SUPPORTING INFORMATION

Evidence on the Impact of Sustained Exposure to Air Pollution on Life Expectancy from China's Huai River Policy

PART 1: Description of Data

I. Mortality Rate and Life Expectancy Data

Our sample of mortality in China is taken from the Disease Surveillance Points system, which forms a nationally-representative sample of mortality for 1991-2000. These data are collected by the Chinese Center for Disease Control and were made available to the research team for this project.

Table S1 reports the death rates by cause at the DSP locations. The categories are selected from the International Classification of Disease Revision 9 (ICD-9). Cardiorespiratory causes of death are lung cancer (10), heart diseases (25, 26, 27, 28), vascular disease (29), and respiratory diseases (31, 32). Non-cardiorespiratory related illnesses are cancers other than lung (8, 9, 11, 12, 13, 14), accidents and violent deaths (47-56), and all other causes (1-7, 15-24, 30, 33-46, 99). It is worth noting that these death rates match the rates reported in Yang (1), an official tabulation of the death rates recorded by the Chinese Disease Surveillance Points system.

Since the paper's goal is to determine the relationship between mortality rates and long-term exposure to ambient air pollution, it is critical that the DSP accurately reports mortality among all permanent residents. There are two possible threats to the accurate calculation of such mortality rates. First, although China's *hukou* (household registration) system restricted migration, it did not prevent all migration, and indeed migration became more common in China by the end of our sample period. Second, sick rural residents are referred to urban hospitals with an unknown frequency; if their deaths are registered where they die instead of where they reside, our estimates could be biased.

Although we do not have a silver bullet for these problems, there are two primary reasons that we believe that mismeasurement of location-specific mortality rates are unlikely to explain the paper's results. First, the DSP's approach to assigning mortality rates to locations mitigates these potential problems because, like the *hukou* system, it assigns a death to an individuals' *hukou* or place of birth. At the DSP locations, the covered population is tracked from a registry designed at the outset of the program, and deaths are usually recorded by personnel at local hospitals. In the circumstance that a death occurs away from home, the family is instructed to report on the death wherever it occurs, and a site official is expected to follow up on and accurately record each death at the site of original registration. Further, the *hukou* system requires that all death certificates report the *hukou* or place of birth, and this information is checked by a local government official who provides an official stamp of verification to the death certificate. Second, the regression discontinuity design is likely to provide a solution to any residual confounding. Specifically, in the context of this design these two behaviors (migration and excess urban deaths) will not be a source of confounding unless their frequency changes discretely at the Huai River boundary. We are unaware of a reason that this would be the case.

Our analysis is conducted with cross-sectional data on mortality rates and their determinants. We converted the panel DSP data into a cross-section by taking averages of the cause-specific mortality rates, age-specific mortality rates, and life expectancy, from all annual observations for 1991-2000 for each of the 145 DSP locations.[1]

II. Air Pollution and Weather Data

The creation of the air pollution and weather exposure data sets involved several steps. We describe them here.

A. Creating a Panel Data Set of City-Level Pollution

The air pollution data used for the analysis were collected from China's Environmental Yearbooks[2], which contain nearly-comprehensive readings for 90 cities from 1981-2001 (2).

1. The data from 1981-1995 were taken from the World Bank online archive[3] of air quality readings, and supplemented by hand-entered readings from the Chinese language yearbooks. For this period, we have a total of 760 valid readings, 680 of which were taken from the World Bank online archive and 80 readings were entered by our team directly from print copies of the yearbooks.

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[1] The DSP sample includes 1,374 DSP year-location observations, instead of 1,450 (145 x 10) as a result of difficulties encountered in the DSP collection process at certain sites in certain years.

[2] Issued by the State Statistical Bureau and accessed in print form by the authors at Harvard University's Fung Library.

[3] The World Bank online data is also taken from China's Environmental Yearbooks, but did not contain all available data for the cities included in our sample. Therefore, we supplemented these data with our hand-entered data from hard copies of the Yearbooks.

2. The data for 1995-2001 were entered by hand by two different researchers on our team, with nearly perfect data agreement. Out of a total of 508 readings for 1996-2001, there were 18 total cases of disagreement, and in these cases averages of the two readings were taken.

3. Steps 1 and 2 created a data set of 1,268 validated TSP measurements from 1981-2001 for 90 cities with monitoring stations. This was from a possible total of 1,890 readings, with most of the missing readings for the 1980s. The missing values were imputed (when possible) using linear interpolation from valid measurements in years prior to or following the missing value. The interpolation provided an estimate for an additional 138 readings, yielding a data set of 1,406 measurements for our analysis.

B. Creating a Panel Data Set of DSP location-Level Pollution Data from the City-Level Pollution Panel

The next step was to use the city-level panel data to create a DSP location-level panel of pollution data. This was done in three steps:

1. We first calculated the distance between each of these monitoring stations and our mortality sample taken from China's Disease Surveillance Points (DSP). The distance between each of these 90 stations and the 145 DSP sites or locations yielded a full matrix of 145 X 90 calculated distances.[4]

2. Our measure of air pollution for a DSP location in a year was calculated as the weighted average of air pollution at each station, with the weights determined by the inverse of the distance between the two points.[5] When a station had no valid TSP reading for a particular year, it was assigned a zero weight for that year and did not enter into the calculation.

3. At each DSP location, the air pollution exposure was measured as the average TSP reading in all previous years for which data are available. For example, the reading for a DSP location in 1991 is the average of TSP readings from 1981-1990 at the location. This creates a panel data set of year by DSP location mortality readings with validated air pollution data averaged across all previous years.

[4] The centroid of the county containing the DSP location and the centroid of the city containing the monitoring station were used to calculate an exact distance between the two.

[5] The results are robust to different choices for the functional form. This is discussed further in Part 4.

C. Creating a Cross-Sectional Data Set of DSP-Level Pollution Data from the Panel DSP Data File.

The panel data set was then averaged across all observations for each DSP location to create a single observation for each of the 145 DSP locations. The empirical analysis is restricted to locations within 150 kilometers of a monitoring station. Additionally, we dropped 1 DSP location for having invalid mortality data.[6] This represents the main sample for our analysis. It contains 125 DSP locations with valid mortality data within 150 kilometers of an air quality monitoring station.

A similar method was used to calculate weather exposure at each DSP location. Daily temperature readings for 1981-2001 were obtained from the World Meteorological Association (3). Our analysis is limited to the 339 weather stations with nearly-complete weather data for 1981-2001.[7] At each of these stations, we calculated the total heating and cooling degree days for each year. The total heating and cooling degree exposure for a DSP location in a given year was calculated as the weighted average of the degree days at the 339 stations, with the weights determined by the distance between the DSP location and the station. The weather exposure for a DSP location in a year is the average of heating and cooling degrees in all previous years during the sample period assigned in a manner similar to our method for assigning air pollution exposure.

III. Other Covariates

As a complement to the DSP, we also use the China 2000 county census data to control for confounders that might vary across locations in China. We assigned county-level information to each of the DSP locations by spatially merging the DSP locations with ArcGIS shape files of the 2000 census. For example, in the main regressions, we include controls for the average education, share in manufacturing, share of minority population, share with urban registration, and share with access to tap water. These data are taken from the Harvard Geospatial Library collection of China census data, linked to the DSP locations. Information on the average

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[6] The DSP location in the Meilie District of Sanming City, Fujian Province, is excluded with a calculated life expectancy of 182 years. This was determined to be an outlier, with the unrealistic life expectancy due to either unregistered deaths or over-registered population counts, at the DSP location.

[7] Only stations with at least 360 days of data for every year in the period were included in the sample of weather stations. If a station had fewer than 360 readings in a particular year, the station was assigned a zero weight when estimating the weather for the DSP location for that year.

education, the share of minority population and share with urban registration are based on tabulations of the Short Form (100% sample) of the survey, and information on manufacturing employment and access to tap water are taken from the Long Form (9.5% sample) of the survey.

