mines, and the nation’s first and largest cement factory. According to national and regional reports, the GDP of Tangshan surpassed 622.53 billion yuan in 2015, ranking the city first in Hebei province and 25th in all of mainland China. The city’s GDP per

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*footnote continued*

Hangzhou. They document a high degree of variation and adaptability in terms of how pollution regulations are implemented at the local level.

- 8 The Bohai Bay Economic Rim or the Bohai Economic Rim (BER) is the economic hinterland surrounding Beijing and Tianjin, and also includes areas in Hebei, Liaoning, and Shandong, which surrounds the Bohai Sea. Tangshan is located on the inner rim along with Beijing and Tianjin.

capita is 78,525 yuan (approximately US\$12,608), and Tangshan has led Hebei province in GDP per capita for over a decade.<sup>9</sup>

But these economic advancements have come with severe environmental costs. A common saying among the general public and the mass media holds that “If you want to see China’s smog, look to Hebei; if you want to see Hebei’s smog, look to Tangshan” (*Zhongguo wumai kan Hebei, Hebei wumai kan Tangshan* 中国雾霾看河北, 河北雾霾看唐山). While major pollution remediation efforts were made in Beijing leading up to the 2008 Olympics, Hebei province experienced further deterioration of its air quality, since many polluting industries were relocated there in order to improve air quality in the host city. According to a 2015 report from *China Daily*, six Hebei cities, including Tangshan, are routinely listed in the nation’s top ten in terms of smog.<sup>10</sup> Real-time data reports on China’s air quality index also routinely show Tangshan to be one of the most polluted cities in the nation.<sup>11</sup>

Like most heavily industrialized cities in China, Tangshan has undergone a dramatic transformation in its economy and environment during the past few decades, following a strategy of “pollute first, control later” (*xian wuran, hou zhili* 先污染, 后治理) or “develop first, clean up later” (*xian fazhan, hou zhili* 先发展, 后治理), a pattern familiar to earlier industrialized regions in Europe and North America.<sup>12</sup> Top government leaders have only recently begun to acknowledge the dire environmental consequences of this strategy. Despite the momentum brought by new policies such as the National Action Plan on Air Pollution, Tangshan’s Environmental Protection Bureau officials acknowledge the agency’s overall lack of capacity for effective enforcement of regulations.<sup>13</sup>

In many ways, Tangshan’s environmental problems are a microcosm of the larger environmental crisis in China stemming from rapid industrial development. China is the largest producer and consumer of coal in the world and is the largest consumer of coal-derived electricity, generating an estimated 73 per cent of domestic electricity production from coal as of 2014.<sup>14</sup> China’s dependence on coal is cause for concern on a global scale. Due in large part to the emissions caused by burning coal, China is now the number one producer of CO<sub>2</sub> (carbon dioxide), responsible for a full quarter of the world’s CO<sub>2</sub> output.<sup>15</sup> Hailed as the “Cradle of China’s Modern Industry,” Tangshan was the home of China’s first modern coal pit and the site of China’s first cement works.<sup>16</sup> Today, iron and steel continue to be the cornerstones of the city’s economy, including two main companies: Tangshan Iron and Steel (*Tangshan gangtie youxian zeren gongsi*

9 <http://www.tangshan.gov.cn/zhuzhan/gongxin/20161025/361578.html>. Accessed 8 November 2016.

10 *China Daily*, [http://www.chinadaily.com.cn/china/2015-02/02/content\\_19466412.htm](http://www.chinadaily.com.cn/china/2015-02/02/content_19466412.htm). Accessed on 8 November 2016.

11 <http://aqicn.org/city/tangshan/>.

12 Azadi, Verheijke and Witlox 2011; Liu 2010.

13 Interview, 29 August 2014.

14 Bhattacharya, Rafiq and Bhattacharya 2015.

15 Bawden 2013.

16 Li 2003; Vale and Campanella 2005, 237.

唐山钢铁有限责任公司) and Shoudu Iron and Steel (*Shoudu gangtie gongsi* 首都钢铁公司). The coal and petroleum industries are also major economic players in the city and the region.

Many residents of Tangshan feel they are on the “front lines” of China’s severe air pollution problems. Since 2012 the Ministry of Environmental Protection (MEP) has conducted a national programme for monitoring PM<sub>2.5</sub>, ultra-fine particles that have been correlated with cardiovascular illnesses and other health problems in epidemiological studies. Monitoring data routinely shows PM<sub>2.5</sub> levels in Tangshan to exceed MEP and World Health Organization standards. On a typical smoggy day, the sun is blocked by a thick layer of smog hovering in the sky. Street lights often turn on automatically in response to the dim light, even in the daytime; drivers turn on their vehicles’ fog lights in order to be seen; and residents wear masks to try to somewhat protect themselves from the polluted air. Simply put, smog has woven itself deeply into people’s daily lives, influencing school, work, entertainment, and all aspects of family, community and society.

