

Supplementary Material

Combined inhalation exposure to retail insecticides for preschool children and children based on household usage patterns

Joo-hyon Kim,^{A,B} Moon-young Hwang^A and Myunghee Kwon^A

^ADivision of Chemical Research, The National Institute of Environmental Research, Hwangyeong-ro 42, Seo-gu, Incheon, 22689, South Korea.

^BCorresponding author. Email: jhkim0318@korea.kr

Table S1. The full online Questionnaire for household use of insecticides



- research institute : National Institute of Environmental Research
 survey company : World research

I. Demographic information

SQ1. where are you living, city, province?

- ① seoul ② pusan ③ daegu ④ incheron ⑤ kwangju ⑥ daejun
⑦ wolsan ⑧ kyungi-do ⑨ kwangwon-do ⑩ chungbuk-do ⑪ chungnam-do
⑫ Junbuk-do ⑬ junnam-do ⑭ kyungbuk-do ⑮ kyungnam-do ⑯ Jeju-do

SQ2. what is your age? _____ years

SQ2-1. ages detail

- ① 19year~29year ② 30year ③ 40year ④ 50year +

SQ3. sex ① male ② female

II. environmental exposure – living environment

SQ4. house information?

- ① single-family house ② multi-family house ③ apartment
④ residential complex ⑤ others(_____)

SQ5. size of house?

- ① 10pyong below ② 10pyong ~ 20pyong ③ 20pyong ~ 30pyong
④ 30pyong ~ 40pyong ⑤ 40pyong ~ 50pyong ⑥ 50pyong +

SQ6. how many family members are living in your home?

- ① 1member ② 2members ③ 3members ④ 4members
⑤ 5members ⑥ 6members +

SQ7. do you have preschool children below 5 years old in your family?

- ① yes(_____) ② no

SQ7-1. Detail of members of families

NO	member details	sex	birth year & age	average indoor time at home		occupation	average time in working place(occupational place)
				working day	non-working day		
01		① male ② female	_____ year (or) _____ age	_____ hr	_____ hr		_____ hr
02		① male ② female	_____ year (or) _____ age	_____ hr	_____ hr		_____ hr
03		① male ② female	_____ year (or) _____ age	_____ hr	_____ hr		_____ hr
04		① male ② female	_____ year (or) _____ age	_____ hr	_____ hr		_____ hr
05		① male ② female	_____ year (or) _____ age	_____ hr	_____ hr		_____ hr
06		① male ② female	_____ year (or) _____ age	_____ hr	_____ hr		_____ hr
07		① male ② female	_____ year (or) _____ age	_____ hr	_____ hr		_____ hr

SQ8. how many rooms are there in your home?

- ① 1ea ② 2ea ③ 3ea ④ 4ea ⑤ 5ea ⑥ 6ea +

III. Demographic characteristics

SQ9. education-academic background?

- ① ~middle school ② ~high school ③ ~college
 ④ _ university ⑤ ~graduate school

SQ10. average monthly income?

- ① ~1000000won ② 1000000-2000000won ③ 2000000-3000000won
 ④ 3000000-4000000won ⑤ 4000000-5000000won ⑥ 5000000won +

SQ11. occupation information?

- ① profession ② business management ③ office work ④ sale related
 ⑤ factory work ⑥ self-employment ⑦ housewife ⑧ student
 ⑨ official or government work ⑩ non-occupation

part 1. Household Insecticides

question1. Have you ever used for last 1year **mosquito insecticides**?

- ① yes (to q1-1) ② no

products examples



q1-1) what kinds of **mosquito insecticides** have you used? choose every products (can choose multiple products)

① spray type (aerosol spray)	② electric matt vaporizer	③ electric liquid vaporizer	④ mosquito coil
			

q1-2) what was products name you used?
size, volume of products, write detail.

application types of products	products name (manufacturing company)
① spray type (aerosol spray)	
② electric matt vaporizer	
③ electric liquid vaporizer	
④ mosquito coil	

q1-3) [use frequency] how often have you used?