PART 2: Information on Dietary Patterns and Smoking Rates Regionally

We examined diet and smoking patterns in North and South China as they are potential confounders for determining the causal relationship between TSP and mortality rates. These variables come from the China Health and Nutrition Survey (1989-2006) and the China Household Income Survey (1995), respectively. Neither survey contains geographic identifiers at a level that would allow for reliable assignment to DSP locations, so these variables cannot be included in the regressions. Instead, this subsection assesses whether there are differences in these variables in the North and South which may be informative about differences at the river's border, since our identification strategy requires that no variables relevant to human health (other than air pollution) change discontinuously at the river.

Table S2 demonstrates that dietary patterns in terms of broad caloric intake are similar. Note also that the main dietary difference between Southern and Northern China is that the southern provinces have a diet with greater intake of rice and Northern China has greater intake of wheat. This would presumably not affect non-cardiorespiratory related illnesses differently than it affects non-cardiorespiratory related illnesses. In fact, the Yangtze River is generally thought the cultural divide between Northern and Southern China that is relevant in terms of diet, rather than the Huai River. Smoking rates are also quite similar between the South and North for men (69.2 versus 71.8), whereas the rates are somewhat higher in the North than South for women (2.7 versus 6.9). These differences seem quite small relative to the regional differences in cardiorespiratory illness rates. Also note that our empirical specifications control for a polynomial in the latitude of a DSP location, so the Two-stage least squares estimates exploit the discrete change in TSP near the Huai River. We suspect that it is unlikely that dietary patterns or smoking rates change nearly as dramatically as TSP near this boundary.

PART 3: Heterogeneity by Gender and Age

I. Estimates by Gender

As shown in Table S3, the results when estimated separately for men and women fail to reveal important gender differences in the effect of TSP on mortality. For example, the saturated model with a full set of controls in the overall sample indicates that an additional 100 $\mu g/m^3$ of TSP imposes a 2.5/3.6 year cost in life expectancy at birth for men and women respectively. The results are less precisely estimated than what we find for the overall sample, but the estimates are statistically significant at the 10 and 5 percent levels respectively. One interpretation of a larger effect among women than men is that Chinese men have much higher smoking rates than Chinese women, and so ambient air pollution is a larger factor in determining female respiratory health than it is for men.

II. Estimates by Age

In Table S4, we examine the relationship between TSP exposure and mortality rates separately for different age groups. The results indicate that air pollution has a deleterious effect on health throughout the life cycle. Among infants, we observe a large impact on mortality for both cardiorespiratory related and non-cardiorespiratory related mortality. The non-cardiorespiratory mortality impact for infants appears to be due to the crude classification of the causes of mortality among infants in the DSP data.[8] Indeed, the difficulty in assigning causes to infant deaths leads us to conclude that the all cause mortality results are the most meaningful for infants.

At older ages, the results indicate that there is a stronger relationship between age-specific mortality for cardiorespiratory related causes than for non-cardiorespiratory related causes. For example, the results implicating air pollution in higher mortality rates for cardiorespiratory related illnesses are most pronounced for those ages 40 and older, where we estimate coefficients that range from .08 to .28, with the largest effects observed among those

[8] Nearly half of all infants deaths are assigned to causes of death that are almost never used for deaths at older ages. Specifically, 37.9% of infant deaths are classified as “certain conditions originating in the perinatal period” and 9.5% are assigned to “congenital anomalies.” These causes of death fall outside the range of ICD-9 codes for our cardiorespiratory category. They are very broad and non-specific causes of death and we suspect that many of the deaths are likely to be related to cardiac or respiratory conditions. However rather than change the definition of cardiorespiratory diseases for infants only, the analysis keeps the definition of cardiorespiratory mortality constant across all ages. The bottom line is that given the crude classification system for infant causes of death, we conclude that the all cause mortality results are the most meaningful for infants.

ages 60-80. The results for non-cardiorespiratory related causes are smaller and statistically insignificant. These results suggest that air pollution has a noticeable impact on human health at all ages, with slightly larger estimated effects among the elderly, possibly due to their longer-term exposure and/or their weaker condition. Figure S4 plots the TSP coefficients from the cardiorespiratory mortality rate regressions.

PART 4: Robustness of Results to Alternative Specifications and Samples

In this section, we examine the robustness of our results according to several different tests to confirm whether our results were affected qualitatively by the decisions made in our paper along several dimensions, such as data assignment, sample selection, and functional forms of our models.

I. Assignment of TSP Concentrations and Weather Variables to DSP Locations

Table S5 examines the sensitivity of the results to alternative approaches to calculating distance weighted averages of TSP and weather for each DSP location, and to our choice of whether to use the closest monitoring station versus a distance-weighted set of monitoring stations. One potential concern is that using distance-weighted averages between a DSP location and TSP readings from monitors will cause the calculated TSP change to vary smoothly with latitude, and this may incorrectly attenuate the estimated effect of the Huai River policy on TSP concentrations. We chose the distance-weighted method as it represents a conservative estimate of the impact of the policy on TSP, though we acknowledge that other choices could have been made. In Table S5, each cell represents a separate regression, with a dummy for "North" the reported independent variable. In the first panel, TSP is the dependent variable. In the second panel, heating and cooling degree days are the dependent variables in the first and second rows respectively. All models include a cubic polynomial in latitude.

In columns (1)-(4) of Table S5, the TSP and weather variables for a given DSP location are calculated as the weighted average of the nearby monitoring stations, with the weight given by the inverse of the distance, the square of the distance, the cube of the distance, and the quartic of the distance respectively. The results are not very sensitive to using alternative methods for assigning TSP and weather variables to DSP locations. For example, the estimated first stage relationship varies between 244.4 μg/m³ and 247.5 μg/m³, and all estimates are statistically significant at the 5% level. The relationship between "North" and the weather measures is qualitatively similar across the specifications as well, suggesting that our results are robust to different treatment of TSP and weather assignment to the DSP locations.

In columns (5)-(11) of Table S5, we examine the sensitivity of the results to alterations in the threshold for the cases where we only use the nearest monitor (rather than a weighted average). The analysis in the paper assigns TSP and weather based only on the nearest station when the nearest station is within 25 km of the DSP location and uses weighted averages across stations in cases where the nearest station is further than 25 km but less than 150 km away. The estimated first-stage relationship varies between 199.5 $\mu g/m^3$ and 252.2 $\mu g/m^3$, with larger estimates found for specifications with smaller values of the threshold which is consistent with some modest attenuation due to measurement error or due to our distance-weighting method that may attenuate the estimated impact of the policy. The weather regressions are generally unaffected by these alterations in the assignment rule. Overall, there is little evidence that the results are affected in any meaningful way by the rule to assign TSP and weather to DSP locations.

II. Maximum Distance Between Monitoring Stations and DSP Locations

The main analysis is restricted to all DSP locations within 150 kilometers of TSP monitoring station. Table S6 examines the robustness of the results to using stricter criteria and only including DSP locations within 150, 125, 100, 75, 50, or 25 kilometers of a monitoring station. To the extent that there is a pattern, it appears that the impact of the Huai River policy on TSP and life expectancy is larger in the more restricted samples where we focus on a smaller number of DSP locations with closer monitoring stations. However, on the whole, these estimates are qualitatively similar to those in Table 3 in that they continue to suggest sharp declines in TSP and life expectancy (due to increases in the cardiorespiratory related mortality rate) north of the Huai River.

III. Expanding the Sample to Include All DSP Locations

Table S7 examines the relationship between health outcomes and living north of the Huai River among *all* DSP locations, even those that are not within 150 kilometers of an air quality monitoring station. For this larger sample of locations without complete TSP data, we simply report the reduced form relationship between health outcomes and an indicator variable for "North". The sample includes all 144 DSP locations, relative to the sample of 125 locations in the main analysis. Among DSP locations within 5 degrees latitude of the Huai River, the expanded sample includes 77 locations, relative to the 69 locations with valid TSP data in the primary sample.