### Public Perceptions of Air Pollution

Understanding public perceptions of air pollution has important implications for developing new technologies and policies to manage pollution.<sup>17</sup> Research on public perceptions of air pollution is fairly advanced in developed regions such as North America, Japan, and Europe, with advancements being made more recently in developing countries such as China and India.<sup>18</sup> Much of the cross-national research on public perceptions of environmental quality comes from the “post-materialist” perspective, which assumes that people in developing nations or poor communities place little emphasis on environmental protection until their basic material needs have been met. However, a growing body of research demonstrates that environmental problems are salient and important issues in both wealthy and poor nations, and that residents of poor nations express as much concern about environmental quality as do those living in wealthy nations.<sup>19</sup> This is particularly true for people who, because of their vulnerable socio-economic position, experience the effects of pollution on a daily basis. While air pollution’s distribution may be regional or even global in scope, people experience it in profoundly local and personal ways.<sup>20</sup>

In recent years, researchers from a variety of disciplines have sought to understand public perceptions of air pollution in both developed and developing countries.<sup>21</sup> A common goal of these researchers is to understand the role of everyday

17 Saksena 2007.

18 Howel et al. 2003; Bickerstaff and Walker 2001; Badland and Duncan 2009; Gallina and Williams 2014; Agrawal 2005.

19 Inglehart 1995; Dunlap and Mertig 1997.

20 Bickerstaff 2004; Tilt 2010.

21 Bickerstaff and Walker 2001; Howel et al. 2003; Bickerstaff 2004; Badland and Duncan 2009; Banik 2010; Egondi et al. 2013.

experience in how people come to know about air pollution through the course of their everyday lives.<sup>22</sup> In China specifically, a growing body of literature on public perceptions of pollution consistently shows that air pollution is a key concern for members of the emerging middle class, and that these concerns have the potential to drive more stringent policy controls at various levels of government.<sup>23</sup> Moreover, government officials in major urban areas view pollution control as a high priority, but they are often forced to balance it against other key imperatives such as economic growth.<sup>24</sup>

Opinion polls routinely show growing levels of environmental consciousness among the Chinese public, especially among the more educated and wealthier urban residents.<sup>25</sup> For example, a survey conducted by the Pew Research Center in 2008 asked Chinese people to rate the seriousness of air pollution on a scale ranging from “not a problem at all” to a “very big problem”; 31 per cent rated it a “very big problem.” By 2013, when the same survey was repeated, 47 per cent of respondents cited air pollution as a “very big problem.”

To a great extent, public perceptions of air pollution are bound up with people’s daily experiences. As Hansen and Liu observe in this issue based on fieldwork in Zhejiang province, people’s perceptions of air quality are entwined in their ideas about economic development, their aspirations for a higher quality of life, and even prominent national discourses such as “ecological civilization.”<sup>26</sup> Moreover, people’s experiences are often marked by anxiety in the face of uncertainty about the link between pollution exposure and the health problems they may face.<sup>27</sup> The choices people make about how to cope with pollution on a daily basis are also constrained by personal, social and demographic factors such as age, income, class, gender and educational background.

## Research Methods

Data collection methods for this study included semi-structured interviews and a standardized, quantitative survey instrument, supported by site visits and observation in Tangshan. We used an intercept point survey approach to recruit middle-class, urban study participants in public places such as shopping centres. The intercept point sampling method is a non-probability sample (i.e. non-random) and therefore does not allow us to make generalizations about the Chinese public at large. However, it is a convenient and cost-effective way to collect large amounts of data and, if carefully conducted, can yield a study sample similar to a probability sample.<sup>28</sup> Our results are thus meant to be viewed as a

22 Hedges 1993; Jenkins 2000; Bickerstaff 2004.

23 Mol and Carter 2006; Zhang et al. 2014.

24 Tong 2007.

25 Shapiro 2012.

26 Hansen and Liu 2017 (this issue).

27 Lora-Wainwright, 2013; Lora-Wainwright, 2010; Holdaway, 2010.

28 McKenzie and Mistiaen 2009; Keiding and Louis 2016.

close examination of urban residents in Tangshan, rather than a nationally representative picture of China as a whole.

