

Article title: From Climate Concerns to Health Equity: Local Government Priorities for Smart Healthy Cities in South Korea

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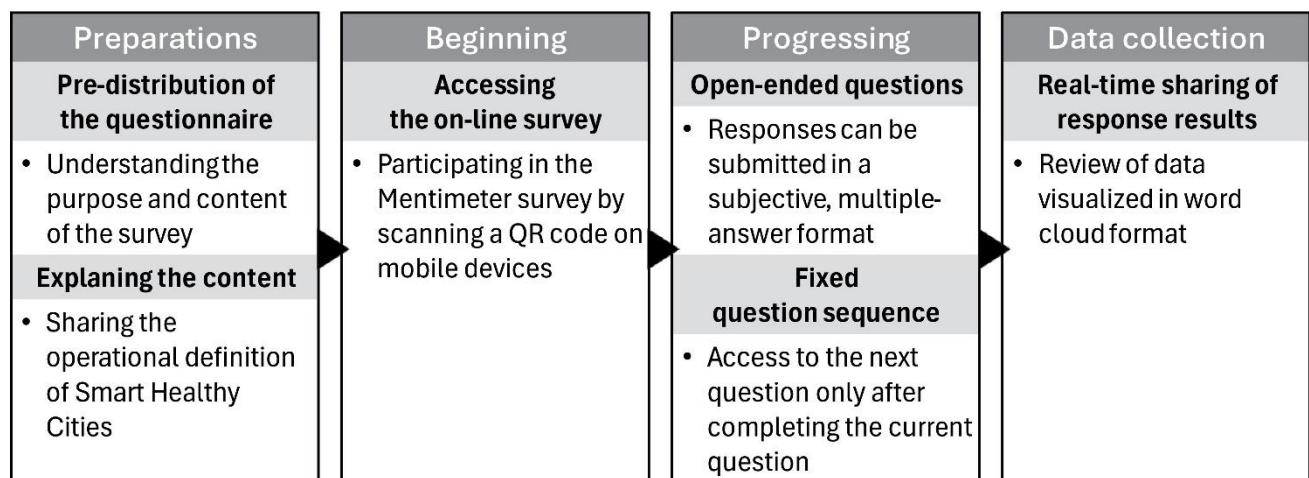
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Supplementary file 1

Supplementary Figure S1. Real-time conference survey procedure using Mentimeter (pre-distribution, online access, progression, and real-time visualization).



Supplementary Table S1. Participating Municipal Governments*

Regional Government	Municipal Government	N
Seoul Special City	Seoul-si, Dobong-gu, Dongdaemun-gu, Dongjak-gu, Eunpyeong-gu, Gangbuk-gu, Gangdong-gu, Gangnam-gu, Geumcheon-gu, Gwangjin-gu, Jung-gu, Jungnang-gu, Mapo-gu, Nowon-gu, Seodaemun-gu, Seongbuk-gu, Seongdong-gu, Songpa-gu, Yangcheon-gu, Yeongdeungpo-gu, Yongsan-gu	21
Busan Metropolitan City	Busan-si, Jin-gu, Suyeong-gu	3
Daejeon Metropolitan City	Daejeon-si, Yuseong-gu	2
Gwangju Metropolitan City	Dong-gu, Gwangsan-gu, Nam-gu, Seo-gu	4
Incheon Metropolitan City	Incheon-si, Yeonsu-gu	2
Chungcheongbuk-do	Chungju-si, Boeun-gun, Jincheon-gun	3
Chungcheongnam-do	Dangjin-si, Seosan-si, Yesan-si, Buyeo-gun, Geumsan-gun, Hongseong-gun	6
Gangwon-do	Wonju-si	1
Gyeonggi-do	Ansan-si, Bucheon-si, Goyang-si, Gwangju-si, Gwangmyeong-si, Hwaseong-si, Osan-si, Siheung-si, Suwon-si, Uijeongbu-si, Yeuju-si, Yongin-si, Yangpyeong-gun	13
Gyeongsangbuk-do	Andong-si, Goryeong-gun, Gumi-si, Gyeongju-si, Gyeongsan-si, Pohang-si	6
Gyeongsangnam-do	Changwon-si, Geoje-si, Gimhae-si, Jinju-si, Tongyeong-si, Yangsan-si, Geochang-gun	7
Jeju-do	Jeju-si	1
Jeollanam-do	Gwangyang-si, Suncheon-si, Wando-gun	3
Total		72