In this larger sample, the estimated effect of living north of the Huai River is qualitatively similar to the results reported in the main analysis. Specifically, all-cause mortality rates are estimated to be 17-25% higher and this is entirely driven by higher cardiorespiratory related mortality rates that are elevated by 31-43%. Overall, the table indicates that living north of the Huai River causes a 3.7-4.7 year decline in life expectancy.

IV. Adjustment for Distance from the Coast

The specifications that produce the estimates in Table S8 are identical to those in Table 3, except that in columns (2) and (3) there is an additional control variable for the distance in meters from China's coast. The adjustment for distance from the Coast aims to account for factors related to China's rapid integration into the global economy and manufacturing boom in coastal cities. As reflected, the results controlling for a DSP location's distance from the coast are very similar to the results we report in Table 3, and in fact are slightly more precisely estimated.

V. Alternative Approaches to Implementation of the Regression Discontinuity Design

We additionally explored the robustness of the results to alternative approaches to implementing the RD design, noting that the design is demanding of the data. Table S9 replicates the column (2) specification from Table 3 but with alternative choices for the polynomial in degrees latitude from the Huai River, starting with a linear polynomial in column (1) and then progressively adding a higher order term to each subsequent specification as one moves from left to right. For example, column (3) includes latitude, its square, and its cube. Below the point estimate and its standard errors, we report two measures of goodness of fit; the p-value associated with a chi-squared test statistic from the addition of the nth term in latitude is in square brackets and the Akaike Information Criterion (AIC) statistic is in braces (4).

The results support our emphasis on a cubic in degrees latitude from the Huai River. Across the outcome variables, the chi-squared test statistics favor the cubic polynomial. For TSPs, the AIC statistic is minimized with a quartic polynomial, although the cubic is the next favored model. In the case of all cause and cardiorespiratory mortality rates and life expectancy, the AIC criteria indicate that the cubic is the optimal order of the polynomial. Both statistics suggest that the linear and quadratic polynomials fail to fit the data as well as the higher order models; these poorer fitting models fail to find a significant relationship between living north of the river and mortality rates, which may be because the lower-order polynomials fail to absorb the variation in mortality patterns in cities that are farthest north and south. Notably, the estimates from the better fitting polynomials (i.e., the cubic, quartic, and quantic) are all similar.

Tables S10 and S11 explore the sensitivity of the results to limiting the sample to DSP locations near the Huai River, and to allowing the polynomial to vary to the north and south of the river. In the former case, the goodness of fit statistics favor the linear and quadratic polynomials; the results from these models are similar to those in Table 3. In the latter case, the goodness of fit statistics strongly support the use of a quadratic polynomial that is allowed to vary to the north and south of the river. Compared to the Table 3 estimates, this specification suggests a smaller increase in TSP at the border but a larger decline in life expectancy.

VI. Do Other Government Policies Change at the Huai River?

A natural concern related to the research design is that the government used the Huai River as the demarcation line for changes in other government policies related to public health, and this would confound the estimates of TSP on health. This possibility is mitigated by the fact that the Huai River is not a border used for administrative purposes. The Huai River follows the January zero degree average temperature line (Celsius), and this was in fact the basis of its choice as a method to divide the country for free heating. Further, local policies generally hew to administrative boundaries associated with cities and provinces; indeed, the Huai River cuts through several provinces. Nevertheless, we identified and compiled variables on policies that are plausibly related to health across 261 cities from the China City Statistical Yearbooks. Table S12 reports on the results of fitting regressions for these policy variables, where the parameter of interest is associated with an indicator for North. The outcome variables are: counts of hospitals, beds in hospitals, doctors, and social service workers; total health care, sports and social welfare workers; and, budgetary expenditures of local governments. These variables are calculated as averages for the years 1996 through 2000 (data are unavailable for 1991-1995). Column (1) reports on the parameter associated with the indicator for North without adjustment for any covariates. Column (2) adjusts the estimate for a cubic in latitude, while column (3) restricts the sample to cities that are roughly 5° latitude north or south of the Huai River (i.e., cities between 27.5° and 37.5° latitude) and adjusts for a linear function of latitude. The restricted sample of cities in column (3) includes 138 cities.

The results fail to suggest any substantial differences in policies north and south of the Huai river. The column (2) specification indicates that the null hypothesis of equality can be rejected at the 10% level for two variables: the number of social service workers and the number of health care, sports and social welfare workers. The column (3) specification indicates that the null hypothesis of equality can only be rejected at the 10% level for the number of hospitals. However, there is little evidence of differences in these variables from the other specifications, or for the other variables in any of the specifications.

Table S13 further explores the possibility that the paper's results are due to differences in other policies north and south of the Huai River. It reports on specifications that are identical to those in Table 3, except that in columns (2) and (3) the full set of policy variables in Table S12 are included as covariates. The results are qualitatively identical to those in Table 3 but estimated with slightly more precision. If anything, they suggest that the Huai River policy and TSP exposure lead to larger losses of life expectancy than indicated in Table 3.

References

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Table S1

Age-adjusted death rates (per 100,000) by cause in China, 1991-2000

	South	North	Difference In Means	p-value
	(1)	(2)	(3)	(4)
All Cause Mortality Rate	624.9	644.9	20.0	0.589
	(155.1)	(221.3)	(36.9)	
<u>Cardiorespiratory Mortality Rate</u>				
All Cardiorespiratory Mortality	353.7	400.3	46.6*	0.100
	(114.7)	(166.2)	(28.1)	
Heart	108.7	147.7	39.0***	0.005
	(55.2)	(76.6)	(13.6)	
Stroke	102.7	133.7	31.0***	0.005
	(46.2)	(64.2)	(10.8)	
Lung Cancers	21.1	25.6	4.5**	0.050
	(12.7)	(12.5)	(2.3)	
Respiratory Illnesses	121.2	93.3	-27.9*	0.075
	(74.8)	(84.2)	(15.5)	
<u>Non-Cardiorespiratory Mortality Rate</u>				
All Non-Cardiorespiratory Mortality	271.2	244.5	-26.6*	0.065
	(74.4)	(78.5)	(14.3)	
Cancers Other than Lung	82.5	91.1	8.5	0.307
	(41.8)	(39.9)	(8.3)	
Accidents / Violence	72.4	59.9	-12.5**	0.016
	(30.0)	(26.9)	(5.1)	
Other	116.3	93.6	-22.7***	0.004
	(53.9)	(36.6)	(7.7)	

Source : Chinese Disease Surveillance Points Mortality Registration System (DSP)

Note : N=145. The cardiorespiratory mortality causes are heart disease, stroke, lung cancer and other respiratory illnesses (e.g. pneumonia, bronchitis). The non-cardiorespiratory mortality causes are violence, cancers other than lung, and all other causes (e.g. diseases of the digestive system). Age adjustment is performed by calculating age-specific death rates and creating weighted averages using the population structure in China's 2000 census. The classification of North is determined by whether the DSP location is covered by the home heating policy, which is all cities north of the line formed by the Huai River and Qinling Mountain range (approximately 33^{o} latitude). The DSP has 75 sites located north of the Huai River boundary and 70 sites south of the Huai River boundary. Heteroskedastic-consistent standard errors are reported in parentheses.

Table S2

Dietary and smoking habits, South and North of the Huai River.

	South	North
	(1)	(2)
Dietary Patterns		
Total Caloric Intake	2,313	2,263
Carbohydrates (%)	15.04	15.32
Fat (%)	2.95	2.77
Protein (%)	2.87	2.98
Other (%)	79.14	78.93
Smoking Rates by Gender		
Men	0.692	0.718
Women	0.027	0.069

Source : Smoking rates are taken from the China Household Income Survey (CHIS, 1995). Dietary information is taken from the China Health and Nutrition Survey (CHNS, 1989-2006).

