

Supplementary Table I. Unadjusted associations between interquartile range increases in particulate matter with diameter of 2.5µm or less (PM_{2.5}) and O₃ and implantation, pregnancy, and live birth, by time of exposure

Exposure period	PM _{2.5}			O ₃		
	Implantation* RR [†] (95% CI)	Pregnancy RR [†] (95% CI)	Live birth RR [†] (95% CI)	Implantation* RR [†] (95% CI)	Pregnancy RR [†] (95% CI)	Live birth RR [†] (95% CI)
Cycle start to oocyte retrieval	1.00 (0.98-1.01)	1.00 (0.99-1.01)	1.00 (0.99-1.01)	1.02 (1.01-1.04)	1.01 (1.01-1.02)	1.02 (1.02-1.03)
Oocyte retrieval to embryo transfer [§]	1.00 (0.98-1.01)	1.00 (0.99-1.01)	1.00 (0.99-1.01)	1.02 (1.01-1.04)	1.01 (1.01-1.02)	1.02 (1.01-1.03)
Embryo transfer + 14 days [§]	1.00 (0.98-1.01)	1.00 (0.99-1.01)	1.00 (0.99-1.01)	1.02 (1.01-1.04)	1.01 (1.01-1.02)	1.02 (1.01-1.03)

Abbreviations: RR, adjusted risk ratio

*Calculated as the number of embryos implanted divided by the total number of embryos transferred; if number of fetal heartbeats and number of live and stillborn infants was missing, then implantation rate was considered missing

[§]Restricted to cycles with transfer of 1 or more embryos

Supplementary Table II. Associations between interquartile range increases in particulate matter with diameter of 2.5µm or less (PM_{2.5}) and O₃ and implantation, pregnancy, and live birth, by time of exposure among first time IVF patients

	PM _{2.5}			O ₃		
	Implantation* aRR [†] (95% CI)	Pregnancy aRR [†] (95% CI)	Live birth aRR [†] (95% CI)	Implantation* aRR [†] (95% CI)	Pregnancy aRR [†] (95% CI)	Live birth aRR [†] (95% CI)
Cycle start to oocyte retrieval	0.99 (0.98-1.00)	1.00 (0.99-1.01)	1.00 (0.96-1.02)	1.01 (0.99-1.02)	1.01 (1.00-1.02)	1.01 (1.00-1.02)
Oocyte retrieval to embryo transfer [§]	0.99 (0.98-1.01)	1.00 (0.99-1.02)	0.99 (0.99-1.00)	1.01 (0.99-1.02)	1.01 (1.00-1.02)	1.01 (1.00-1.02)
Embryo transfer + 14 days [§]	0.99 (0.98-1.00)	1.00 (0.99-1.00)	1.00 (0.99-1.01)	1.01 (1.00-1.02)	1.01 (1.00-1.02)	1.01 (1.00-1.02)

Abbreviations: aRR, adjusted risk ratio

*Calculated as the number of embryos implanted divided by the total number of embryos transferred; if number of fetal heartbeats and number of live and stillborn infants was missing, then implantation rate was considered missing

[†]Models included PM_{2.5}, ozone, patient age, parity, infertility diagnosis, number of oocytes retrieved, season, urban vs rural county designation, and year and accounted for clustering by county and clinic

[§]Restricted to cycles with transfer of 1 or more embryos

Supplementary Table III. Associations between interquartile range increases in particulate matter with diameter of 2.5µm or less (PM_{2.5}) and O₃ and implantation, pregnancy, and live birth, by time of exposure among women <35 years