* do: province; si: city; gun: rural municipality

Note: This table presents the geographical distribution of the 72 local governments represented at the conference. The high representation from Seoul Special City (21 municipalities) and Gyeonggi-do (13 municipalities) reflects the population density and urbanization patterns of Korea.

Supplementary Table S2. Classification of responses by agendas, themes, and indicators, and summary of omnibus tests across questions (Q1–Q3)

Panel A. Classification of agendas, themes, and indicators

Agenda	Response Count						Theme	Response Count						Indicator	Response Count												
	Q1		Q2		Q3			Q1		Q2		Q3			Q1		Q2		Q3								
	n	%	n	%	n	%		n	%	n	%	n	%		n	%	n	%	n	%							
Planet	45	25.9	6	3.7	16	11.0	Sustainable and Ethical Development Strategies	7	4.0	0	0.0	5	3.4	Sustainability	2	1.1	0	0.0	4	2.7							
														Low Birth Rate and Aging Population	5	2.9	0	0.0	1	0.7							
							Actions on Climate Change	38	21.8	6	3.7	11	7.5	Climate Change	34	19.5	5	3.1	11	7.5							
														Environmental Issues	4	2.3	1	0.6	0	0.0							
Peace	13	7.5	18	11.1	22	15.1	Social Justice and Implementation of Inclusive Societies	3	1.7	1	0.6	8	5.5	Inclusivity	3	1.7	1	0.6	5	3.4							
														Ethics	0	0.0	0	0.0	3	2.1							
							Human Security	10	5.7	17	10.5	14	9.6	Safety in Society	7	4.0	17	10.5	11	7.5							
														Health Security	0	0.0	0	0.0	2	1.4							
														Housing Security	2	1.1	0	0.0	1	0.7							
														Economic Security	1	0.6	0	0.0	0	0.0							
People	40	23.0	67	41.4	68	46.6	Improving Equity	17	9.8	40	24.7	48	32.9	Equity	4	2.3	4	2.5	4	2.7							
														Health Equity	7	4.0	32	19.8	38	26.0							
														Regional Equity	6	3.4	4	2.5	6	4.1							
														Improvement of Health Levels	1	0.6	4	2.5	8	5.5							
							Enhancing Health and Well-being	5	2.9	9	5.6	11	7.5	Prevention	1	0.6	0	0.0	2	1.4							
														Health Life Practice	3	1.7	5	3.1	1	0.7							
														Disease Management and Care	9	5.2	16	9.9	6	4.1	Chronic Disease Management	2	1.1	2	1.2	0	0.0
																					Mental Health Management	2	1.1	2	1.2	3	2.1
							Infectious Disease Management	5	2.9	1	0.6	1	0.7														
							Care	0	0.0	11	6.8	1	0.7														
							Lifelong Health for All	9	5.2	2	1.2	3	2.1	Continuity	0	0.0	0	0.0	1	0.7							
														Lifecycle Considerations (Elderly)	6	3.4	2	1.2	1	0.7							
														Lifecycle Considerations (Children)	1	0.6	0	0.0	0	0.0							
														The Disabled	2	1.1	0	0.0	0	0.0							
Place	13	7.5	3	1.9	7	4.8	Cities Promoting Health and Well-being for All	13	7.5	3	1.9	7	4.8	Health-Promoting Environment	13	7.5	3	1.9	7	4.8							
Prosperity	15	8.6	38	23.5	16	11.0	Innovation in Service Models	7	4.0	14	8.6	8	5.5	Improvement of Accessibility	4	2.3	7	4.3	2	1.4							
														Service Integration	3	1.7	3	1.9	1	0.7							
														Evidence-Based	0	0.0	4	2.5	5	3.4							
							Investment in Information	8	4.6	24	14.8	8	5.5	Data Collection	2	1.1	6	3.7	0	0.0							