Note : The smoking rates are shown for the DSP locations which were in the 19 provinces included in the CHIS (1995), which includes 102 of the 145 DSP locations. Information on diet is shown for DSP locations located in the 9 provinces included in the CHNS, which includes 55 of the 145 locations.

Table S3

Using the Huai River Policy to Estimate the Impact of Total Suspended Particulates (100 μg/m^3) on Health Outcomes, Males and Females

	Males			Females		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel 1: Impact of "North" on the Listed Variable, Ordinary Least Squares						
TSP (100 μg/m^3)	2.48***	1.84***	2.17***	2.48***	1.84***	2.17***
	(0.65)	(0.63)	(0.66)	(0.65)	(0.63)	(0.66)
ln(All Cause Mortality Rate)	0.20*	0.25**	0.31**	0.2400	0.27*	0.26
	(0.12)	(0.12)	(0.14)	(0.15)	(0.15)	(0.17)
ln(Cardiorespiratory Mortality Rate)	0.33**	0.36**	0.53***	0.43**	0.41**	0.46**
	(0.14)	(0.15)	(0.18)	(0.18)	(0.19)	(0.21)
ln(Non-Cardiorespiratory Mortality Rate)	0.03	0.10	0.02	-0.05	0.03	-0.04
	(0.12)	(0.12)	(0.13)	(0.14)	(0.14)	(0.14)
Life Expectancy (years)	-3.99*	-4.52*	-5.78*	-6.01**	-6.55**	-4.35
	(2.39)	(2.30)	(2.94)	(2.87)	(2.83)	(3.00)
Panel 2: Impact of TSP (100 μg/m^3) on the Listed Variable, Two-stage Least Squares						
ln(Total Death Rate)	0.08*	0.14**	0.15*	0.10*	0.14*	0.12
	(0.05)	(0.07)	(0.08)	(0.06)	(0.08)	(0.08)
ln(All Cause Mortality Rate)	0.13**	0.19**	0.25**	0.17**	0.22**	0.21**
	(0.05)	(0.09)	(0.10)	(0.07)	(0.10)	(0.10)
ln(Cardiorespiratory Mortality Rate)	0.01	0.06	0.01	-0.02	0.02	-0.02
	(0.05)	(0.06)	(0.06)	(0.06)	(0.08)	(0.07)
ln(Non-Cardiorespiratory Mortality Rate)	-1.61*	-2.46*	-2.66*	-2.43**	-3.56**	-2.00
	(0.92)	(1.27)	(1.57)	(1.05)	(1.55)	(1.50)
Climate Controls	N	Y	Y	N	Y	Y
Census and DSP Controls	N	Y	Y	N	Y	Y
Polynomial in Latitude	Cubic	Cubic	Linear	Cubic	Cubic	Linear
Only DSP sites within 5^0 latitude	N	N	Y	N	N	Y

* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000).

Note : This table reports results estimated in an identical manner to those presented in Table 3 but separately for men and women.

Table S4

Using the Huai River Policy to Estimate the Impact of Total Suspended Particulates (100 μg/m^3) on Health Outcomes

Age	All Cause Mortality	Cardiorespiratory Mortality	Non-Cardiorespiratory Mortality
		(1)	(2)
0	0.55***	0.36*	0.63***
	(0.20)	(0.22)	(0.22)
1	0.01	-0.31	-0.27
	(0.18)	(0.26)	(0.17)
5	-0.04	-0.13	-0.03
	(0.12)	(0.19)	(0.12)
10	-0.11	0.21	-0.09
	(0.13)	(0.26)	(0.14)
15	0.01	0.17	0.00
	(0.10)	(0.17)	(0.13)
20	0.10	0.08	0.12
	(0.09)	(0.21)	(0.09)
25	0.13*	0.21	0.12
	(0.08)	(0.15)	(0.08)
30	0.01	0.20	-0.03
	(0.07)	(0.16)	(0.08)
35	0.05	0.04	0.06
	(0.06)	(0.1)	(0.07)
40	0.12	0.18*	0.09
	(0.07)	(0.11)	(0.07)
45	0.08	0.21*	0.01
	(0.07)	(0.12)	(0.07)
50	0.07	0.17*	0.01
	(0.06)	(0.09)	(0.08)
55	0.00	0.08	-0.07
	(0.07)	(0.1)	(0.1)
60	0.17**	0.21**	0.14
	(0.08)	(0.09)	(0.1)
65	0.14**	0.20**	0.08
	(0.07)	(0.09)	(0.09)
70	0.14*	0.19**	0.04
	(0.07)	(0.09)	(0.09)
75	0.19**	0.24**	0.10
	(0.09)	(0.11)	(0.11)
80	0.13	0.19	0.00
	(0.11)	(0.13)	(0.14)

* significant at 10% ** significant at 5%. *** significant at 1%.

Source: China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000).

Note : N=125. The sample is restricted to DSP locations within 150 kilometers of an air quality monitoring station. Each cell in the table represents the coefficient from a separate regression, and heteroskedastic-consistent standard errors are reported in parentheses. The models are estimated in an identical manner to those in Table 3 but separately by age group.

Table S5

Robustness checks using weighted averages of TSP across the air quality and weather monitoring stations

	Weighted by:				Only use Nearest Station for Sites within (x) of a Monitor:						
	Distance	Distance^2	Distance^3	Distance^4	10 km	25 km	50 km	75 km	100 km	125 km	150 km
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel 1: Air Pollution Exposure at the Disease Surveillance Points											
Total Suspended	247.5***	246.0***	245.0***	244.4***	252.2***	247.5***	253.1***	234.5***	202.5***	200.1***	199.5***
Particulates (μg/m^3)	(65.2)	(65.7)	(66.1)	(66.4)	(65.6)	(65.2)	(67.4)	(59.6)	(63.5)	(62.9)	(62.9)
Panel 2: Weather Patterns at the Disease Surveillance Points											
Total Heating	465.2	485.7	492.4	493.8	455.8	465.2	673.1*	544.7	400.5	484.9	482.4
Degree Days (000s)	(353.6)	(348.2)	(351.8)	(357.5)	(354.2)	(353.6)	(367.9)	(384.8)	(381.7)	(430.8)	(428.3)
Total Cooling	-240.9	-242.0	-242.1	-240.7	-238.4	-240.9	-329.8*	-263.7	-166.1	-184.5	-182.6
Degree Days (000s)	(177.0)	(177.9)	(180.3)	(182.5)	(177.5)	(177.0)	(190.0)	(197.0)	(195.9)	(205.2)	(203.3)

* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000).

Note : N=125. Each cell in the table represents the coefficient from a separate regression, with a dummy for "North" the reported independent variable. Heteroskedastic-consistent standard errors are reported in parentheses. The first panel has TSP as the dependent variable, and the second panel has heating and cooling degree days as the dependent variable. All models include a cubic in latitude. The sample is restricted to DSP points within 150 kilometers of an air quality monitoring station, and calculation of TSP is only made using stations within 150km. In the first four columns, TSP for a given DSP site is calculated as the weighted average of the nearby monitoring stations, with the weight given by the inverse of the distance, the square of the distance, the cube of the distance, and the quartic respectively. In columns 5-11, we assign to DSP sites sufficiently close to a monitoring station the value for the station, and assign all others using weighted averages where the weight is given by the inverse of the distance. For example, in column 5, any DSP location within 10 kilometers of a station is assigned the value at the closest station instead of a weighted average of the value at multiple stations.