factors	application types of products	seasons	times	use frequency
	① spray type (aerosol spray)	summer(JUN~ SEP)	① 1day ② 1week ③ 1month	() times
		spring, autumn, winter	① 1week ② 1month ③ 6month	() times
	② electric matt vaporizer	summer(JUN~ SEP)	① 1day ② 1week ③ 1month	() times
		spring, autumn, winter	① 1week ② 1month ③ 6month	() times
	③ electric liquid vaporizer	summer(JUN~ SEP)	① 1day ② 1week ③ 1month	() times
		spring, autumn, winter	① 1week ② 1month ③ 6month	() times
	④ mosquito coil	summer(JUN~ SEP)	① 1day ② 1week ③ 1month	() times
		spring, autumn, winter	① 1week ② 1month ③ 6month	() times

q1-4) [time of use] * time of use : mean exposure time from products, chemicals of products when you used products through inhalation and dermal contact

questions	application types	factors
mean time for using products per one time? (average total time of using insecticides at home)	① spray type (aerosol spray)	<input type="text"/> hr <input type="text"/> min
mean time for using products per one time? (average total time of turning on electric vaporizers at home)	② electric matt vaporizer	<input type="text"/> hr <input type="text"/> min
mean time for using products per one time? (average total time of turning on electric vaporizers at home)	③ electric liquid vaporizer	<input type="text"/> hr <input type="text"/> min
mean time for using products per one time? (average total time of burning mosquito coils at home)	④ mosquito coil	<input type="text"/> hr <input type="text"/> min

q1-5) [use amount and spaying time] mean used amount and (or) spraying time per use?

questions	application types	factors
time of press button of aerosol spray products for spraying task per one use?	① spray type (aerosol spray)	mean <input type="text"/> spray per second

q1-6) which places did you use insecticides per use? (can check multiple answers)

- ① bed room ② living room ③ toilet, bath room ④ etc()

q1-7) did you read products information, cautious direction, ingredients information?

- ① yes ② no

q1-8) feel stimulation, pain, irritation, and others? (can check multiple answers)

- ① eyes ② nose ③ skin ④ neck ⑤ no

question2. Have you ever used for last 1year **cockroach insecticides**?

① **yes** (to q2-1)

② **no**

products examples



q2-1) what kinds of **cockroach insecticides** have you used? choose every products (can choose multiple products)



q2-2) what was products name you used? size, volume of products, write detail.

application types of products	products name (manufacturing company)
① gel type	
② spray type (aerosol spray)	
③ stationary traps type	
④ fogging spray by one time use	

q2-3) [use frequency] how often have you used?

factors	application types of products	times	use frequency
use frequency	① gel type	① week ② 1month ③ 6months ④ 1year	() times
	② spray type (aerosol spray)	① week ② 1month ③ 6months ④ 1year	() times
	③ stationary traps type	① week ② 1month ③ 6months ④ 1year	() times
	④ fogging spray by one time use	① week ② 1month ③ 6months ④ 1year	() times

q2-4) [time of use] * time of use : mean exposure time from products, chemicals of products when you used products through inhalation and dermal contact

questions	application types	factors
mean time for using products per one time? (including task time, total time for using insecticides)	① gel type	<input type="text"/> min <input type="text"/> sec
mean time for using products per one time? (including task time, total time for using insecticides)	② spray type (aerosol spray)	<input type="text"/> min <input type="text"/> sec
mean time for using products per one time? (including task time, total time for using insecticides)	③ stationary traps type	<input type="text"/> min <input type="text"/> sec
mean time for using products per one time? ((average total time of turning on fogging spray, treating time, cleaning places and other task after finishing use)	④ fogging spray by one time use	<input type="text"/> hr <input type="text"/> min <input type="text"/> sec

q1-5) [use amount and spaying time] mean used amount and (or) spraying time per use?

questions	application types	factors
how long time took it to use up gel type products?	① gel type	mean <input type="text"/> month
time of press button of aerosol spray products for spraying task per one use?	② spray type (aerosol spray)	mean <input type="text"/> spray per second
how many stationary traps did you used per one use?	③ stationary traps type	mean <input type="text"/> ea products
how many fogging spray did you used per one use?	④ fogging spray by one time use	mean <input type="text"/> ea products

q1-6) which places did you use insecticides per use? (can check multiple answers)

- ① bed room ② living room ③ toilet, bath room ④ etc()

q1-7) did you read products information, cautious direction, ingredients information?

- ① yes ② no

q1-8) feel stimulation, pain, irritation, and others? (can check multiple answers)

- ① eyes ② nose ③ skin ④ neck ⑤ no

question3. Have you ever used for last 1year **house fly insecticides**?