Exposure period	PM _{2.5}			O ₃		
	Implantation*	Pregnancy	Live birth	Implantation*	Pregnancy	Live birth
	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)
Cycle start to oocyte retrieval	1.00 (0.99-1.00)	1.00 (0.99-1.00)	1.00 (0.99-1.01)	1.01 (1.00-1.02)	1.01 (1.00-1.01)	1.01 (1.00-1.06)
Oocyte retrieval to embryo transfer [§]	1.00 (0.99-1.00)	1.00 (0.99-1.01)	1.00 (0.99-1.01)	1.01 (1.00-1.03)	1.01 (1.00-1.01)	1.01 (1.00-1.02)
Embryo transfer + 14 days [§]	1.00 (0.99-1.00)	1.00 (0.99-1.00)	1.00 (0.99-1.00)	1.01 (1.00-1.02)	1.00 (1.00-1.01)	1.01 (1.00-1.02)

Abbreviations: aRR, adjusted risk ratio

*Calculated as the number of embryos implanted divided by the total number of embryos transferred; if number of fetal heartbeats and number of live and stillborn infants was missing, then implantation rate was considered missing

[†]Models included PM_{2.5}, ozone, patient age, parity, infertility diagnosis, number prior IVF cycles, number of oocytes retrieved, season, urban vs rural county designation, and year and accounted for clustering by county and clinic

[§]Restricted to cycles with transfer of 1 or more embryos

Supplementary Table IV. Associations between interquartile range increases in particulate matter with diameter of 2.5µm or less (PM_{2.5}), O₃, NO₂, and SO₂ and implantation* by time of exposure

Exposure period	PM _{2.5}	O ₃	NO ₂	SO ₂
	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)
<i>Model 1</i>				
Cycle start to oocyte retrieval	1.02 (1.00-1.03)	1.00 (0.99-1.02)	0.98 (0.96-1.00)	
Oocyte retrieval to embryo transfer [§]	1.02 (1.00-1.04)	1.01 (0.99-1.03)	0.96 (0.94-0.99)	
Embryo transfer + 14 days [§]	1.01 (1.00-1.02)	1.00 (0.99-1.02)	0.96 (0.95-0.98)	
<i>Model 2</i>				
Cycle start to oocyte retrieval	1.01 (1.00-1.02)	1.00 (0.99-1.02)		0.98 (0.96-0.99)
Oocyte retrieval to embryo transfer [§]	1.00 (0.99-1.03)	1.00 (0.99-1.02)		0.97 (0.95-1.00)
Embryo transfer + 14 days [§]	1.01 (0.99-1.02)	1.00 (0.99-1.02)		0.97 (0.95-0.99)
<i>Model 3</i>				
Cycle start to oocyte retrieval	1.02 (1.00-1.03)	1.00 (0.99-1.02)	0.98 (0.96-1.00)	0.98 (0.96-1.00)
Oocyte retrieval to embryo transfer [§]	1.02 (1.00-1.03)	1.00 (0.99-1.03)	0.97 (0.94-0.99)	0.98 (0.94-0.99)
Embryo transfer + 14 days [§]	1.01 (1.00-1.03)	1.00 (0.99-1.02)	0.97 (0.95-0.98)	0.98 (0.96-0.99)

Abbreviations: aRR, adjusted risk ratio

*Calculated as the number of embryos implanted divided by the total number of embryos transferred; if number of fetal heartbeats and number of live and stillborn infants was missing, then implantation rate was considered missing.

[†]Models included PM_{2.5}, O₃, NO₂, SO₂, patient age, parity, infertility diagnosis, number prior IVF cycles, number of oocytes retrieved, season, and year and accounted for clustering by county and clinic

[§]Restricted to cycles with transfer of 1 or more embryos

Supplementary Table V. Associations between interquartile range increases in particulate matter with diameter of 2.5µm or less (PM_{2.5}), O₃, NO₂, and SO₂ and pregnancy by time of exposure