Table S6

Robustness checks of choice of acceptable distance from monitoring station

	<150KM	<125KM	<100KM	<75KM	<50KM	<25KM
	(1)	(2)	(3)	(4)	(5)	(6)
Panel 1: Impact of "North" on the Listed Variable, Ordinary Least Squares						
TSP (100 μg/m^3)	1.84***	1.88***	1.49**	2.17**	4.81***	2.91**
	(0.63)	(0.65)	(0.64)	(1.06)	(1.50)	(1.08)
ln(All Cause Mortality Rate)	0.26*	0.22*	0.30**	0.52***	0.30	0.45*
	(0.13)	(0.13)	(0.13)	(0.15)	(0.18)	(0.23)
ln(Cardiorespiratory Mortality Rate)	0.38**	0.34**	0.42**	0.70***	0.55***	0.66**
	(0.16)	(0.17)	(0.17)	(0.19)	(0.20)	(0.27)
ln(Non-Cardiorespiratory Mortality Rate)	0.08	0.06	0.12	0.25*	0.00	0.18
	(0.13)	(0.12)	(0.11)	(0.14)	(0.21)	(0.24)
Life Expectancy (years)	-5.52**	-4.89*	-5.38**	-9.49***	-9.67***	-8.20*
	(2.39)	(2.47)	(2.52)	(2.85)	(3.54)	(4.12)
Panel 2: Impact of TSP (100 μg/m^3) on the Listed Variable, Two-stage Least Squares						
ln(All Cause Mortality Rate)	0.14**	0.12*	0.21**	0.24**	0.06	0.15
	(0.07)	(0.06)	(0.10)	(0.12)	(0.05)	(0.11)
ln(Cardiorespiratory Mortality Rate)	0.21**	0.18**	0.29**	0.32**	0.11*	0.23
	(0.09)	(0.09)	(0.13)	(0.15)	(0.06)	(0.15)
ln(Non-Cardiorespiratory Mortality Rate)	0.04	0.03	0.08	0.12	0.00	0.06
	(0.07)	(0.06)	(0.08)	(0.09)	(0.04)	(0.09)
Life Expectancy (years)	-3.00**	-2.61**	-3.62*	-4.38**	-2.01**	-2.82
	(1.33)	(1.28)	(1.95)	(2.18)	(0.84)	(2.02)
Observations	125	112	94	69	50	28

* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000).

Note : Each cell in the table represents the coefficient from a separate regression. Heteroskedastic-consistent standard errors are reported in parentheses. All models have a cubic in latitude, demographic controls from China's 2000 census and wealth controls from the DSP, and weather controls. Each column reports these results for the restricted sample of DSP locations with a monitoring station within the listed distance.

Table S7

Relationship between Living North of the Huai River and Health Outcomes using All Disease Surveillance Points

	(1)	(2)	(3)
Panel 1: Impact of "North" on the Listed Variable, Ordinary Least Squares			
ln(All Cause Mortality Rate)	0.17	0.22*	0.25*
	(0.12)	(0.12)	(0.14)
ln(Cardiorespiratory Mortality Rate)	0.31**	0.32**	0.43**
	(0.14)	(0.15)	(0.18)
ln(Non-Cardiorespiratory Mortality Rate)	-0.03	0.07	-0.01
	(0.11)	(0.12)	(0.11)
Life Expectancy (years)	-3.74*	-4.54**	-4.65*
	(2.16)	(2.26)	(2.69)
Climate Controls	N	Y	Y
Census and DSP Controls	N	Y	Y
Polynomial in Latitude	Cubic	Cubic	Linear
Only DSP locations within 5^0 latitude	N	N	Y

* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000).

Note : The sample in columns (1) and (2) includes all DSP locations with valid mortality data (N=144) and in column (3) is restricted to DSP locations within 5^0 latitude of the Huai River boundary (N=77). In this table, we include all DSP locations, including those that are not within 150 kilometers of an air quality monitoring station. One DSP location is excluded due to invalid mortality data. Each cell in the table represents the coefficient from a separate regression, and heteroskedastic-consistent standard errors are reported in parentheses. The cardiorespiratory mortality causes are heart disease, stroke, lung cancer and other respiratory illnesses. The non-cardiorespiratory mortality causes are violence, cancers other than lung, and all other causes. Models in column (1) include a cubic in latitude. Models in column (2) additionally include controls for average education, share employed in manufacturing, share minority, share with urban registration, share with tap water, and controls for the heating and cooling degrees days between 1981 and 2000 prior to the year being analyzed. Degree days are the sum of the difference between the temperature and 65^0F. Models in column (3) are estimated with a linear control for latitude. Regressions are weighted by the population at the DSP location.

Table S8

Using the Huai River Policy to Estimate the Impact of Total Suspended Particulates (100 μg/m^3) on Health Outcomes Controlling for Distance from the Coast

	(1)	(2)	(3)
Panel 1: Impact of "North" on the Listed Variable, Ordinary Least Squares			
TSP (100 μg/m^3)	2.48***	1.86***	2.19***
	(0.65)	(0.63)	(0.66)
ln(All Cause Mortality Rate)	0.22*	0.26**	0.32**
	(0.13)	(0.13)	(0.15)
ln(Cardiorespiratory Mortality Rate)	0.37**	0.39**	0.54***
	(0.16)	(0.16)	(0.18)
ln(Non-Cardiorespiratory Mortality Rate)	0.00	0.08	0.01
	(0.13)	(0.13)	(0.13)
Life Expectancy (years)	-5.04**	-5.59**	-5.55**
	(2.47)	(2.35)	(2.78)
Panel 2: Impact of TSP (100 μg/m^3) on the Listed Variable, Two-stage Least Squares			
ln(All Cause Mortality Rate)	0.09*	0.14**	0.15*
	(0.05)	(0.07)	(0.08)
ln(Cardiorespiratory Mortality Rate)	0.15**	0.21**	0.25**
	(0.06)	(0.09)	(0.10)
ln(Non-Cardiorespiratory Mortality Rate)	0.00	0.04	0.01
	(0.05)	(0.07)	(0.06)
Life Expectancy (years)	-2.04**	-3.00**	-2.54*
	(0.92)	(1.31)	(1.50)
Climate Controls	N	Y	Y
Census and DSP Controls	N	Y	Y
Distance from Coast	N	Y	Y
Polynomial in Latitude	Cubic	Cubic	Linear
Only DSP locations within 5^0 latitude	N	N	Y

* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000).

Note : These results are estimated in an identical manner to those presented in Table 3 but include an additional control for the DSP location's distance from the coast (in meters).

Table S9

Robustness checks of choice of functional form for latitude

	Linear & Controls	Quadratic & Controls	Cubic & Controls	Quartic & Controls	Quintic & Controls
	(1)	(2)	(3)	(4)	(5)
Panel 1: Impact of "North" on the Listed Variable, Ordinary Least Squares					
TSP (100 μg/m^3)	2.89***	2.63***	1.84***	1.95***	1.52**
	(0.56)	(0.49)	(0.63)	(0.59)	(0.72)
	[0.988]	[0.068]	[0.148]	[0.229]	[0.671]
	{492.4}	{489}	{487.2}	{486.3}	{487.5}
ln(All Cause Mortality Rate)	0.12	0.09	0.26*	0.26**	0.37**
	(0.10)	(0.10)	(0.13)	(0.13)	(0.16)
	[0.276]	[0.215]	[0.035]	[0.908]	[0.409]
	{39.88}	{38.8}	{34.11}	{35.92}	{36.13}
ln(Cardiorespiratory Mortality Rate)	0.13	0.09	0.38**	0.39**	0.47**
	(0.13)	(0.13)	(0.16)	(0.16)	(0.19)
	[0.652]	[0.243]	[0.003]	[0.747]	[0.696]
	{102.3}	{101.5}	{91.92}	{93.34}	{94.62}
ln(Non-Cardiorespiratory Mortality Rate)	0.09	0.05	0.08	0.07	0.19
	(0.10)	(0.09)	(0.13)	(0.12)	(0.14)
	[0.135]	[0.151]	[0.933]	[0.973]	[0.35]
	{43.04}	{41.27}	{43.13}	{45.07}	{44.97}
Life Expectancy (years)	-1.62	-1.29	-5.52**	-5.67**	-5.43*
	(1.66)	(1.68)	(2.39)	(2.36)	(2.94)
	[0.101]	[0.6]	[0.001]	[0.737]	[0.984]
	{757.1}	{758}	{746.8}	{748.2}	{750.2}
Panel 2: Impact of TSP (100 μg/m^3) on the Listed Variable, Two-stage Least Squares					
ln(All Cause Mortality Rate)	0.04	0.03	0.14**	0.13**	0.24*
	(0.03)	(0.04)	(0.07)	(0.06)	(0.13)
ln(Cardiorespiratory Mortality Rate)	0.05	0.03	0.21**	0.20**	0.31*
	(0.04)	(0.05)	(0.09)	(0.08)	(0.17)
ln(Non-Cardiorespiratory Mortality Rate)	0.03	0.02	0.04	0.04	0.13
	(0.03)	(0.03)	(0.07)	(0.06)	(0.10)
Life Expectancy (years)	-0.56	-0.49	-3.00**	-2.90**	-3.56
	(0.54)	(0.62)	(1.33)	(1.24)	(2.34)

* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000).

