

Table S1. Details of the AC-dust sampling sites

Sample No.	Area	GPS Coordinates
1	Al-Nabiah	26°35'06.9"N 50°02'11.0"E
2		26°35'18.8"N 50°02'31.7"E
3		26°31'08.3"N 50°00'08.6"E
4		26°31'06.0"N 50°00'10.2"E
5	Al-Qatif-Agricultural	26°29'37.5"N 50°01'50.7"E
6		26°27'44.3"N 50°01'33.4"E
7		26°31'36.8"N 49°59'37.9"E
8	Al-Qatif-Industrial	26°30'14.9"N 50°01'58.2"E
9		26°34'57.4"N 50°02'09.6"E
10		26°35'01.9"N 50°01'53.2"E
11		26°26'29.7"N 50°03'02.5"E
12	Al-Qatif-Residential	26°27'51.1"N 50°00'59.4"E
13		26°25'56.9"N 50°00'42.9"E
14		26°25'56.9"N 50°00'42.9"E
15	Saihat-Residential	26°30'47.6"N 49°59'42.5"E
16		26°30'50.3"N 49°59'22.6"E
17		26°30'39.2"N 49°59'01.8"E
18		26°30'18.0"N 50°02'04.1"E

Table S2. Details about the AC filter dust sample such as area of the room, time span of filter replacement or cleaning, presence or absence of smoking, and cooking in the building etc.

question	Answer	question	answer
Zone:	Residential	Zone:	Residential
Sample number:	1	Sample number:	2
Site:	Saihat	Site:	Saihat
Floor:	Ground floor	Floor:	Ground floor
Sample collector name:	Hasan saho	Sample collector name:	Hasan saho
Date-Time:	21/1/2019-7:30 PM	Date-Time:	21/1/2019-8:15 PM
Air conditioner (AC) company-type-weight :	Media - split - 2 ton.	Air conditioner (AC) company-type-weight :	LG – split – 2 ton.
When last time has the filter been cleaned up?	12 months	When last time has the filter been cleaned up?	6 months
Is there smoker in the place?	No	Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	No cock	Do you cock in the place? if you cock How many times do you cock in the place?	Yes Five time in every week
Are there children or elderly ?	No	Are there children or elderly ?	2 children
How much of time do you spend in the place?	8 hours	How much of time do you spend in the place?	14-16 hours
When does the AC usually run at morning-afternoon- night ?	4 hours at morning 4 hours at night	When does the AC usually run at morning-afternoon- night ?	Afternoon-night

question	Answer	question	Answer
Zone:	Residential	Zone:	Residential
Sample number:	3	Sample number:	4
Site:	Saihat	Site:	Saihat
Floor:	Ground floor	Floor:	Ground floor
Sample collector name:	Hasan saho	Sample collector name:	Hasan saho
Date-Time:	21/1/2019-10:00 PM	Time:	21/1/2019-10:25PM
Air conditioner (AC) company-type-weight :	Mitsubishi – window-1.5 ton .	Air conditioner (AC) company-type-weight :	Gree – split – 2 tons.
When last time has the filter been cleaned up?	16 months	When last time has the filter been cleaned up?	7 months
Is there smoker in the place?	No	Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	Yes Every day	Do you cock in the place? if you cock How many times do you cock in the place?	Every day except Friday
Are there children or elderly ?	1 child	Are there children or elderly ?	3 children
How much of time do you spend in the place?	12-14 hours	How much of time do you spend in the place?	12-16 hours
When does the AC usually run at morning-afternoon- night ?	Afternoon-night	When does the AC usually run at morning-afternoon- night ?	Afternoon-night

question	Answer
Zone:	Industrial
Sample number:	7
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Mustafa al-hassan
Date-Time:	20/1/2019-7:40 PM
Air conditioner (AC) company-type-weight :	daewoo – window – 2 tons.
When last time has the filter been cleaned up?	20 months
Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	No
Are there children or elderly ?	No
How much of time do you spend in the place?	8 hours
When does the AC usually run at morning-afternoon- night ?	4 hours at morning 4 hours afternoon
comment	For Painting metal

question	Answer
Zone:	Industrial
Sample number:	5
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Mustafa al-hassan
Date-Time:	20/1/2019-7:00 PM
Air conditioner (AC) company-type-weight :	Al-zameel – window – 1.5 ton.
When last time has the filter been cleaned up?	3 months
Is there smoker in the place?	Some costumers
Do you cock in the place? if you cock How many times do you cock in the place?	No
Are there children or elderly ?	No
How much of time do you spend in the place?	8 hours
When does the AC usually run at morning-afternoon- night ?	4 hours at morning 4 hours afternoon
comment	For Car maintaince