Data collection proceeded in two phases, and was carried out by the first author and four research assistants during August and September 2014. Phase One consisted of 30 semi-structured interviews (14 women and 16 men, ranging in age from 20 to 68). As part of the interview, study participants were asked to complete a free-listing exercise<sup>29</sup> in response to the questions, “What does quality of life mean to you? In your view, what are the most important terms and concepts related to quality of life?” We coded the results of the free-listing exercise into a series of themes, which can be seen as “tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study.”<sup>30</sup> We identified six major themes related to quality of life from the perspective of study participants: children’s health; personal health; jobs and income; family harmony; children’s education; and environmental quality.

Phase Two of the study, which employed a standardized survey questionnaire, was designed to examine the relative importance (priority) of these different themes from the perspective of study participants. The survey questionnaire included modules on personal background and demographics, knowledge and reactions to smog, and ranking decisions about the six themes related to quality of life. The first author and research assistants administered the questionnaire to 477 Tangshan residents using the intercept point sampling method described above. A total of 341 valid surveys containing complete ranking data were returned, resulting in a 71 per cent response rate. In terms of basic demographic characteristics, our sample was 45 per cent male and 55 per cent female, with an average age in the late thirties, some educational attainment beyond secondary school, and a median household monthly income just under 3,000 yuan, which is similar to the median income for Tangshan as a whole. This mixed methods approach allows us to better understand the conflict, complexity, and tradeoffs between air quality and various other aspects of quality of life for Tangshan residents.

### **Ranking Various Aspects of Quality of Life**

A common approach for measuring public perceptions of pollution via quantitative surveys is to use ordinal scale questions (e.g. Likert scales). We collected this type of data by asking study participants to rate each theme related to quality of life by its importance, from 1 (very important) to 5 (not important). However, this approach yielded limited results, because study participants routinely rated all themes high in importance; as a result, all themes had mean ratings from 1.29 to 1.78. We opted instead to ask study participants to rank (prioritize) the six themes relative to one another by ordering them from 1 (highest priority)

<sup>29</sup> Tilt 2011.

<sup>30</sup> Miles and Huberman 1994, 56.

Table 1: Mean Ranking of Themes Related to Quality of Life

	Themes	Mean Rank	Standard Deviation
Most important	Children's health	2.01	1.163
	Personal health	2.80	1.460
	Family harmony	3.26	1.293
	Children's education	3.55	1.291
	Environmental quality	4.30	1.676
Least important	Jobs and income	5.04	1.463

Note:

Themes are ranked from 1 (most important) to 6 (least important).

to 6 (lowest priority), encouraging study participants to weigh each theme by perceived importance. Table 1 presents the results of ranking decisions for our full study sample, listed from most important to least important.

In order to examine whether study participants' rankings of the six themes were statistically different from one another, we conducted a Friedman test, which is a non-parametric procedure designed for the analysis of ranked data. We also conducted a Wilcoxon signed-rank test as a post-hoc analysis (with Bonferroni correction to control for multiple comparisons) to examine pairwise differences between all themes. As Table 2 shows, our study sample ranked the six themes related to quality of life in very different ways ( $\chi^2(2) = 573.85$ ,  $p = .000$ ). All pairwise differences are also statistically significant, likely due to the fairly large sample size.

As the results of the quantitative survey demonstrate, themes related to health, including children's health and personal health, were consistently seen as the most important aspects of quality of life. Environmental quality was consistently ranked as a fairly low priority relative to the other themes. Somewhat surprisingly, the theme of jobs and income showed the lowest priority ranking.

## Narratives of Air Pollution

Results from qualitative interviews help provide context for interpreting the survey findings. These narratives reveal several interesting trade-offs between the various themes constituting quality of life in Tangshan. In what follows, we briefly describe these narratives by focusing on the relationship between economic well-being and perceptions of pollution, by describing how residents' perceptions of various themes related to quality of life were intertwined with one another, and by characterizing the role that gender plays in perceptions of pollution.

### *The insufficiency of economic well-being*

Many residents expressed the view that economic well-being was a necessary precondition for enjoying a high quality of life, but that, on its own, it was insufficient. One study participant, Mr Guo, illustrated this point by noting:

Table 2: **Statistical Comparison of Theme Rankings Related to Quality of Life**

<b>Friedman test</b>			
N	Chi-square	df	Asymp. Sig.
341	573.846	5	.000
Post hoc Analysis (Wilcoxon signed-rank test)			
Paired themes	Z	Asymp. Sig. (2-tailed)	
Personal health – jobs & income	-13.964 <sup>b</sup>	.000	
Environmental quality – jobs & income	-5.391 <sup>b</sup>	.000	
Family harmony – jobs & income	-11.671 <sup>b</sup>	.000	
Children health – jobs & income	-14.660 <sup>b</sup>	.000	
Children education – jobs & income	-10.661 <sup>b</sup>	.000	
Environmental quality – personal health	-10.120 <sup>c</sup>	.000	
Family harmony – personal health	-3.728 <sup>c</sup>	.000	
Children health – personal health	-6.335 <sup>b</sup>	.000	
Children education – personal health	-5.681 <sup>c</sup>	.000	
Family harmony – environmental quality	-7.604 <sup>b</sup>	.000	
Children health – environmental quality	-12.964 <sup>b</sup>	.000	
Children education – environmental quality	-5.121 <sup>b</sup>	.000	
Children health – family harmony	-11.151 <sup>b</sup>	.000	
Children education – family harmony	-3.283 <sup>c</sup>	.000	
Children education – children health	-14.225 <sup>c</sup>	.000	

Notes:

<sup>b</sup> Based on positive ranks.

<sup>c</sup> Based on negative ranks.

I don't make a lot of money, but it's enough for (my) household. Tangshan is not an expensive city to live in, compared to Beijing or Tianjin; daily expenses here are much lower, and we are living a much better life now. You know, when I was a child I never had enough food, not to mention other things. But the environment was good. We had blue skies and usually at night you could see the Milky Way. I haven't seen the stars for years, and I think it's solely because the air quality is really bad now. It's always grey, even at night; fortunately, the moon is still visible. They (the government) should stop bringing in more polluting industries to Tangshan and start cleaning the air for the sake of people's health, but I don't think they care. They say they care, but where is the action?<sup>31</sup>

Mr Guo's comments underscore a common sense of frustration among urban residents towards government regulators. Chinese victims of pollution continue to face formidable institutional barriers to gaining redress, including the cost of litigation, lack of impartiality in the judicial system, corruption, lack of legal and scientific knowledge, and general difficulty accessing the court system. Meanwhile, polluting companies often have sufficient economic resources and political power to shed their responsibility and avoid enforcement due to their close connection to the local government.<sup>32</sup> As a result, residents are left with the sense that, despite having fulfilled their economic ambitions, certain aspects of quality of life elude them. For example, Mr Zhao, an employee of a private company who was in his fifties and supporting a daughter in college, noted that:

31 Interview, 10 September 2014.

32 Van Rooij 2010.

We have all we've ever wanted now: a house, money, a car, etc. But the environment has become unfit for us to live in. It used to be bad, but it's only getting worse and worse. Tangshan is wealthy enough; why don't they (the government) stop bringing more polluting industries? [Referring to the relocation of the Shougang steel plant from Beijing to Tangshan.] I hope my daughter can stay in Hainan (where she went for college) after graduation and get a job there. That way, we can at least go there during winter to breathe some clear air.

Most study participants expressed the view that their incomes had increased significantly in recent years and that, as a result, they felt as though they were solidly in the middle class. While there is no simple empirical standard or definition for middle class, according to the Chinese Statistical Bureau the middle-income group consists of households whose income falls between the third and fourth quintile nationally, which was a range between US\$1,545 and US\$2,917 in disposable income as of 2008.<sup>33</sup> More recent analyses of China's middle class have suggested that about 14 per cent of the population belongs to the middle class, and that this category is increasing rapidly along with China's accelerated economic growth.<sup>34</sup>

Many of our study participants expressed in interviews that income was not a primary means of determining whether one's family had reached middle-class status. Instead, many people used the term *xiaokang* 小康, or being "well-off," to describe their aspirations. This term, which denotes a moderate level of material comfort, has been in common circulation in China since the Jiang Zemin era, and has also been espoused by President Xi Jinping as a fundamental policy goal. However, material comfort is increasingly being undermined by a polluted environment. One study participant, Mr Qi, remarked:

I think we've already become a *xiaokang* society (*xiaokang shehui* 小康社会). It's not necessary to make money without thinking about anything else (*pin le ming de zhengqian* 拼了命的挣钱). Life has improved significantly during the past few decades; every household has at least one car, and, within some families, each family member drives their own car. Tangshan is famous for being wealthy, but also notorious for being heavily polluted. If I had to choose, I would prefer to have a better living environment. Who needs that much money anyway?