Exposure period	PM _{2.5}	O ₃	NO ₂	SO ₂
	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)
<i>Model 1</i>				
Cycle start to oocyte retrieval	1.02 (1.00-1.03)	1.00 (0.99-1.02)	0.99 (0.96-1.02)	
Oocyte retrieval to embryo transfer [§]	1.01 (1.00-1.02)	1.01 (0.99-1.03)	0.98 (0.96-1.01)	
Embryo transfer + 14 days [§]	1.00 (1.00-1.02)	1.01 (1.00-1.02)	0.95 (0.96 -1.00)	
<i>Model 2</i>				
Cycle start to oocyte retrieval	1.02 (1.00-1.03)	1.00 (0.99-1.01)		0.97 (0.95-0.98)
Oocyte retrieval to embryo transfer [§]	1.01 (1.00-1.02)	1.00 (0.99-1.02)		0.97 (0.95-0.99)
Embryo transfer + 14 days [§]	1.01 (1.00-1.02)	1.01 (1.00-1.02)		0.97 (0.96-0.98)
<i>Model 3</i>				
Cycle start to oocyte retrieval	1.02 (1.00-1.03)	1.00 (0.99-1.01)	1.00 (0.98-1.02)	0.97 (0.95-0.99)
Oocyte retrieval to embryo transfer [§]	1.01 (1.00-1.02)	1.00 (0.99-1.02)	0.99 (0.97-1.01)	0.97 (0.95-1.00)
Embryo transfer + 14 days [§]	1.01 (1.00-1.02)	1.01 (1.00-1.02)	0.99 (0.97-1.01)	0.97 (0.96-0.99)

Abbreviations: aRR, adjusted risk ratio;

[†]Models included PM_{2.5}, O₃, NO₂, SO₂, patient age, parity, infertility diagnosis, number prior IVF cycles, number of oocytes retrieved, season, and year and accounted for clustering by county and clinic

[§]Restricted to cycles with transfer of 1 or more embryos

Supplemental Table VI. Associations between interquartile range increases in particulate matter with diameter of 2.5µm or less (PM_{2.5}), O₃, NO₂, and SO₂ and live birth by time of exposure

Exposure period	PM _{2.5}	O ₃	NO ₂	SO ₂
	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)	aRR [†] (95% CI)
<i>Model 1</i>				
Cycle start to oocyte retrieval	1.02 (1.01-1.04)	1.01 (0.99-1.02)	0.98 (0.96-1.01)	
Oocyte retrieval to embryo transfer [§]	1.01 (1.00-1.02)	1.02 (1.00-1.03)	0.98 (0.95-1.00)	
Embryo transfer + 14 days [§]	1.01 (1.00-1.02)	1.01 (0.99-1.02)	0.98 (0.96-1.00)	
<i>Model 2</i>				
Cycle start to oocyte retrieval	1.02 (1.01-1.03)	1.01 (0.99-1.02)		0.97 (0.96-0.98)
Oocyte retrieval to embryo transfer [§]	1.01 (1.00-1.02)	1.01 (1.00-1.03)		0.97 (0.95-0.99)
Embryo transfer + 14 days [§]	1.01 (1.00-1.02)	1.02 (0.99-1.02)		0.97 (0.96-0.99)
<i>Model 3</i>				
Cycle start to oocyte retrieval	1.01 (1.01-1.04)	1.00 (0.99-1.02)	0.99 (0.97-1.01)	0.97 (0.95-0.99)
Oocyte retrieval to embryo transfer [§]	1.01 (1.00-1.03)	1.01 (1.00-1.03)	0.98 (0.96-1.01)	0.98 (0.96-1.00)
Embryo transfer + 14 days [§]	1.01 (1.00-1.02)	1.01 (0.99-1.02)	0.98 (0.97-1.00)	0.97 (0.96-0.99)

Abbreviations: aRR, adjusted risk ratio

[†]Models included PM_{2.5}, O₃, NO₂, SO₂, patient age, parity, infertility diagnosis, number prior IVF cycles, number of oocytes retrieved, season, and year and accounted for clustering by county and clinic

[§]Restricted to cycles with transfer of 1 or more embryos