question	Answer
Zone:	Industrial
Sample number:	8
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Mustafa al-hassan
Date-Time:	20/1/2019-7:55 PM
Air conditioner (AC) company-type-weight :	media – window – 2 tons.
When last time has the filter been cleaned up?	6 months
Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	No
Are there children or elderly ?	No
How much of time do you spend in the place?	8 hours
When does the AC usually run at morning-afternoon- night ?	4 hours at morning 4 hours afternoon
comment	For manufacturing plastic

question	Answer
Zone:	Industrial
Sample number:	6
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Mustafa al-hassan
Date-Time:	20/1/2019-7:30 PM
Air conditioner (AC) company-type-weight :	LG – window – 2 tons.
When last time has the filter been cleaned up?	4 months
Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	No
Are there children or elderly ?	No
How much of time do you spend in the place?	8 hours
When does the AC usually run at morning-afternoon- night ?	4 hours at morning 4 hours afternoon
Comment	For Manufacturing glass

question	Answer
Zone:	Residential
Sample number:	11
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Ali Al-ekhwan
Date-Time:	22/1/2019-5:30 PM
Air conditioner (AC) company-type-weight :	samsung – window – 2.0 tons
When last time has the filter been cleaned up?	18 months
Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	4 times in a week
Are there children or elderly ?	2
How much of time do you spend in the place?	14 hours
When does the AC usually run at morning-afternoon- night ?	Morning

question	Answer
Zone:	Agriculture
Sample number:	12
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Ali al-ekhwan
Date-Time:	23/1/2019-5:30 PM
Air conditioner (AC) company-type-weight :	Al-zameel-window-2 tons
When last time has the filter been cleaned up?	Never been cleaned
Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	Every day
Are there children or elderly ?	No
How much of time do you spend in the place?	16 hours
When does the AC usually run at morning-afternoon- night ?	Night

question	answer
Zone:	Residential
Sample number:	9
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Ali Al-ekhwan
Date-Time:	22/1/2019 4:00 PM
Air conditioner (AC) company-type-weight :	Daikin – split – 2.5 tons
When last time has the filter been cleaned up?	12 months
Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	3-4 times in a week
Are there children or elderly ?	2
How much of time do you spend in the place?	10-12 hours
When does the AC usually run at morning-afternoon- night ?	Night

question	Answer
Zone:	Residential
Sample number:	15
Site:	Al-nabiah
Floor:	Ground floor
Sample collector name:	Abdullah al-qahtani
Date-Time:	23/1/2019-8:15 PM
Air conditioner (AC) company-type-weight :	craft-split-2.5 tons
When last time has the filter been cleaned up?	4 months
Is there smoker in the place?	1
Do you cock in the place? if you cock How many times do you cock in the place?	Every day except Friday
Are there children or elderly ?	1
How much of time do you spend in the place?	12 hours
When does the AC usually run at morning-afternoon- night ?	Afternoon

question	Answer
Zone:	Residential
Sample number:	10
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Ali Al-ekhwan
Date-Time:	22/1/2019 5:10 PM
Air conditioner (AC) company-type-weight :	Ariston – split – 3 tons
When last time has the filter been cleaned up?	4 months
Is there smoker in the place?	1
Do you cock in the place? if you cock How many times do you cock in the place?	No
Are there children or elderly ?	No
How much of time do you spend in the place?	12 hours
When does the AC usually run at morning-afternoon- night ?	Overnight

question	Answer
Zone:	Residential
Sample number:	16
Site:	Al-nabiah
Floor:	Ground floor
Sample collector name:	Abdullah al-qahtani
Date-Time:	23/1/2019-9:00 PM
Air conditioner (AC) company-type-weight :	whirlpool-window-1.5 tons
When last time has the filter been cleaned up?	4 months
Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	Every day except weekend
Are there children or elderly ?	No
How much of time do you spend in the place?	9 hours
When does the AC usually run at morning-afternoon- night ?	Night

question	Answer
Zone:	residential
Sample number:	17
Site:	Al-nabiah
Floor:	Ground floor
Sample collector name:	Abdullah al-qahtani
Date-Time:	23/1/2019-9:25 PM
Air conditioner (AC) company-type-weight :	Lloyd-window-1.5 tons
When last time has the filter been cleaned up?	11 month
Is there smoker in the place?	No
Do you cock in the place? if you cock How many times do you cock in the place?	3-4 days in a week
Are there children or elderly ?	3
How much of time do you spend in the place?	15 hours
When does the AC usually run at morning-afternoon- night ?	Morning