							Technology							Information Integration and Sharing	3	1.7	9	5.6	3	2.1
														Utilization of Information Technology	3	1.7	9	5.6	5	3.4
Participation	48	27.6	30	18.5	17	11.6	Strengthening Collaborative and Participatory Governance at all levels	18	10.3	15	9.3	8	5.5	Collaborative Governance	13	7.5	10	6.2	5	3.4
														Health in All Policies (HIAP)	2	1.1	0	0.0	1	0.7
														Participatory Governance	0	0.0	4	2.5	2	1.4
														Health Impact Assessment	3	1.7	1	0.6	0	0.0
														Commitment of Local Government Leaders	5	2.9	1	0.6	0	0.0
							Leadership of Cities and Local Governments	5	2.9	1	0.6	0	0.0	Community-Centered	1	0.6	0	0.0	2	1.4
														Health Literacy	1	0.6	0	0.0	0	0.0
														Digital Literacy	1	0.6	0	0.0	2	1.4
							Promotion of Normative Changes Across Society	10	5.7	3	1.9	3	2.1	Awareness Improvement	10	5.7	3	1.9	3	2.1
							Stable Administrative Foundations	12	6.9	11	6.8	2	1.4	Securing Rationale for Project Implementation	4	2.3	0	0.0	2	1.4
														Effective Program Operation	8	4.6	11	6.8	0	0.0
Total	174	100	162	100	146	100		174	100	162	100	146	100		174	100	162	100	146	100

Panel B. Summary of overall chi-square tests for shifts across questions (Q1–Q3)

Level	Categories (k)	Table size (rows × cols)	df = (r–1)(c–1)	N	$\chi^2(df)$	p-value	Cramer's V	Interpretation*
Agenda (6P)	6	3 × 6	10	482	79.50	<0.001	0.29	Moderate
Theme	16	3 × 16	30	482	121.4	<0.001	0.36	Moderate (upper range)
Indicator	43	3 × 43	84	482	211.9	<0.001	0.47	Relatively strong

* Rea & Parker (1992)'s benchmarks for Cramer's V: 0.00–0.09: negligible; 0.10–0.19: weak; 0.20–0.39: moderate; 0.40–0.59: relatively strong; 0.60–0.79: strong; 0.80–1.00: very strong.

Supplementary Table S3. Word Cloud Results from the Mentimeter Survey and Response Counts Before and After Data Preprocessing

Questions	Word cloud visualizations	Respondents (n)
(Q1) What urgent challenges should Healthy Cities in Korea address among current issues facing Korean society?		86
(Q2) Which challenges could be more effectively addressed as Korea's Healthy Cities transition to 'Smart' Healthy Cities?		171
(Q3) What primary values should Korean Smart Healthy Cities prioritize?		174
(Q4) What are the most important factors for the success of Smart Healthy Cities?		75
(Q5) How can Smart Healthy Cities contribute to sustainable development?		156
(Q6) What are the key challenges in implementing Smart Healthy Cities?		162
(Q7) How can Smart Healthy Cities improve the quality of life for citizens?		79
(Q8) What are the most effective strategies for promoting Smart Healthy Cities?		146
(Q9) How can Smart Healthy Cities address the needs of vulnerable populations?		146

Supplementary Table S4. Agenda-level standardized residuals

Agendas	Standardized Residuals		
	Q1	Q2	Q3
Participation	2.340 ▲	-0.341	-2.195 ▼
Peace	-1.402	0.044	1.484
People	-2.916 ▼	1.067	2.059 ▲
Place	1.630	-1.701	0.013
Planet	4.232 ▲	-3.481 ▼	-0.953
Prosperity	-1.985 ▼	3.075 ▲	-1.072

Note. Cells with $|z| \geq 1.96$ are flagged as over-represented (▲) or under-represented (▼) relative to expected counts under independence.