① **yes** (to q3-1)

② **no**

products examples



q3-1) what kinds of house fly insecticides have you used? choose every products (can choose multiple products)

① spray type (aerosol spray)



② spray type (trigger)



q3-2) what was products name you used? size, volume of products, write detail.

application types of products	products name (manufacturing company)
① spray type (aerosol spray)	
② spray type (trigger)	

q3-3) [use frequency] how often have you used?

factors	application types	seasons	times	use frequency
use frequency	① spray type (aerosol spray)	summer(JUN~ SEP)	① 1day ② 1week ③ 1month	() times
		spring, autumn, winter	① 1week ② 1month ③ 6month	() times
	② spray type (trigger)	summer(JUN~ SEP)	① 1day ② 1week ③ 1month	() times
		spring, autumn, winter	① 1week ② 1month ③ 6month	() times

q3-4) [time of use] * time of use : mean exposure time from products, chemicals of products when you used products through inhalation and dermal contact

questions	application types	factors
how long time did you use insecticides per use?	① spray type (aerosol spray)	<input type="text"/> hr <input type="text"/> min
how long time did you use insecticides per use?	② spray type (trigger)	<input type="text"/> hr <input type="text"/> min

q3-5) [use amount and spaying time] mean used amount and (or) spraying time per use?

questions	application types	factors
time of press button of aerosol spray products for spraying task per one use?	① spray type (aerosol spray)	mean <input type="text"/> spray per second
number of triggering actions for task per one use?	② spray type (trigger)	mean <input type="text"/> times

q3-6) which places did you use insecticides per use? (can check multiple answers)

- ① bed room ② living room ③ toilet, bath room ④ etc()

q3-7) did you read products information, cautious direction, ingredients information?

- ① yes ② no

q3-8) feel stimulation, pain, irritation, and others? (can check multiple answers)

- ① eyes ② nose ③ skin ④ neck ⑤ no

question4. Have you ever used for last 1year **house ant insecticides?**

① yes (to q4-1)

② no

제품 예시



q4-1) what kinds of house ant insecticides have you used? choose every products (can choose multiple products)

① spray type (aerosol spray)	② spray type (trigger)	③ gel type	④ powder
			

q4-2) what was products name you used? size, volume of products, write detail.

application types of products	products name (manufacturing company)
① spray type (aerosol spray)	
② spray type (trigger)	
③ gel type	
④ powder type	

q4-3) [use frequency] how often have you used?

factors	application types of products	times	use frequency
use frequency	① spray type (aerosol spray)	① week ② 1month ③ 6months ④ 1year	() times
	② spray type (trigger)	① week ② 1month ③ 6months ④ 1year	() times
	③ gel type	① week ② 1month ③ 6months ④ 1year	() times
	④ powder type	① week ② 1month ③ 6months ④ 1year	() times

q4-4) [time of use] * time of use : mean exposure time from products, chemicals of products when you used products through inhalation and dermal contact

questions	application types	factors
mean time for using products per one time? (average total time of using insecticides including task time at home)	① spray type (aerosol spray)	<input type="text"/> hr <input type="text"/> min
mean time for using products per one time? (average total time of using insecticides including task time at home)	② spray type (trigger)	<input type="text"/> hr <input type="text"/> min
mean time for using products per one time? (average total time of using insecticides including task time at home)	③ gel type	<input type="text"/> hr <input type="text"/> min
mean time for using products per one time? (average total time of using insecticides including task time at home)	④ powder type	<input type="text"/> hr <input type="text"/> min

q4-5) [use amount and spaying time] mean used amount and (or) spraying time per use?

questions	application types	factors
time of press button of aerosol spray products for spraying task per one use?	① spray type (aerosol spray)	mean <input type="text"/> spray per second
number of triggering actions to use insecticides per one use?	② spray type (trigger)	mean <input type="text"/> times
how long time took it to use up gel type products?	③ gel type	mean <input type="text"/> month
how many spoons(5ml) did you use to use insecticides per one use?	④ powder type	mean <input type="text"/> spoons

q4-6) which places did you use insecticides per use? (can check multiple answers)

- ① bed room ② living room ③ toilet, bath room ④ etc()

q4-7) did you read products information, cautious direction, ingredients information?

