

Supplementary material for the paper titled:

Modeling and analysis of barriers to climate change adaptation in Tehran

Characteristics of the participants in the FGDs

Table S1. Characteristics of the participants in the FGDs to identify the barriers to climate change adaptation.

Characteristics	Gender	Total (%)	FG1	FG2	FG3	FG4	FG5	FG6	FG7	FG8	FG9
Number of participants		59	4	7	7	7	6	6	6	8	8
Gender	Male	41	4	5	7	3	5	6	3	3	5
	Female	18	-	2	-	4	1	-	3	5	3
Age	30-40	23	2	3	5	1	2	2	2	3	3
	41-50	30	2	4	2	5	2	3	4	5	3
	51-60	6	-	-	-	1	2	1	-	-	2
	Mean (years)	20	2	4	4	2	2	2	3	4	3
Employment status	City Council	12	1	1	2	1	1	2	1	1	2
	Municipality	17	1	2	2	2	2	1	3	2	2
	Private professionals	14	1	2	1	1	2	2	1	3	1
	Academics	17	1	2	2	3	1	1	2	2	3
Education	BSc	8	-	1	2	1	1	-	-	2	1
	MSc	27	2	3	3	2	3	3	5	3	3
	PhD	24	2	3	2	4	2	3	1	3	4
Experience (years)			5 to 8	4 to 7	3 to 6	5 to 8	4 to 7	3 to 8	5 to 7	2 to 8	3 to 9
	Mean (years)		6	6	4	6	6	6	6	5	6
Field	Architecture	5	-	1	1	1	-	-	1	1	-
	Urban design	3	-	1	1	-	-	-	-	-	1
	Urban development	13	1	2	2	2	1	1	1	1	2
	Urban sociology	5	-	1	-	-	-	1	-	2	1
	Civil Engineering	9	1	-	1	1	1	1	2	1	1
	Urban environment	11	1	1	1	1	2	1	1	1	2
	Urban planning	13	1	1	1	2	2	2	1	2	1

Consideration of ethical issues while conducting the FGD approach

Ethical issues are of paramount importance in qualitative research (Sanjari et al., 2014). Accordingly, the following measures were taken in this research: asking permission to record the discussions, providing written and verbal information about the research project and its objectives, obtaining informed consent from the participants for their participation in the study, refraining from mandatory participation, granting the participants the privilege to drop out at every stage of the study, and publishing general findings as opposed to person-specific data (Guillemin and Gillam, 2004). The researchers also provided the participants with contact information including email address and phone number so that they could follow up on the findings of the study or withdraw from the study even after the data analysis had been done (Bell and Bryman, 2007).

Horsburgh and et al (Horsburgh, 2003) have pointed out the significance of trustworthiness, credibility, dependency, transferability, and confirmability in the evaluation of qualitative research (Pope and Mays, 1995). To meet these criteria, the following actions were taken: prolonged engagement in data collection and analysis, peer check with two experts who were familiar with qualitative research, transcription right after each FGD and performing the analysis and data collection at the same time, member check by the participants after the FGDs, respondent validation during and at the end of the FGDs, using verbatim quotes from the participants in reporting the study findings, detailed recording of the study process, providing a similar situation for the participants, checking the analysis and coding by a second researcher to ensure correct and un-biased coding, applying a team approach in the study process to benefit from the opinions of the experts, archiving all documents of the study, ensuring the researchers' interest in the study subject, using external check to validate the themes and sub-themes, trying to bracket the preconceptions of the researchers during interviews and data analysis, and maximum variety sampling.

Characteristics of the survey respondents

Table S2. Demographics of the survey respondents.

ariables	Categories	Frequency	Percent%
Gender	Male	123	61.5
	Female	77	38.5
Education level	BSc	55	27.5
	MSc	86	43
	PhD	59	29.5

Field of study	Architecture	34	17
	Urban development	48	24
	Urban design	27	13.5
	Urban environment	25	12.5
	Urban planning	29	14.5
	Civil Engineering	37	18.5
Age (year)	30-40	86	43
	41-50	72	36
	51-60	42	21
Work experience (year)	5-10	93	46.5
	10-15	62	31
	15+	45	22.5

Characteristics of the participants in the ISM survey

Table S3. Demographics of the participants.