Note : N=125. Each cell in the table represents the coefficient from a separate regression. All models have demographic controls from China's 2000 census, wealth controls from the DSP, and climate controls. Heteroskedastic-consistent standard errors are reported in parentheses. In panel 1, we also report in brackets the p-value associated with the addition of an nth term in latitude. This is calculated using a likelihood ratio test derived by comparing the log likelihood of a model estimated with the extra term restricted to be zero versus an unrestricted model where the extra term is estimated without restriction. The value of Akaike's Information Criterion (AIC) statistic is reported in braces.

Table S10

Robustness checks of choice of functional form for latitude, DSP locations within 5^0 Latitude of Huai River

	Linear & Controls	Quadratic & Controls	Cubic & Controls
	(1)	(2)	(3)
Panel 1: Impact of "North" on the Listed Variable, Ordinary Least Squares			
TSP (100 μg/m^3)	2.17***	1.18*	0.60
	(0.66)	(0.69)	(0.55)
	[0.576]	[0.0001]	[0.28]
	{232}	{216.4}	{215.8}
ln(All Cause Mortality Rate)	0.30*	0.24	0.33
	(0.15)	(0.17)	(0.20)
	[0.171]	[0.587]	[0.577]
	{21.91}	{22.84}	{23.74}
ln(Cardiorespiratory Mortality Rate)	0.50***	0.40*	0.51**
	(0.19)	(0.22)	(0.24)
	[0.042]	[0.359]	[0.652]
	{56.1}	{56.05}	{57.19}
ln(Non-Cardiorespiratory Mortality Rate)	0.00	0.02	0.09
	(0.13)	(0.15)	(0.18)
	[0.999]	[0.931]	[0.66]
	{8.704}	{10.56}	{11.73}
Life Expectancy (years)	-5.30*	-4.04	-5.74
	(2.85)	(3.48)	(3.84)
	[0.036]	[0.333]	[0.463]
	{400.3}	{400.1}	{400.6}
Panel 2: Impact of TSP (100 μg/m^3) on the Listed Variable, Two-stage Least Squares			
ln(All Cause Mortality Rate)	0.14*	0.20	0.56
	(0.08)	(0.17)	(0.56)
ln(Cardiorespiratory Mortality Rate)	0.23**	0.34	0.85
	(0.10)	(0.21)	(0.76)
ln(Non-Cardiorespiratory Mortality Rate)	0.00	0.02	0.16
	(0.06)	(0.13)	(0.34)
Life Expectancy (years)	-2.44	-3.44	-9.57
	(1.50)	(3.26)	(10.03)

* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000).

Note : N=69. Each cell in the table represents the coefficient from a separate regression. Heteroskedastic-standard errors are reported in parentheses. All models have demographic controls from China's 2000 census, wealth controls from the DSP, and climate controls. In panel 1, we also report in brackets the p-value associated with the addition of an n^{th} term in latitude. This is calculated using a likelihood ratio test derived by comparing the log likelihood of a model estimated with the extra term restricted to be zero versus an unrestricted model where the extra term is estimated without restriction. The value of Akaike's Information Criterion (AIC) statistic is reported in braces.

Table S11

Robustness checks of choice of functional form for latitude allowing the effect to vary North and South of the Huai River

	Linear & Controls	Quadratic & Controls	Cubic & Controls
	(1)	(2)	(3)
Panel 1: Impact of "North" on the Listed Variable, Ordinary Least Squares			
TSP (100 μg/m^3)	2.87***	1.18*	0.52
	(0.55)	(0.64)	(0.81)
	[0.557]	[0.0003]	[0.517]
	{493.3}	{480.9}	{483.6}
ln(All Cause Mortality Rate)	0.11	0.33**	0.38**
	(0.10)	(0.15)	(0.19)
	[0.05]	[0.029]	[0.919]
	{38.45}	{35.33}	{39.16}
ln(Cardiorespiratory Mortality Rate)	0.13	0.49***	0.50**
	(0.13)	(0.18)	(0.24)
	[0.19]	[0.001]	[0.71]
	{101.9}	{91.8}	{95.12}
ln(Non-Cardiorespiratory Mortality Rate)	0.08	0.12	0.20
	(0.09)	(0.15)	(0.17)
	[0.008]	[0.764]	[0.456]
	{39.51}	{42.98}	{45.4}
Life Expectancy (years)	-1.57	-6.78**	-4.61
	(1.67)	(2.89)	(4.08)
	[0.059]	[0.002]	[0.575]
	{758}	{749.1}	{752}
Panel 2: Impact of TSP (100 μg/m^3) on the Listed Variable, Two-stage Least Squares			
ln(Total Death Rate)	0.04	0.28*	0.72
	(0.03)	(0.16)	(1.05)
ln(Cardiorespiratory Mortality Rate)	0.04	0.41*	0.95
	(0.04)	(0.22)	(1.41)
ln(Non-Cardiorespiratory Mortality Rate)	0.03	0.10	0.38
	(0.03)	(0.12)	(0.59)
Life Expectancy (years)	-0.55	-5.74*	-8.79
	(0.55)	(3.14)	(13.38)

* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000).

Note : N=125. Each cell in the table represents the coefficient from a separate regression. All models have demographic controls from China's 2000 census, wealth controls from the DSP, and climate controls. Heteroskedastic-consistent standard errors are reported in parentheses. In panel 1, we also report in brackets the p-value associated with the addition of an n^{th} term in latitude and it interacted with a "North" dummy. This is calculated using a likelihood ratio test derived by comparing the log likelihood of a model estimated with the extra terms restricted to be zero versus an unrestricted model where the extra term is estimated without restriction. The value of Akaike's Information Criteria (AIC) statistic is reported in braces. This table differs from Table S9 in which latitude is restricted to take an equivalent functional form in the South and the North.

Table S12

Patterns in Health-Related Government Policies South and North of the Huai River

	(1)	(2)	(3)
Number of Hospitals	0.01	-0.02	-0.03*
(000s)	(0.01)	(0.02)	(0.02)
Number of Beds in Hospitals	1.29	-2.39	-2.89
(000s)	(0.85)	(1.59)	(2.13)
Number of Doctors	0.63	-1.70	-2.34
(000s)	(0.63)	(1.17)	(1.58)
Social Services Workers	0.14	-2.17*	-2.46
(10,000 persons)	(0.66)	(1.24)	(1.75)
Health Care, Sports and Social Welfare Workers	0.04	-0.61*	-0.73
(10,000 persons)	(0.19)	(0.36)	(0.51)
Budgetary Expenditure of Local Government	-338	-1,233	-1,817
(million yuan)	(420)	(932)	(1413)
Polynomial in Latitude	None	Cubic	Linear
Only Cities within +/- 5^0 degrees latitude of Huai	N	N	Y

* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China City Statistical Yearbooks (1996-2000)

Note : Each cell in the table represents the coefficient from a separate regression. Heteroskedastic-consistent standard errors are reported in parentheses. In each regression, we regress the listed variable on a "North" dummy variable. The sample in columns (1) and (2) includes all cities with information on social spending in the listed categories. The sample in column (3) is restricted to cities near the Huai River (27.50-37.50). The larger sample in columns (1) and (2) includes 261 cities and the restricted sample in column (3) includes 138 cities.