question	answer
Zone:	Agriculture
Sample number:	13
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Ali al-ekhwani
Date-Time:	23/1/2019-5:50 PM
Air conditioner (AC) company-type-weight :	comfort-window-1.5 tons
When last time has the filter been cleaned up?	Never been cleaned
Is there smoker in the place?	2
Do you cock in the place? if you cock How many times do you cock in the place?	Every day
Are there children or elderly ?	No
How much of time do you spend in the place?	15 hours
When does the AC usually run at morning-afternoon- night ?	Night

question	Answer
Zone:	Residential
Sample number:	18
Site:	Al-nabiah
Floor:	Ground floor
Sample collector name:	Abdullah al-qahtani
Date-Time:	23/1/2019-9:40 PM
Air conditioner (AC) company-type-weight :	hitachi-window-2 tons
When last time has the filter been cleaned up?	2 month
Is there smoker in the place?	1
Do you cock in the place? if you cock How many times do you cock in the place?	Every day
Are there children or elderly ?	No
How much of time do you spend in the place?	13 hours
When does the AC usually run at morning-afternoon- night ?	Afternoon-Night

question	Answer
Zone:	Agriculture
Sample number:	14
Site:	Qatif
Floor:	Ground floor
Sample collector name:	Ali al-ekhwani
Date-Time:	23/1/2019-7:00 PM
Air conditioner (AC) company-type-weight :	comfort-window-1.5 tons
When last time has the filter been cleaned up?	3 years
Is there smoker in the place?	1
Do you cock in the place? if you cock How many times do you cock in the place?	Every day
Are there children or elderly ?	No
How much of time do you spend in the place?	12-14 hours
When does the AC usually run at morning-afternoon- night ?	Night

Table S3. Parameters along with symbols and values used to estimate the health risk.

Parameters	Symbol	Units	Values	References
Concentrations of toxic metals	C	mg kg ⁻¹		
Reference doses	Rfd	mg kg ⁻¹ day ⁻¹	Oral RfD: 1.0×10 ⁻³ (Cd) 3.0×10 ⁻³ (Cr), 3.7×10 ⁻² (Cu) 2.4×10 ⁻² (Mn), 3.5×10 ⁻³ (Pb), 3.0×10 ⁻¹ (Zn), Dermal RfD: 1.0×10 ⁻⁵ (Cd), 6.00×10 ⁻⁵ (Cr), 0.012 (Cu) 4.6×10 ⁻² (Mn), 5.25×10 ⁻⁵ (Pb), 6.0×10 ⁻² (Zn), Inhalation RfD: 1.0×10 ⁻⁵ (Cd), 3.00×10 ⁻³ (Cr), 0.04 (Cu) 5.0×10 ⁻⁵ (Mn), 3.5×10 ⁻³ (Pb), 3.0×10 ⁻² (Zn), Ingestion SF: 8.5×10 ⁻³ (Pb)	Askarova and Mussagaliyeva, (2014); Ferreira-Baptista and De Miguel, (2005)
Slope factor (SF)	SF	mg kg ⁻¹ day ⁻¹	Inhalation SF: 6.3 (Cd), 42 (Cr), Ingestion SF: 8.5×10 ⁻³ (Pb) 0.1 (Cd), Cr (0.04), Cu (0.1), Mn (0.001), Pb (0.006) and (0.02) Zn	Ferreira-Baptista and De Miguel, (2005); Lu et al., (2014); USDOE, (2011)
Dermal absorption factor	ABS	Unit less		
Exposed skin exposed surface area	SA	m ²	5700 ^a , 2800 ^b	Askarova and Mussagaliyeva, (2014);
Inhalation rate	InhR	m ³ day ⁻¹	20 ^a , 7.6 ^b	USEPA (2002); Zheng et al., (2010)
Exposure frequency	EF	Day year ⁻¹	350	US-EPA, (2002)
Exposure duration	ED	Year	30 ^a , 6 ^b	US-EPA, (2002)
Average time cancer	ATcan	Days	70 × 365	US-EPA, (2002)
Average time non cancer	ATnon can	Days	30 × 365	US-EPA, (2002)

^aAdults and ^bChildren