### *Linkages between pollution and quality of life*

It became clear during qualitative interviews that most residents view quality of life in a fairly holistic way, and that the various themes constituting quality of life cannot be easily separated.<sup>35</sup> Many participants expressed the view that health (both for themselves and for their children) was fundamentally tied to environmental quality and other aspects of quality of life, influencing their daily activities in a profound way. One study participant, Ms Wang, expressed this view as follows:

Physical health is so important to both adults and children. It is pointless to earn lots of money if you don't have the good fortune to spend it (*you qian mei ming hua* 有钱没命花). Moreover,

33 Chinese National Bureau of Statistics 2009.

34 Mol 2012.

35 Interviews, 3–15 September 2014.

the economy is good enough and there are plenty of opportunities to make money, but the air quality is so bad that I don't even want to go out. My uncle just died of lung cancer a couple months ago; he was only in his early fifties. It's getting more common than ever for people to have lung cancer here, and they die at a young age. I'd rather have a healthier living environment than own a mountain of gold.<sup>36</sup>

The longing for a better and healthier living environment was consistently cited during qualitative interviews, and the health risks related to smog were often discussed in uncertain and speculative terms. Across China, the annual death toll from air pollution, primarily from industrial and household emissions, is estimated to be 300,000 people.<sup>37</sup> In 2013, people living in northern China were informed by a team of American, Chinese and Israeli researchers that they could expect to live much shorter lives – 5.5 years shorter – than their countrymen to the south, due to heavier dependency on coal-fired power plants and much more severe levels of air pollution.<sup>38</sup> Around the same time, a World Health Organization (WHO) report found that 1.2 million Chinese people died prematurely in 2010 alone due to the country's polluted air.<sup>39</sup> Although the precise link between smog and respiratory illness has not yet been established through epidemiological studies in Tangshan, the phenomenon has definitely aroused anxiety among Tangshan's citizens.

For example, Ms Liu, a banker in her thirties, had recently returned to her hometown of Tangshan to take up employment after obtaining her Master's degree, convinced that the high salary of her new job would make the transition worthwhile. She soon regretted the decision to return, citing the gloomy winter smog as the reason. Ms. Liu also expressed a sense of anxiety and helplessness regarding air pollution. She drove her own car regularly, and while she was mindful of her own contribution to air pollution, she saw little hope for a solution to the problem since so many other city residents also commuted by car and heavy industry remained an important part of the local economy.

### *The role of gender in perceptions of air pollution*

Another important trend that emerged from analysis of the in-depth interviews in this study is that gender appears to play a key role in the way participants perceive and experience air pollution. This is particularly true for mothers of young children who worry about the effects of pollution on their children's health. One study participant, Ms Ma, discussed her concerns during an interview:

What I am most concerned about is my daughter. She's only two years old. I weigh her health over anything else in my life. I grew up here, and I have four elders (her parents and her

36 Interview, 3 September 2014.

37 *Economy* 2004, 19. The precise number of deaths annually attributable to air pollution is the subject of considerable academic debate. Hansen and Liu 2017 (this issue), drawing upon data from the Institute for Health Metrics and Evaluation, estimate that the annual death toll from all types of air pollution (including ambient and household air pollution) may be considerably higher.

38 Chen et al. 2013.

39 Gardner 2014.

husbands' parents) to take care of; otherwise I would buy a house somewhere cleaner, or at least somewhere with better air quality. Kids are more vulnerable than us, because we can get used to this toxic environment. There's not much I can do to protect her from pollution, other than staying inside as much as possible. I bought an air purifier, too, but I don't know if it works in the long run.

In her comments, Ms. Ma expressed a general concern about the lack of information regarding how to safeguard one's family from the health effects of air pollution. This sense of uncertainty, which was shared by many study participants, can heighten the anxiety about pollution exposure. For example, Ms Tian, a new mother with a two-year-old, noted that:

I used to like life here (Tangshan), because we live so close to Beijing and everything is convenient, yet we still managed to live a good life because things are not as expensive as in Beijing. However, since I have had my son, I am actually planning on moving somewhere else, somewhere cleaner. My son was diagnosed with asthma not long after he was born. Neither my husband's family nor my family have a history of asthma, so I consulted a few doctors and was told that it's highly possible that my son's asthma is caused by environmental factors. I think they meant the air pollution here. Look at how bad it is (pointing her finger into the haze). As adult, I think I even have problems breathing this air, so how can my son manage to survive this? I don't want him to get worse. We need to move. I don't think I can wait until it (air quality) gets cleaned up, and I don't see the government doing anything about it.<sup>40</sup>

Studies linking gender with perceptions of pollution have grown in number and prominence within the academic literature in recent years, and a recurring finding is that women are often more concerned than men about environmental quality in general.<sup>41</sup> Women's perceptions of pollution are often entwined with their concerns about family health and with concerns about how pollution damages their connection to place and community.<sup>42</sup> In China specifically, research has documented the concerns of women whose families are exposed to chronically high levels of pollution. In the absence of scientific information about how pollution may be linked to specific health outcomes, from respiratory illnesses to developmental problems in children, many mothers are left to speculate and worry amid what has been called "the ambiguity of harm."<sup>43</sup>

## Discussion and Conclusions

Smog continues to pose a chronic problem in Tangshan, as in most major Chinese cities, due to both heavy industry and a dramatic increase in automobile traffic. Smog is also increasingly recognized as an acute public health problem throughout northern China, and the government has declared several high-profile "red alerts" in recent years. Residents in Tangshan and beyond are facing an ongoing battle with smog, an issue at the intersection of science, public policy and rising perceptions among urban residents about how air pollution affects their quality of life.