Row	Gender	Education level	Field of study	Work experience (years)
1	Male	MSc	Urban planning	5
2	Male	PhD	Urban development	7
3	Female	M.A	Architecture	9
4	Male	PhD	Civil engineering	7
5	Female	PhD	Urban environment	5
6	Male	PhD	Urban sociology	8
7	Male	M.A	Urban design	6

Results of the T-test to evaluate the importance of the variables

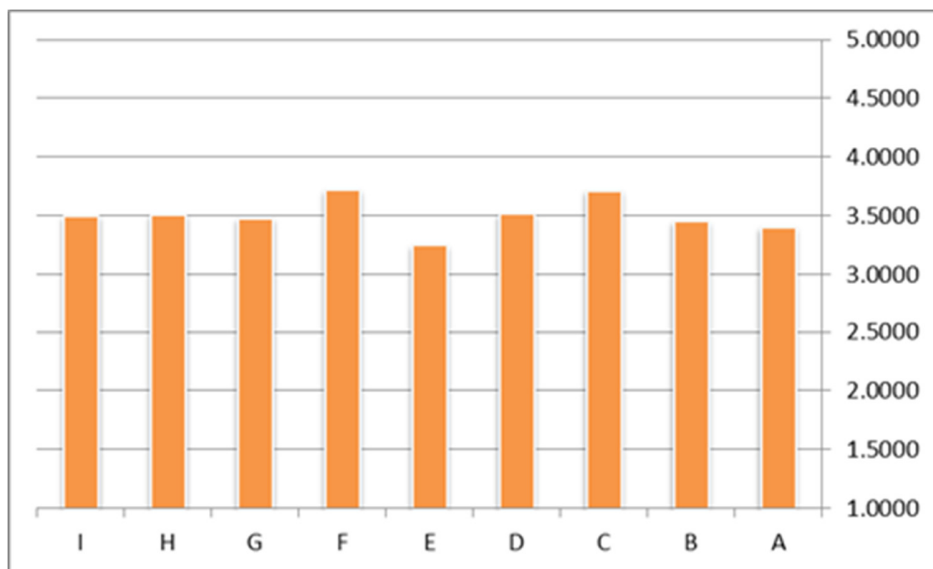


Figure S1. Average importance scores of the barriers (see Table 1 for the codes).

Results of the path analysis

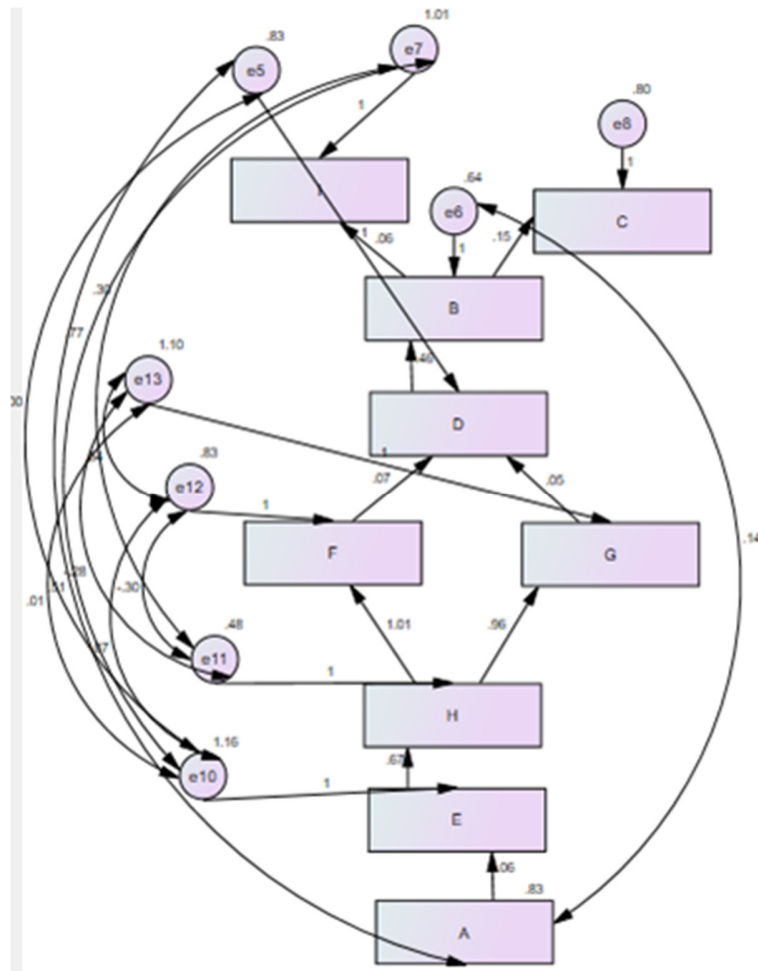


Figure S2. Path diagram of the SEM for the barriers to climate change adaptation.