- ① yes ② no

q4-8) feel stimulation, pain, irritation, and others? (can check multiple answers)

- ① eyes ② nose ③ skin ④ neck ⑤ no

question5. Have you ever used for last 1year **bedbug and flea insecticides?**

① **yes** (to q5-1)

② **no**

products examples



q5-1) what kinds of bedbug and flea insecticides have you used? choose every products (can choose multiple products)

① spray type (aerosol spray)



② spray type (trigger)



q5-2) what was products name you used? size, volume of products, write detail.

application types of products	products name (manufacturing company)
① spray type (aerosol spray)	
② spray type (trigger)	

q5-3) [use frequency] how often have you used?

factors	application types	seasons	times	use frequency
use frequency	① spray type (aerosol spray)	summer(JUN~ SEP)	① 1day ② 1week ③ 1month	() times
		spring, autumn, winter	① 1week ② 1month ③ 6month	() times
	② spray type (trigger)	summer(JUN~ SEP)	① 1day ② 1week ③ 1month	() times
		spring, autumn, winter	① 1week ② 1month ③ 6month	() times

q5-4) [time of use] * time of use : mean exposure time from products, chemicals of products when you used products through inhalation and dermal contact

questions	application types	factors
how long time did you use insecticides per use?	① spray type (aerosol spray)	<input type="text"/> min <input type="text"/> sec
how long time did you use insecticides per use?	② spray type (trigger)	<input type="text"/> min <input type="text"/> sec

q5-5) [use amount and spaying time] mean used amount and (or) spraying time per use?

questions	application types	factors
time of press button of aerosol spray products for spraying task per one use?	① spray type (aerosol spray)	mean <input type="text"/> spray per second
number of triggering actions to use insecticides per one use?	② spray type (trigger)	mean <input type="text"/> times

q5-6) which places did you use insecticides per use? (can check multiple answers)

- ① bed room ② living room ③ toilet, bath room ④ etc()

q5-7) did you read products information, cautious direction, ingredients information?

- ① yes ② no

q5-8) feel stimulation, pain, irritation, and others? (can check multiple answers)

- ① eyes ② nose ③ skin ④ neck ⑤ no

question6. Have you ever used for last 1year **bed mite insecticides**?

① yes (to q6-1)

② no

products examples



q6-1) what kinds of **bed mite insecticides** have you used? choose every products (can choose multiple products)



q6-2) what was products name you used? size, volume of products, write detail.

application types of products	products name (manufacturing company)
① spray type (aerosol spray)	
② spray type (trigger)	
③ patch sheet type	

q6-3) [use frequency] how often have you used?

factors	application types of products	times	use frequency
use frequency	① spray type (aerosol spray)	① week ② 1month ③ 6months ④ 1year	() times
	② spray type (trigger)	① week ② 1month ③ 6months ④ 1year	() times
	③ patch sheet type	① week ② 1month ③ 6months ④ 1year	() times

q6-4) [time of use] * time of use : mean exposure time from products, chemicals of products when you used products through inhalation and dermal contact

questions	application types	factors
how long time did you use insecticides per use?	① spray type (aerosol spray)	<input type="text"/> min <input type="text"/> sec
how long time did you use insecticides per use?	② spray type (trigger)	<input type="text"/> min <input type="text"/> sec
how long time did you use insecticides per use?	③ patch sheet type	<input type="text"/> min <input type="text"/> sec

q6-5) [use amount and spaying time] mean used amount and (or) spraying time per use?

questions	application types	factors
time of press button of aerosol spray products for spraying task per one use?	① spray type (aerosol spray)	mean <input type="text"/> spray per second
number of triggering actions to use insecticides per one use?	② spray type (trigger)	mean <input type="text"/> times
how many sheet did you use to use insecticides per one use?	③ patch sheet type	mean <input type="text"/> sheets

q6-6) [exposure time] * time of exposure : mean exposure time from products, chemicals of products when you used products through inhalation and dermal contact

questions	application types	factors
how long time did you use bed/blanket etc treated by insecticides per day?	① spray type (aerosol spray)	<input type="text"/> hr <input type="text"/> min
how long time did you use bed/blanket etc treated by insecticides per day?	② spray type (trigger)	<input type="text"/> hr <input type="text"/> min
how long time did you use bed/blanket etc treated by insecticides per day?	③ patch sheet type	<input type="text"/> hr <input type="text"/> min

q6-7) did you read products information, cautious direction, ingredients information?

- ① yes ② no

q6-8) feel stimulation, pain, irritation, and others? (can check multiple answers)

- ① eyes ② nose ③ skin ④ neck ⑤ no

**** Thank you for your effort ****