40 Interview, 8 September 2014.

41 Bord and O'Connor 1997.

42 Gallina and Williams 2014.

43 Tilt 2010, 78.

Using qualitative interviews and a standardized survey questionnaire, we have examined public perceptions of various themes that residents of Tangshan identified as important aspects of “quality of life” for the public, including personal health, children’s health, family harmony, children’s education, environmental quality, and jobs and income. Although study participants considered environmental quality an issue of lower priority than many themes, they consistently ranked it above economic concerns such as jobs and income.

Most importantly, Tangshan residents tended to have a holistic view of “quality of life,” seeing the connections across various themes. In the narratives of our study participants, key themes such as personal health and children’s health were seen as fundamentally linked to environmental quality in complex and nuanced ways. When people remain indoors in order to avoid pollution exposure, or put on respiratory masks before going outdoors, or worry constantly about the health of their family members, it is clear that environmental quality influences all other aspects of everyday life. In this way, Tangshan’s smog problem can be viewed as a crucial factor that limits general quality of life. This is in line with key findings from other studies in this special issue, which suggests that perceptions of pollution are shaped by a range of factors including economic status, increased media scrutiny of pollution events, and governmental discourses promoting the rise of an ecological civilization.<sup>44</sup>

Our findings also resonate with recent research that has shown a link between environmental degradation and increased public concern and environmental awareness in contemporary China.<sup>45</sup> In some cases, public anxiety regarding the health threats posed by pollution has led to greater frequency of environmental protests.<sup>46</sup> However, pollution victims face a variety of challenges in gaining official recognition and redress, including the difficulty of showing a causal link between pollution exposure and specific damages, as well as the general difficulty of accessing the court system.<sup>47</sup> A next logical step in this research agenda is to attempt to understand whether increased environmental awareness actually leads to pro-environmental behaviours and support among the public for more aggressive environmental regulations. As a 2002 UN Development Programme report on the potential for sustainable development in China observed, public environmental awareness and concern are among the most important driving forces for environmental improvements worldwide, and a well-informed society, with outspoken public intellectuals, is often a necessary condition for successful environmental protection campaigns.<sup>48</sup>

Public engagement in environmental governance is crucial, as traditional top-down pollution control approaches are increasingly proving inadequate in enforcing regulations. Public engagement is also a key component of China’s Agenda

44 Hansen and Liu 2017 (this issue).

45 Liu and Leiserowitz 2009.

46 Gardner 2014.

47 Van Rooij 2010; Stern 2011.

48 Liu and Leiserowitz 2009.

21 document, which explicitly champions a greater public role in environmental governance.<sup>49</sup> However, understanding public engagement within the unique political context of contemporary China, with its limited space for civil society and non-governmental organizations, can be challenging. According to the Ministry of Environmental Protection's incident investigation centre, anonymous tips about polluting industries and activities have risen steadily in recent years, and air pollution is the most common topic of concern.<sup>50</sup> Hebei province, where Tangshan is located, established a system in 2013 to reward residents who report environmental infractions, and this system undoubtedly contributes to the rising public awareness about pollution.<sup>51</sup> If true progress towards addressing China's severe air pollution crisis is to be made, the perceptions and attitudes of middle-class urban residents will undoubtedly need to be a key driving factor.

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## Biographical notes

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**摘要:** 经过数十年迅猛的经济发展, 中国当下面临极其严重的环境问题。尤其是近些年中国的城市雾霾引起了国内外学者和媒体的广泛关注。这篇文章探讨了生活在中国北方城市唐山的人们对于雾霾污染的公众意识。在这篇文章中, 作者总结了定性访谈和 341 份城市调查问卷的分析结果, 介绍了唐山的城市居民如何认识和权衡生活质量相关的几个方面, 包括他们自身对于雾霾的经验和认知。被调查居民认为环境质量相较其他几项生活质量相关的方面并不在优先考虑之列, 然而却优先于经济考量, 比如说比工作和家庭收入。被调查居民的回答反映出对于很多城市居民来讲, 环境问题很大程度上和对于最基本生活质量的忧虑息息相关, 包括身体健康以及家庭和睦。此文章引用了中国中产阶级的崛起, 环境意识的苏醒, 以及性别在影响环境相关的公众意识的作用为框架阐述研究成果, 同时作者认为此篇研究成果对于以后中国更好的控制和改善大气污染具有实践性的意义。