Supplementary Table S5. Correspondence analysis of round (Q1–Q3) by agenda (6P): eigenvalues and inertia

Dimension	Singular value	Principal inertia	Chi-squared	% of inertia	Cumulative %
Dim 1	0.368	0.136	65.36	82.2	82.2
Dim 2	0.171	0.029	14.14	17.8	100.0
Total	—	0.165	79.50	100.0	—

Total inertia= 0.1649

Supplementary Table S6a Row categories (round) – mass, coordinates, and contributions (symmetric normalization)

Round	Mass	Quality	% inertia	Coord Dim1	Sqcorr Dim1	Contrib Dim1	Coord Dim2	Sqcorr Dim2	Contrib Dim2
Q1	0.361	1.000	0.509	0.791	0.991	0.613	0.110	0.009	0.026
Q2	0.336	1.000	0.324	−0.591	0.810	0.319	0.419	0.190	0.345
Q3	0.303	1.000	0.168	−0.287	0.332	0.068	−0.597	0.668	0.629

Supplementary Table S6b. Column categories (6P agendas) – mass, coordinates, and contributions (symmetric normalization)

Agenda	Mass	Quality	% inertia	Coord Dim1	Sqcorr Dim1	Contrib Dim1	Coord Dim2	Sqcorr Dim2	Contrib Dim2
Participation	0.197	1.000	0.131	0.439	0.648	0.103	0.475	0.352	0.260
Peace	0.110	1.000	0.052	−0.342	0.546	0.035	−0.457	0.454	0.134
People	0.363	1.000	0.175	−0.426	0.844	0.179	−0.269	0.156	0.154
Place	0.048	1.000	0.070	0.768	0.899	0.076	−0.377	0.101	0.040
Planet	0.139	1.000	0.389	1.113	0.988	0.468	−0.180	0.012	0.026
Prosperity	0.143	1.000	0.183	−0.598	0.624	0.139	0.680	0.376	0.387

Supplementary Table S7. Correlations between agenda-level profiles across questions (Q1–Q3)

Question pair	Pearson's r	p-value
Q1 - Q2	0.2646	0.6124
Q2 - Q3	0.8608	0.0277
Q1 - Q3	0.3426	0.5062

Note: Correlations are based on six WHO Copenhagen 6P agendas (n = 6); given the non-probability sample, results are interpreted descriptively.

Supplementary Table S8. Theme-level standardized residuals

Agendas	Themes	Standardized Residuals		
		Q1	Q2	Q3
Participation	Empowerment	0.298	-1.534	1.291
	Leadership of Cities and Local Governments	1.926	-0.716	-1.348
	Promotion of Normative Changes Across Society	1.758	-1.025	-0.839
	Stable Administrative Foundations	0.990	0.896	-2.025 ▼
	Strengthening Collaborative and Participatory Governance at all levels	0.832	0.329	-1.254
Peace	Human Security	-1.248	0.867	0.449
	Social Justice and Implementation of Inclusive Societies	-0.640	-1.510	2.290 ▲
People	Disease Management and Care	-0.655	1.729	-1.106
	Enhancing Health and Well-being	-1.340	0.206	1.245
	Improving Equity	-3.395 ▼	0.793	2.872 ▲
	Lifelong Health for All	1.755	-1.247	-0.602
Place	Healthy Cities Promoting Health and Well-being for All	1.630	-1.701	0.013
Planet	Actions on Climate Change	4.072 ▲	-2.904 ▼	-1.387
	Sustainable and Ethical Development Strategies	1.282	-2.008 ▼	0.716
Prosperity	Innovation in Service Models	-1.072	1.362	-0.265
	Investment in Information Technology	-1.695	2.879 ▲	-1.183

Note. Cells with $|z| \geq 1.96$ are flagged as over-represented (▲) or under-represented (▼) relative to expected counts under independence.