Impact of the variables on each other

Table S4. Correlation coefficients for barriers.

	A	B	C	D	E	F	G	H	I
Kendall's tau_b									
A	1.000	.345**	.124*	.500**	.148**	.249**	.224**	.159**	.212**
B	.345**	1.000	.122*	.371**	.088	.114*	.120*	.069	.110*
C	.124*	.122*	1.000	.097	-.005	.026	.049	.022	.010
D	.500**	.371**	.097	1.000	.158**	.239**	.228**	.121*	.179**
E	.148**	.088	-.005	.158**	1.000	.504**	.424**	.533**	.541**
F	.249**	.114*	.026	.239**	.504**	1.000	.548**	.489**	.526**
G	.224**	.120*	.049	.228**	.424**	.548**	1.000	.406**	.477**
H	.159**	.069	.022	.121*	.533**	.489**	.406**	1.000	.629**
I	.212**	.110*	.010	.179**	.541**	.526**	.477**	.629**	1.000

Correlation is significant at the 0.01 level (2-tailed).**
Correlation is significant at the 0.05 level (2-tailed).*

The reachability matrix

Table S5. Final reachability matrix.

Driving power	I	H	G	F	E	D	C	B	A	
8	1	1	1*	0	1	1	1	1	1	A
5	1	0	0	1	1	0	1	1	0	B
3	1	0	0	0	1	0	1	0	0	C
4	1	0	0	0	0	1	0	1	1	D
8	1	1	1	1	1	1	1	1	0	E
5	1	0	1	1	0	1	0	1	0	F
7	1	0	1	1	0	1	1	1	1	G
7	1	1	1	1	0	1	1	1	0	H
5	1	1	0	0	0	0	1	1	1	I
	9	4	5	5	4	6	7	8	4	Dependency

Note: 1* entries are included to incorporate transitivity

Level partitions

Table S6. Results of level partitions.

Barriers	Reachability Set	Antecedent Set	Intersection	Level
Planning	9,8,3,2,1	9,8,7,6,5,4,3,2,1	9,8,3,2,1	I
Social	9,5,3	9,8,7,5,3,2,1	9,5,3	I
Awareness, education and knowledge	9,6,5,3,2	9,8,7,6,5,4,2,1	9,6,5,2	II
Resources and resource management	9,4,2,1	8,7,6,5,4,1	4,1	III
Communication and interaction	9,7,6,4,2	8,7,6,5,2	7,6,2	IV
Economy	9,7,6,4,3,2,1	8,7,6,5,1	7,6	IV
Governance	9,8,7,6,4,3,2	9,8,5,1	9,8	V

Laws and regulations	9,8,7,6,5,4,3,2	5,3,2,1	5,3,2	VI
Structure and culture of research	9,8,5,4,3,2,1	9,7,4,1	9,4,1	VII

References

- BELL, E. & BRYMAN, A. 2007. The ethics of management research: an exploratory content analysis. *British journal of management*, 18, 63-77.
- GUILLEMIN, M. & GILLAM, L. 2004. Ethics, reflexivity, and “ethically important moments” in research. *Qualitative inquiry*, 10, 261-280.
- HORSBURGH, D. 2003. Evaluation of qualitative research. *Journal of clinical nursing*, 12, 307-312.
- POPE, C. & MAYS, N. 1995. Qualitative research: reaching the parts other methods cannot reach: an introduction to qualitative methods in health and health services research. *Bmj*, 311, 42-45.
- SANJARI, M., BAHRAMNEZHAD, F., FOMANI, F. K., SHOGHI, M. & CHERAGHI, M. A. 2014. Ethical challenges of researchers in qualitative studies: The necessity to develop a specific guideline. *Journal of medical ethics and history of medicine*, 7.