Table S13

Using the Huai River Policy to Estimate the Impact of Total Suspended Particulates (100 μg/m^3) on Health Outcomes Controlling for Health-Related Government Policies

	(1)	(2)	(3)
Panel 1: Impact of "North" on the Listed Variable, Ordinary Least Squares			
TSP (100 μg/m^3)	2.45***	1.93***	2.06***
	(0.66)	(0.67)	(0.65)
ln(All Cause Mortality Rate)	0.22*	0.30**	0.38**
	(0.13)	(0.12)	(0.16)
ln(Cardiorespiratory Mortality Rate)	0.37**	0.44***	0.60***
	(0.16)	(0.15)	(0.21)
ln(Non-Cardiorespiratory Mortality Rate)	0.00	0.10	0.06
	(0.13)	(0.12)	(0.13)
Life Expectancy (years)	-5.04**	-6.65***	-6.08**
	(2.47)	(2.34)	(3.03)
Panel 2: Impact of TSP (100 μg/m^3) on the Listed Variable, Two-stage Least Squares			
ln(All Cause Mortality Rate)	0.09*	0.16**	0.18**
	(0.05)	(0.07)	(0.09)
ln(Cardiorespiratory Mortality Rate)	0.15**	0.23**	0.29**
	(0.06)	(0.10)	(0.12)
ln(Non-Cardiorespiratory Mortality Rate)	0.00	0.05	0.03
	(0.05)	(0.06)	(0.07)
Life Expectancy (years)	-2.06**	-3.44**	-2.95*
	(0.95)	(1.45)	(1.69)
Climate Controls	N	Y	Y
Census and DSP Controls	N	Y	Y
Health-Related Government Policy Controls	N	Y	Y
Polynomial in Latitude	Cubic	Cubic	Linear
Only DSP locations within 5^0 latitude	N	N	Y

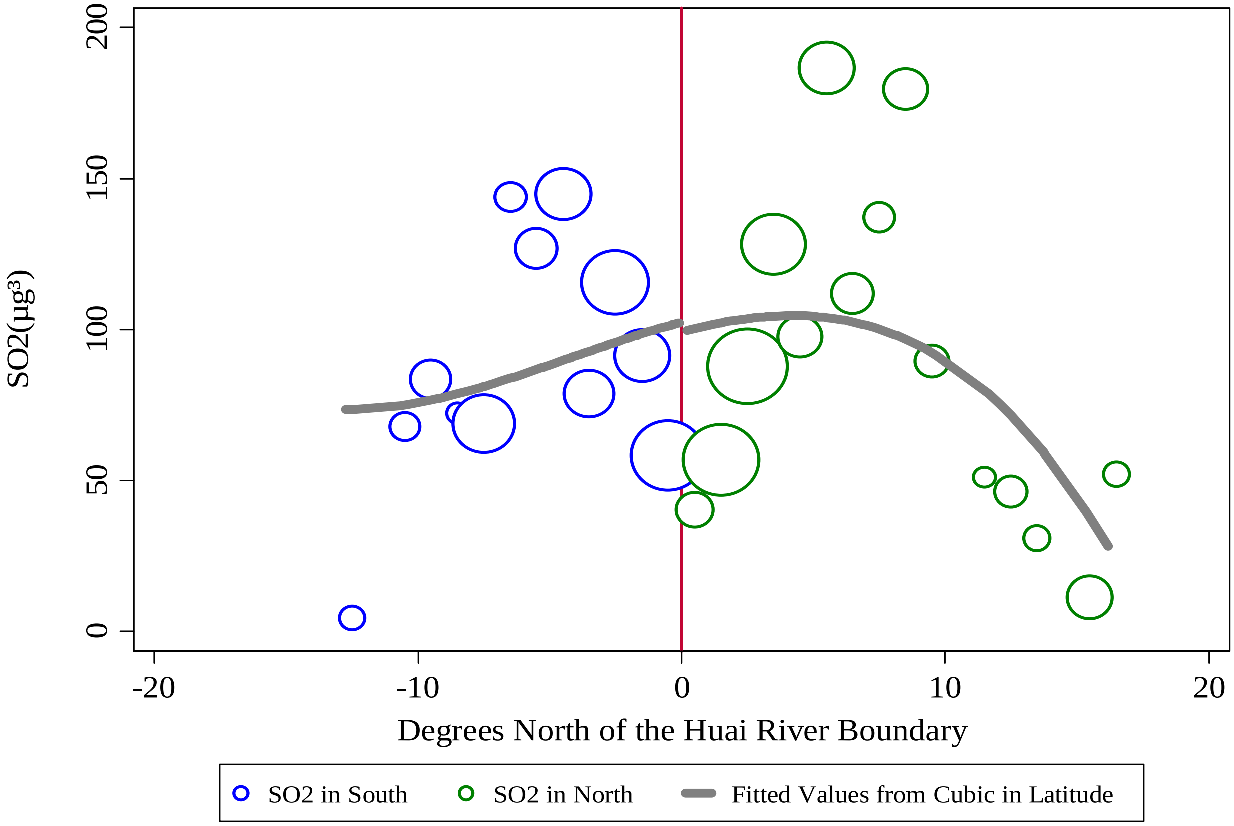
* significant at 10% ** significant at 5%. *** significant at 1%.

Source : China Disease Surveillance Points (1991-2000), China Environmental Yearbooks (1981-2000), World Meteorological Association (1980-2000), China City Statistical Yearbooks (1996-2000).

Note : The regressions are estimated in a manner identical to those presented in Table 3, but in columns 2 and 3 we include the additional health-related government policies listed in Table S12.

Figure S1

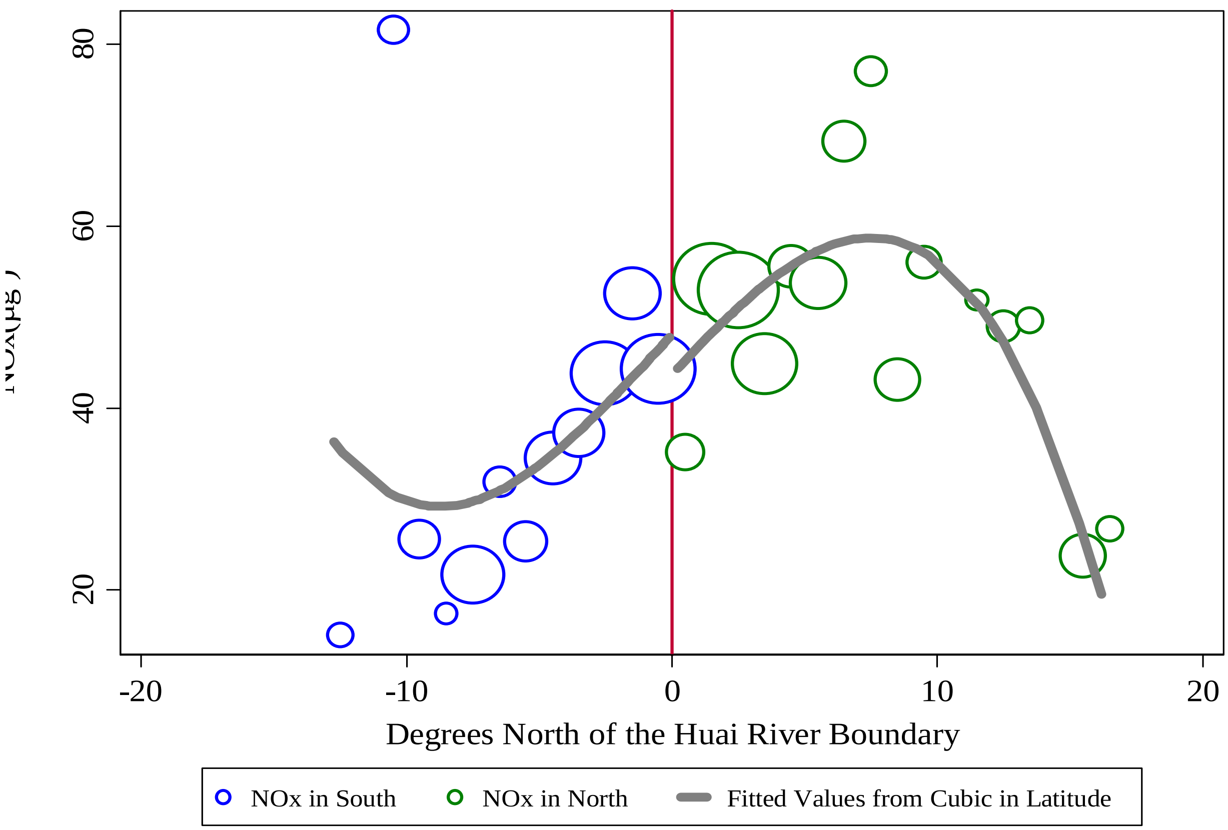
Sulphur Dioxide Concentration Exposure among Chinese Disease Surveillnace Points by Distance from Huai River Boundary