Supplementary Table S9. Indicator-level standardized residuals

Agendas	Theme (abbreviated)	Indicator	Standardized Residuals		
			Q1	Q2	Q3
Participation	Empowerment	Community-Centered	-0.080	-1.004	1.145
		Digital Literacy	-0.080	-1.004	1.145
		Health Literacy	1.064	-0.580	-0.550
	Leadership of Governments	Commitment of Local Government Leaders	1.926	-0.716	-1.348
	Promotion of Normative Changes	Awareness Improvement	1.758	-1.025	-0.839
	Stable Administrative Foundations	Effective Program Operation	0.436	1.826	-2.399 ▼
		Securing Rationale for Project Implementation	1.246	-1.420	0.135
	Strengthening Collaborative and Participatory Governance at all levels	Collaborative Governance	0.910	0.192	-1.195
		Health Impact Assessment	1.295	-0.297	-1.101
		Health in All Policies (HIAP)	0.881	-1.004	0.096
		Participatory Governance	-1.472	1.397	0.135
Peace	Human Security	Economic Security	1.064	-0.580	-0.550
		Health Security	-0.850	-0.820	1.791
		Housing Security	0.881	-1.004	0.096
		Safety in Society	-1.585	1.527	0.122
	Social Justice and Inclusive Societies	Ethics	-1.041	-1.004	2.194 ▲
		Inclusivity	-0.138	-1.164	1.377
People	Disease Management and Care	Care	-2.081 ▼	3.469 ▲	-1.382
		Chronic Disease Management	0.463	0.565	-1.101
		Continuity	-0.601	-0.580	1.267
		Infectious Disease Management	1.556	-0.882	-0.769
		Mental Health Management	-0.332	-0.230	0.604
	Enhancing Health and Well-being	Health Life Practice	-0.138	1.136	-1.045
		Improvement of Health Levels	-1.705	-0.177	2.047 ▲
		Prevention	-0.080	-1.004	1.145
	Improving Equity	Equity	-0.159	-0.017	0.192
		Health Equity	-3.945 ▼	1.203	3.039 ▲
		Regional Equity	0.093	-0.594	0.524
	Lifelong Health for All	Lifecycle Considerations (Children)	1.064	-0.580	-0.550
		Lifecycle Considerations (Elderly)	1.526	-0.589	-1.045
		The Disabled	1.504	-0.820	-0.778
		Vulnerable Groups	-0.850	-0.820	1.791
Place	Cities Promoting Health and Wellbeing	Health-Promoting Environment	1.630	-1.701	0.013
Planet	Actions on Climate Change	Climate Change	3.754 ▲	-2.880 ▼	-1.065
		Environmental Issues	1.634	-0.525	-1.231
	Sustainable and Ethical Development	Low Birth Rate and Aging Population	1.926	-1.420	-0.606
		Sustainability	-0.113	-1.420	1.619
Prosperity	Innovation in Service Models	Evidence-Based	-1.802	0.561	1.377
		Improvement of Accessibility	-0.320	1.259	-0.977
		Service Integration	0.298	0.422	-0.769
	Investment in Information Technology	Data Collection	-0.523	2.019 ▲	-1.557
		Information Integration and Sharing	-1.038	1.763	-0.724
		Utilization of Information Technology	-1.266	1.375	-0.066

Note. Cells with $|z| \geq 1.96$ are flagged as over-represented (▲) or under-represented (▼) relative to expected counts under independence.