

Supplementary materials

Table S1. CFA model fit indices

Indicators	Reference	Actual
CMIN/DF	1-3: Excellent, 3-5: Good	1.529
RMSEA	<0.08: Good	0.037
IFI	>0.8: Good	0.849
TLI	>0.8: Good	0.832
CFI	>0.8: Good	0.846

Table S2. CFA standardized factor loadings for KAP items

			Estimate	Standardized Estimate	S.E.	C.R.	P
K1	<---	Knowledge	1.000	0.426			
K2	<---	Knowledge	1.285	0.550	0.195	6.587	<0.001
K3	<---	Knowledge	1.047	0.451	0.176	5.950	<0.001
K4	<---	Knowledge	0.933	0.401	0.168	5.548	<0.001
K5	<---	Knowledge	1.208	0.534	0.186	6.492	<0.001
K6	<---	Knowledge	0.911	0.391	0.167	5.463	<0.001
K7	<---	Knowledge	0.636	0.273	0.150	4.234	<0.001
K8	<---	Knowledge	1.107	0.485	0.179	6.191	<0.001
K9	<---	Knowledge	1.077	0.476	0.176	6.126	<0.001
K10	<---	Knowledge	1.201	0.493	0.192	6.242	<0.001
A1	<---	Attitude	-0.786	-0.110	0.518	-1.517	0.129
A2	<---	Attitude	-2.175	-0.301	0.954	-2.280	0.023
A3	<---	Attitude	1.999	0.288	0.885	2.259	0.024
A4	<---	Attitude	3.218	0.467	10.329	2.421	0.015
A5	<---	Attitude	3.428	0.483	10.412	2.427	0.015
A6	<---	Attitude	1.593	0.224	0.751	2.120	0.034
A7	<---	Attitude	3.025	0.430	10.260	2.401	0.016
A8	<---	Attitude	-2.435	-0.355	10.039	-2.344	0.019
A9	<---	Attitude	1.000	0.145			
P1	<---	Practice	-0.107	-0.050	0.123	-0.872	0.383

			Estimate	Standardized Estimate	S.E.	C.R.	P
P2	<---	Practice	0.701	0.308	0.148	4.738	<0.001
P3	<---	Practice	0.777	0.353	0.148	5.243	<0.001
P4	<---	Practice	1.023	0.488	0.158	6.470	<0.001
P5	<---	Practice	0.756	0.343	0.147	5.131	<0.001
P6	<---	Practice	0.826	0.374	0.151	5.464	<0.001
P7	<---	Practice	1.153	0.535	0.170	6.799	<0.001
P8	<---	Practice	1.040	0.452	0.168	6.183	<0.001
P9	<---	Practice	0.997	0.434	0.165	6.030	<0.001
P10	<---	Practice	1.000	0.457			

Table S3. Distribution of knowledge dimension responses

	Very familiar	Heard of it	Not clear
1. Allergic rhinitis (also known as atopic rhinitis) is a chronic inflammatory disease of the nasal mucosa and is not caused by infection.	160 (40.71)	135 (34.35)	98 (24.94)
2. After exposure to allergens, patients with allergic rhinitis will experience main symptoms such as paroxysmal sneezing, runny nose, and nasal congestion.	212 (53.94)	102 (25.95)	79 (20.10)
3. Allergens in the environment mainly include: fungal spores, pollen particles, dust mites, animal excreta, etc.	185 (47.07)	124 (31.55)	84 (21.37)
4. Foods such as peanuts, nuts, fish, eggs, milk, soybeans, apples, and pears can also be allergens for allergic rhinitis.	153 (38.93)	141 (35.88)	99 (25.19)
5. The main purpose of environmental control for patients with allergic rhinitis is to avoid exposure to allergens.	186 (47.33)	131 (33.33)	76 (19.34)
6. Drug treatment for allergic rhinitis is simple and effective; therefore, medication is the first choice for treating allergic rhinitis.	150 (38.17)	142 (36.13)	101 (25.70)

7. Common medications for allergic rhinitis include: antihistamines, glucocorticoids, decongestants, anticholinergics, mast cell stabilizers, etc.	142 (36.13)	145 (36.90)	106 (26.97)
8. Traditional Chinese medicine and acupuncture have certain efficacy in treating allergic rhinitis.	181 (46.06)	132 (33.59)	80 (20.36)
9. Nasal saline irrigation is a good adjuvant treatment method.	174 (44.27)	139 (35.37)	80 (20.36)
10. Allergic rhinitis cannot be completely cured and requires long-term treatment and chronic disease management.	176 (44.78)	112 (28.50)	105 (26.72)