Note : Each observation is generated by averaging SO2 across the Disease Surveillance Point locations within a 1^0 latitude range. The size of the point is in proportion to the number of sites within the 1^0 latitude range. The plotted line reports the fitted values from a regression of S02 on a cubic polynomial in latitude using the sample of DSP locations. See the main text for a discussion of these results.

Figure S2

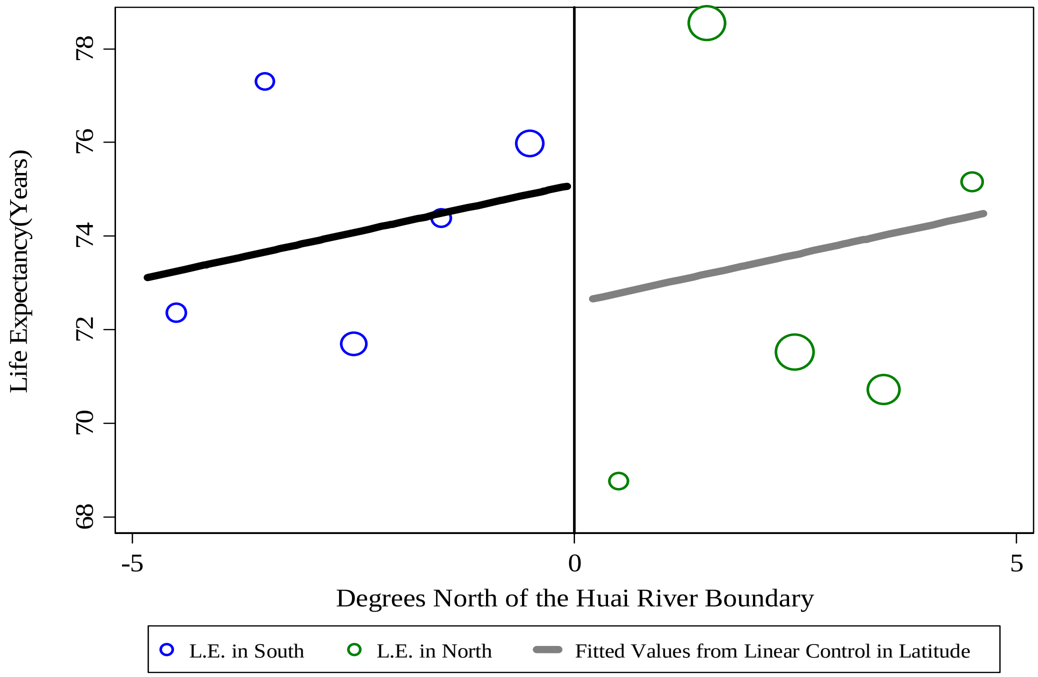
Nitrous Oxide Concentration Exposure among Chinese Disease Surveillance Points by Distance from Huai River Boundary



Note : Each observation is generated by averaging NOx across the Disease Surveillance Point locations within a 1^0 latitude range. The size of the point is in proportion to the number of sites within the 1^0 latitude range. The plotted line reports the fitted values from a regression of S02 on a cubic polynomial in latitude using the sample of DSP locations. See the main text for a discussion of these results.

Figure S3

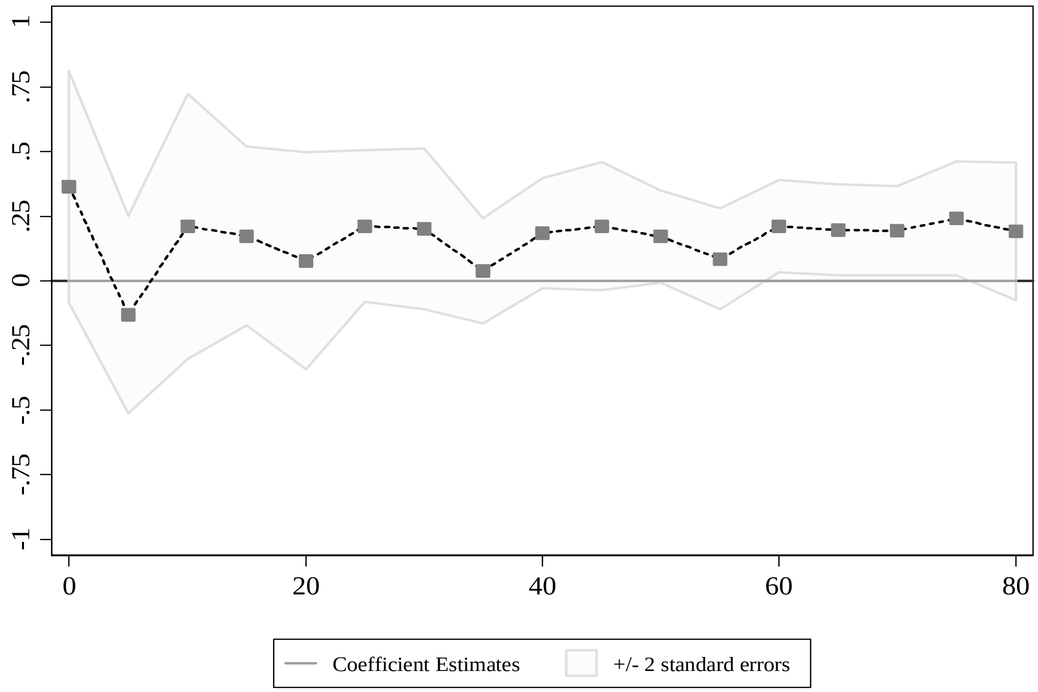
Life Expectancy among Chinese Disease Surveillance Points by Distance from Huai River Boundary in Sample within 5^0 Latitude



Note : Each observation is generated by averaging predicted life expectancy across the Disease Surveillance Point locations within a 1^0 latitude range. The size of the point is in proportion to the number of sites within the 1^0 latitude range. The plotted line reports the fitted values from a regression of life expectancy on a linear term in latitude using the sample of DSP locations.

Figure S4

Estimated Impact of Long-Term TSP exposure (1981-2000) on Cardiorespiratory Mortality by Age using the Huai River Policy (Two-stage Least Squares)



Note : Each point in the plot represents the coefficient from a separate regression, where we examine how the log of age-specific death rates are affected by long-term exposure to TSP (μg/m^3). The IV regressions are estimated in the manner described in Table 3, where the log of the death rate from cardiorespiratory mortality causes is the dependent variable and long-term TSP average is the independent variable. The models are estimated using 1(North) as the instrument for average TSP.