**关键词:** 雾霾; 公众意识; 生活质量; 环境质量; 环保意识; 中产阶级; 性别; 中国

49 Zhao 2010.

50 Wu 2014.

51 Zhang et al. 2014.

## References

- Agrawal, Arun. 2005. *Environmentality: Technologies of Government and the Making of Subjects*. Durham, NC: Duke University Press.
- Ahlers, Anna, and Yongdong Shen. 2017. "Breathe easy? Local nuances of authoritarian environmentalism in China's battle against air pollution." *The China Quarterly*, special section "Human dimensions of air pollution in China."
- Aunan, Kristin, Mette Halskov Hansen and Shuxiao Wang. 2017. "Introduction: air pollution in China." *The China Quarterly*, special section "Human dimensions of air pollution in China."
- Azadi, Hossein, Gijs Verheijke and Frank Witlox. 2011. "Pollute first, clean up later?" *Global and Planetary Change* 78, 77–82.
- Badland, Hannah M., and Mitch J. Duncan, 2009. "Perceptions of air pollution during the work-related commute by adults in Queensland, Australia." *Atmospheric Environment* 43, 5791–95.
- Banik, Bijoy Krishna. 2010. "Female perceptions of health hazards associated with indoor air pollution in Bangladesh." *International Journal of Sociology and Anthropology* 2(9), 206–212.
- Bhattacharya, Mita, Shuddhasattwa Rafiq and Sankar Bhattacharya. 2015. "The role of technology on the dynamics of coal consumption-economic growth: new evidence from China." *Applied Energy* 154, 686–695.
- Bawden, Tom. 2013. "Carbon dioxide in atmosphere at highest level for 5 million years," *The Independent*, 10 May.
- Bickerstaff, Karen, and Gordon Walker. 2001. "Public understandings of air pollution: the 'localisation' of environmental risk." *Global Environmental Change* 11, 133–145.
- Bickerstaff, Karen. 2004. "Risk perception research: socio-cultural perspectives on the public experience of air pollution." *Environment International* 30(6), 827–840.
- Bord, Richard J., and Robert E. O'Connor. 1997. "The gender gap in environmental attitudes: the case of perceived vulnerability to risk." *Social Science Quarterly* 78(4), 830–840.
- Checker, Melissa. 2007. "'But I know it's true': environmental risk assessment, justice, and anthropology." *Human Organization* 66(2), 112–124.
- Chen, Yuyu, Avraham Ebenstein, Michael Green and Li Hongbin. 2013. "Evidence on the impact of sustained exposure to air pollution on life expectancy from China's Huai River policy." *Proceedings of the National Academy of Sciences* 110(32), 12936–41.
- Dunlap, Riley E., and Angela Mertig. 1997. "Global environmental concern: an anomaly for postmaterialism." *Social Science Quarterly* 78(1), 24–29.
- Economy, Elizabeth C. 2004. *The River Runs Black: The Environmental Challenge to China's Future*. Ithaca, NY: Cornell University Press.
- Egondi, Thaddaeus, Catherine Kyobutungi, Nawi Ng, Kanyiva Muindi, Samuel Oti, Steven Van de Vijver, Remare Ettarh et al. 2013. "Community perceptions of air pollution and related health risks in Nairobi slums." *International Journal of Environmental Research and Public Health* 10, 4851–68.
- Gallina, Melissa, and Allison Williams. 2014. "Perceptions of air quality and sense of place among women in northeast Hamilton, Ontario, Canada." *International Journal of Social Science Studies* 2(3).
- Gardner, Daniel. 2014. "China's environmental awakening." *The New York Times*, 14 September. Available online at: <http://www.nytimes.com/2014/09/15/opinion/chinas-environmental-awakening.html>. Accessed 27 December 2015.
- Hansen, Mette Halskov, and Zhaohui Liu. 2017. "Air pollution and grassroots echoes of "ecological civilization" in rural China." *The China Quarterly*, special section "Human dimensions of air pollution in China."
- Hedges, A. 1993. *Air Quality Information, Report on Consultancy and Research*. London: HMSO.
- Holdaway, Jennifer. 2010. "Environment and health in China: an introduction to an emerging research field." *Journal of Contemporary China* 19, 1–22.