Table S4. Distribution of attitude dimension responses

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. Sometimes sudden attacks of allergic rhinitis make me feel very insecure and ashamed, fearing others' ridicule. (N)	65 (16.54)	83 (21.12)	89 (22.65)	89 (22.65)	67 (17.05)
2. I feel anxious and helpless about the symptoms of allergic rhinitis. (N)	103 (26.21)	97 (24.68)	79 (20.10)	66 (16.79)	48 (12.21)
3. I believe that by avoiding environmental and food allergens as much as possible, allergic rhinitis can be prevented to the greatest extent. (P)	85 (21.63)	103 (26.21)	90 (22.90)	70 (17.81)	45 (11.45)
4. I believe that patients should try their best to adapt to, accept, and actively face the challenges of allergic rhinitis. (P)	93 (23.66)	129 (32.82)	73 (18.58)	55 (13.99)	43 (10.94)
5. I believe that allergic rhinitis patients need care from their family and society in various aspects, such as helping with environmental control and emotional counseling. (P)	92 (23.41)	110 (27.99)	85 (21.63)	54 (13.74)	52 (13.23)

6. Allergic rhinitis is not a major illness, and I don't care about it at all. (N)	49 (12.47)	50 (12.72)	69 (17.56)	124 (31.55)	101 (25.70)
7. I believe that although allergic rhinitis cannot be completely cured, it should still be actively treated to prevent worsening and complications. (P)	129 (32.82)	130 (33.08)	49 (12.47)	44 (11.20)	41 (10.43)
8. The recurrent attacks of allergic rhinitis make me feel anxious and irritable. (N)	94 (23.92)	106 (26.97)	90 (22.90)	63 (16.03)	40 (10.18)
9. I believe that if I marry someone with allergic rhinitis, it will be passed on to our children. (P)	68 (17.30)	103 (26.21)	89 (22.65)	83 (21.12)	50 (12.72)

Table S5. Distribution of practice dimension responses

	Always	Often	Occasional ly	Rarely	Never
1. Allergic rhinitis makes me frequently avoid social gatherings and public places. (N)	48 (12.21)	68 (17.30)	127 (32.32)	72 (18.32)	78 (19.85)
2. I go to the hospital to get checked and find out my allergens. (P)	79 (20.10)	81 (20.61)	90 (22.90)	83 (21.12)	60 (15.27)
3. I always pay attention to avoiding allergens. (P)	76 (19.34)	105 (26.72)	91 (23.16)	68 (17.30)	53 (13.49)
4. I strictly follow medical advice, take medication on time, and attend regular follow-ups. (P)	87 (22.14)	116 (29.52)	87 (22.14)	69 (17.56)	34 (8.65)
5. When allergic rhinitis attacks, I frequently use saline to rinse my nasal cavity. (P)	73 (18.58)	94 (23.92)	87 (22.14)	87 (22.14)	52 (13.23)
6. I engage in appropriate physical exercise to improve my fitness and boost my immune system. (P)	89 (22.65)	112 (28.50)	92 (23.41)	48 (12.21)	52 (13.23)

7. I keep my indoor environment clean and dry to reduce dust mites. (P)	86 (21.88)	145 (36.90)	70 (17.81)	44 (11.2)	48 (12.21)
8. I maintain a positive and optimistic mindset. (P)	104 (26.46)	125 (31.81)	59 (15.01)	50 (12.72)	55 (13.99)
9. I wear a mask whenever I go out. (P)	114 (29.01)	107 (27.23)	73 (18.58)	47 (11.96)	52 (13.23)
10. I proactively learn about daily management and treatment of allergic rhinitis. (P)	103 (26.21)	109 (27.74)	84 (21.37)	55 (13.99)	42 (10.69)

Table S6 Fit indices of the adjusted SEM model (after MI refinement)

Indicators	Reference	Actual
CMIN/DF	1-3: Excellent, 3-5: Good	1.961
RMSEA	<0.08: Good	0.050
IFI	>0.8: Good	0.946
TLI	>0.8: Good	0.893
CFI	>0.8: Good	0.943

Table S7 Model estimates (After adjustment)

			Estimate	P
KNOWLEDGE	<---	14. Family history	-0.685	0.003
KNOWLEDGE	<---	13 Hyperlipidemia	1.660	0.037
KNOWLEDGE	<---	12. Duration of allergic rhinitis	0.701	<0.001
KNOWLEDGE	<---	9. Smoking habit	-0.858	<0.001
KNOWLEDGE	<---	7.Marital status	1.401	<0.001
KNOWLEDGE	<---	5.Employment status	-0.389	<0.001
ATTITUDE	<---	KNOWLEDGE	0.220	<0.001
ATTITUDE	<---	9. Smoking habit	-0.627	0.014
ATTITUDE	<---	7. Marital status	0.844	0.046
PRACTICE	<---	ATTITUDE	0.152	0.013
PRACTICE	<---	KNOWLEDGE	0.603	<0.001
PRACTICE	<---	1.Gender	1.672	<0.001

			Estimate	P
PRACTICE	<---	9. Smoking habit	-1.071	<0.001
PRACTICE	<---	7.Marital status	1.382	0.007

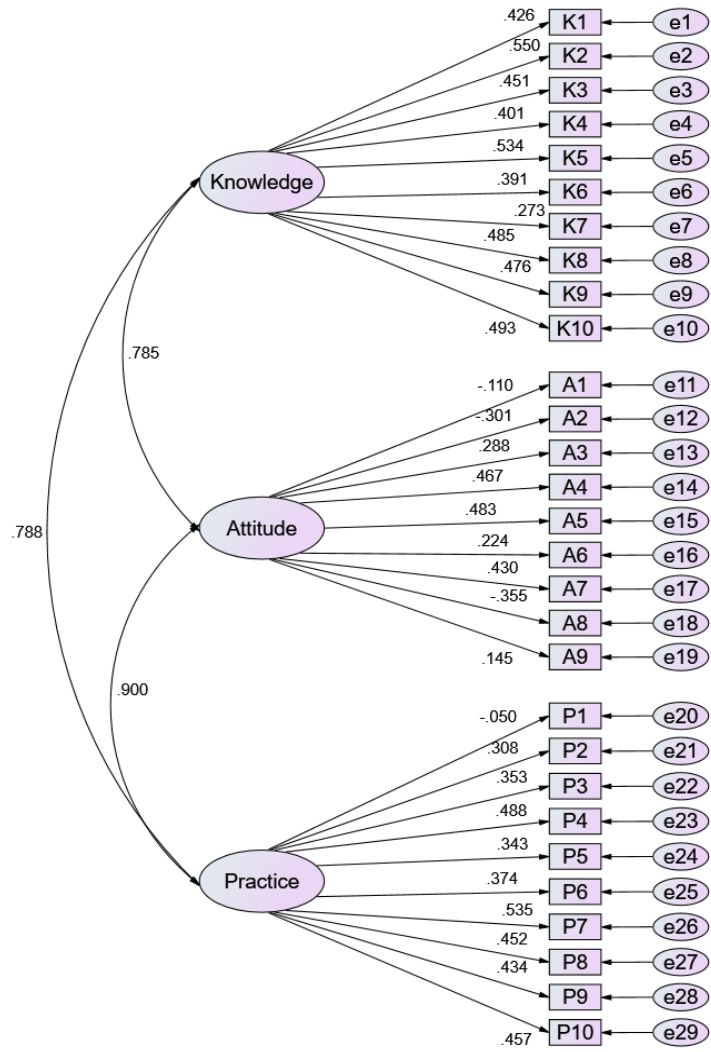


Figure S1. Confirmatory factor analysis model of KAP questionnaire

Questionnaire Number: _____

Dear Participant:

We are researchers from XXX, and we sincerely invite you to participate in our research study. This study aims to understand the knowledge, attitudes, and practices of allergic rhinitis patients regarding environmental control and treatment. The findings will provide a basis for developing scientific intervention strategies, which may help improve the health conditions of more people in the future. Your participation in this study is voluntary. This study has been reviewed and approved by the Ethics Review Committee. If you agree to participate in this study, please refer to the following instructions.

1. Please complete the questionnaire. There are no right or wrong answers; you only need to fill it out based on your actual situation. If you have any questions during the process, feel free to ask us. After completing the questionnaire, please submit it promptly.
2. This study is a simple survey and will not harm your physical or psychological well-being. However, it will involve some privacy issues, such as your gender, age, etc. We will keep your information strictly confidential and will not disclose it. Please feel assured to provide accurate information.
3. As a participant, you can access information related to this study and its progress at any time. If you decide to withdraw from the study, please inform us, and your data will not be included in the research results.

Finally, we sincerely thank you for taking the time to support our scientific research!

I have read and agree to have the collected data used for scientific research.

Informed Consent Signature: _____

Participation Date: _____ year _____ month _____ day

Part 1 basic information

1. your gender:

a. male

b. female

2. your age: _____ years old.