- Howel, Denise, Suzanne Moffatt, Judith Bush, Christine E. Dunn and Helen Prince. 2003. "Public views on the links between air pollution and health in Northeast England." *Environmental Research* 91, 163–171.
- Inglehart, Ronald. 1995. "Public support for environmental protection: objective problems and subjective values in 43 societies." *Political Science and Politics* 28(1), 57–72.
- Jenkins, N. 2000. "The general public's perception of air quality." In J.W.S. Longhurst, C.A. Brebbia and H. Power (eds). *Air Pollution*, vol. 8. Southampton: WIT Press, 243–252.
- Keiding, Niels, and Thomas A. Louis. 2016. "Perils and potentials of self-selected entry to epidemiological studies and surveys." *Journal of the Royal Statistical Society* 179, 319–376.
- Li, Chengzhen. 2003 "Tangshan Da Di Zhen" [The Great Tangshan Earthquake], *China's Business and Information News*, 11 February, 33.
- Liu, Chung-En, and A. Leiserowitz. 2009 "From red to green? Environmental attitudes and behavior in urban China." *Environment* 51(4), 32–45.
- Lora-Wainwright, Anna. 2010. "An anthropology of cancer villages: villagers' perspectives and the politics of responsibility." *Journal of Contemporary China* 19, 79–100.
- Lora-Wainwright, Anna. 2013. *Fighting for Breath: Living Morally and Dying of Cancer in a Chinese Village*. University of Hawai'i Press.
- McKenzie, David J., and Johan Mistiaen. 2009. "Surveying migrant households: a comparison of census-based, snowball and intercept point surveys." *Journal of the Royal Statistical Society* 172, Part 2, 339–360.
- Miles, Matthew B., and A. Michael Huberman. 1994. *Qualitative Data Analysis: An Expanded Sourcebook*. London: Sage.
- Ministry of Environmental Protection of PRC. 2014 Report on the State of the environment in China. Available at: <http://english.sepa.gov.cn/Resources/Reports/soe/soe2011/201606/P020160601592064474593.pdf>.
- Mol, Arthur P.J. 2012. "Carbon flows, financial markets and climate change mitigation." *Environmental Development* 1(1), 10–24.
- Mol, Arthur P.J., and Neil T. Carter. 2006. "China's environmental governance in transition." *Environmental Politics* 15(2), 149–170.
- Saksena, Sumeet 2007. "Public perceptions of urban air pollution with a focus on developing countries." East–West Center Working Papers: Environmental Change, Vulnerability and Governance Series, No. 65.
- Shapiro, Judith. 2012. *China's Environmental Challenges*. Cambridge, UK: Polity Press.
- Stern, Rachel E. 2011. "From dispute to decision: suing polluters in China." *The China Quarterly* 206, 294–312.
- Tilt, Bryan. 2010. *The Struggle for Sustainability in Rural China: Environmental Values and Civil Society*. New York: Columbia University Press.
- Tilt, Bryan. 2011. "Local perceptions of 'quality of life' in rural China: implications for anthropology and participatory development." *Journal of Anthropological Research* 67(1), 27–46.
- Tong, Yanqi. 2007. "Bureaucracy meets the environment: elite perceptions in six Chinese cities." *The China Quarterly* 189, 100–121.
- Vale, Lawrence J., and Thomas J. Campanella. 2005. *The Resilient City: How Modern Cities Recover from Disaster*. Oxford, UK: Oxford University Press.
- Van Rooij, Benjamin. 2010. "The people vs. pollution: understanding citizen action against pollution in China." *Journal of Contemporary China* 19, 55–77.
- Wu, Wencong. 2014. "Public awareness rises over air pollution," *China Daily*, 7 June 2014. Available online: [http://www.chinadailyasia.com/news/2014-06/07/content\\_15139103.html](http://www.chinadailyasia.com/news/2014-06/07/content_15139103.html). Accessed on 25 December 2015.
- Zhang, Dongyang, Liu Junjuan and Li Bingjun. 2014. "Tackling air pollution in China – what do we learn from the great smog of 1950s in London." *Sustainability* 6, 5322–38.

- Zhang, Junfeng, and Jonathan M. Samet. 2015. "Chinese haze versus Western smog: lessons learned." *Journal of Thoracic Disease* 7(1), 3–13.
- Zhang, L. Jianjun, Zhaokang Yuan, Jay E. Maddock, Peng Zhang, Zhiqin Jiang, Thomas Lee, Jiaojiao Zou, Yuanan Lu. 2014. "Air quality and environmental protection concerns among residents in Nanchang, China." *Air Quality Atmosphere and Health* 7, 441–448.
- Zhao, Yuhong. 2010. "Public participation in China's EIA regime: Rhetoric or reality?" *Journal of Environmental Law* 22, 89–123.