3. education level:

a. primary school or below

b. middle school

c. high school/ technical school

d. associate degree/bachelor' s degree

e. master' s degree or above

4. ethnicity:

a. han

b. ethnic minority

5. employment status:

a. employed

b. unemployed

c. retired

d. self-employed

e. homemaker

f. other

6. In the past year, what was your average monthly per capita income in your household (including in-kind income and rental income, etc.)? _____ yuan

a.<2000
b.2000-5000
c.5000-10000
d.10000-20000
e.>20000
f. Prefer not to disclose

7. marital status:

a. Single
b. Married c. Divorced
d. Widowed

8. Do you have children?

a. yes
b. no

9. Do you have a smoking habit?

a. Never smoked
b. Used to smoke
c. Currently smoke

10. Do you have a drinking habit?

a. Never drink
b. Used to drink
c. Currently drink

11. Do you have medical insurance or other commercial insurance?

a. yes
b. no

12. How long have you been diagnosed with allergic rhinitis?

a. Less than 1 year
b. 1-3 years
c. 3-5 years
d. More than 5 years

-
- 13. Do you have any underlying or chronic diseases? (You can choose multiple)**
- a. Hypertension
 - b. Hyperlipidemia
 - c. Diabetes
 - d. Tumor
 - e. Digestive system diseases
 - f. Atherosclerosis
 - g. Depression or other psychological diseases
 - h. Other
 - i. Prefer not to disclose
-

- 14. Do you have any relatives with allergic rhinitis?**
- a. yes
 - b. no
 - c. not sure
-

- 15. Are you currently undergoing treatment with nasal sprays or oral antihistamines?**
- a. yes
 - b. no
-

Part 3 Attitudes and Thoughts on Environmental Control and Treatment of Allergic Rhinitis

1. Sometimes sudden attacks of allergic rhinitis make me feel very insecure and ashamed, fearing others' ridicule. (N)	a. strongly agree	b.	c.	d.	e. strongly disagree
2. I feel anxious and helpless about the symptoms of allergic rhinitis. (N)	a. strongly agree	b.	c.	d.	e. strongly disagree
3. I believe that by avoiding environmental and food allergens as much as possible, allergic rhinitis can be prevented to the greatest extent. (P)	a. strongly agree	b.	c.	d.	e. strongly disagree
4. I believe that patients should try their best to adapt to, accept, and actively face the challenges of allergic rhinitis. (P)	a. strongly agree	b.	c.	d.	e. strongly disagree
5. I believe that allergic rhinitis patients need care from their family and society in various aspects, such as helping with environmental control and emotional counseling. (P)	a. strongly agree	b.	c.	d.	e. strongly disagree
6. Allergic rhinitis is not a major illness, and I don't care about it at all. (N)	a. strongly agree	b.	c.	d.	e. strongly disagree
7. I believe that although allergic rhinitis cannot be completely cured, it should still be actively treated to prevent worsening and complications. (P)	a. strongly agree	b.	c.	d.	e. strongly disagree
8. The recurrent attacks of allergic rhinitis make me feel anxious and irritable. (N)	a. strongly agree	b.	c.	d.	e. strongly disagree
9. I believe that if I marry someone with allergic rhinitis, it will be passed on to our children. (P)	a. strongly agree	b.	c.	d.	e. strongly disagree

Part 4 Practices for Environmental Control and Treatment of Allergic Rhinitis

1. Allergic rhinitis makes me frequently avoid social gatherings and public places. (N)	a. always	b. often	c. occasionally	d. rarely	e. never
2. I go to the hospital to get checked and find out my allergens. (P)	a. always	b. often	c. occasionally	d. rarely	e. never
3. I always pay attention to avoiding allergens. (P)	a. always	b. often	c. occasionally	d. rarely	e. never
4. I strictly follow medical advice, take medication on time, and attend regular follow-ups. (P)	a. always	b. often	c. occasionally	d. rarely	e. never
5. When allergic rhinitis attacks, I frequently use saline to rinse my nasal cavity. (P)	a. always	b. often	c. occasionally	d. rarely	e. never
6. I engage in appropriate physical exercise to improve my fitness and boost my immune system. (P)	a. always	b. often	c. occasionally	d. rarely	e. never
7. I keep my indoor environment clean and dry to reduce dust mites. (P)	a. always	b. often	c. occasionally	d. rarely	e. never
8. I maintain a positive and optimistic attitude. (P)	a. always	b. often	c. occasionally	d. rarely	e. never
		often	occasionally		
9. I wear a mask whenever I go out. (P)	a. always	b. often	c. occasionally	d. rarely	e. never
10. I proactively learn about daily management and treatment of allergic rhinitis. (P)	a. always	b. often	c. occasionally	d. rarely	e. never

Thank you for filling out our questionnaire! Your responses are extremely valuable to our future work.

Thank you for filling out our questionnaire!

If you have any comments or suggestions regarding this survey, we would be honored to hear your feedback.

Comments and Suggestions: _____ (optional)

To ensure that this survey can effectively contribute to our ongoing research and facilitate future follow-ups, we would greatly appreciate it if you could provide your contact information.

Your phone number: _____ (optional)

Figure A1. English version of the KAP questionnaire for allergic rhinitis environmental control and treatment.