



Perceptions, governance, and health interlinkages of SRM and climate change in Pakistan—and toward mapping fractured South Asia

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RFF & Harvard SRM Social Science Research Workshop
— Governance in a Fractured World

September 4–5, 2025

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Motivation & Context

- Pakistan sits at the nexus of climate vulnerability, strained institutions, and public-health risks
- SRM debates remain ethically and politically fragile; health-sector implications are underexplored
- Goal: connect climate-health governance realities with perceptions of SRM among health professionals (global gap)

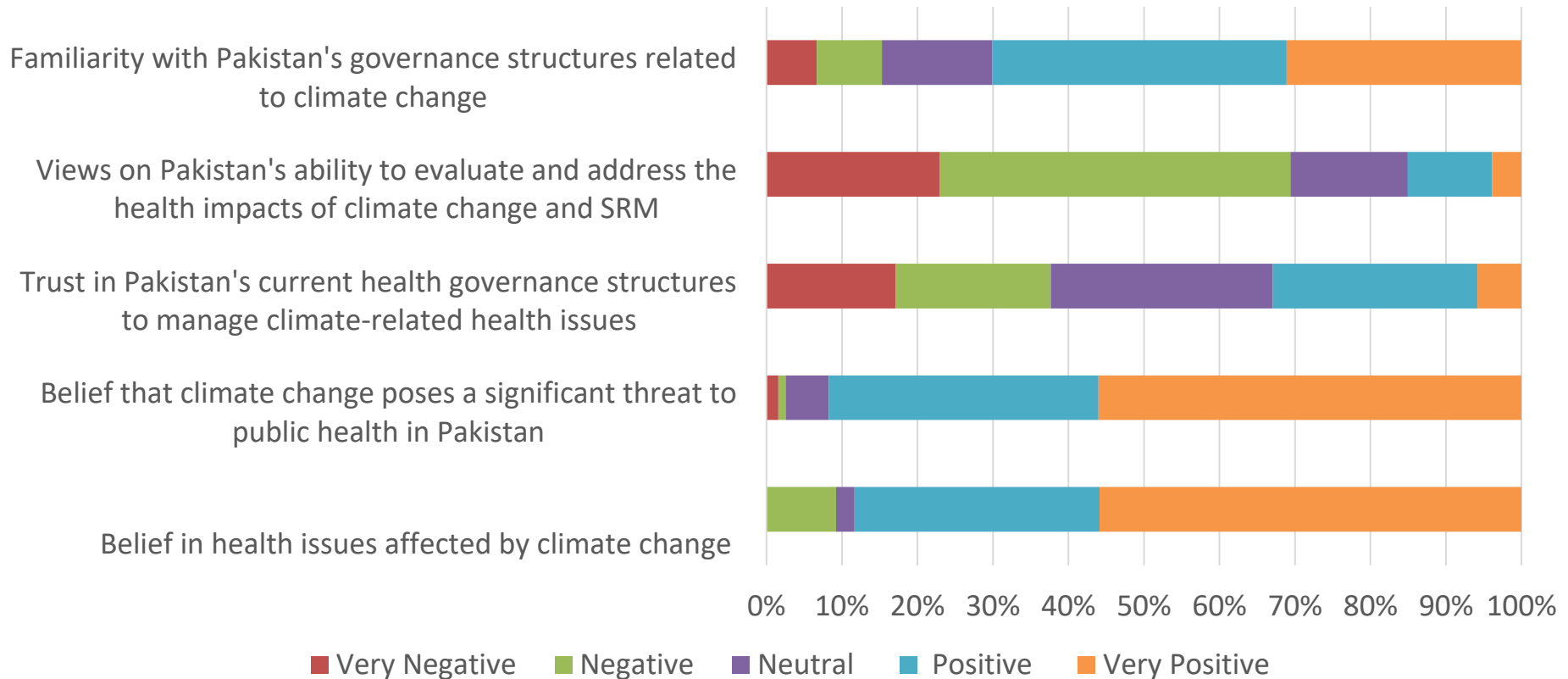
Research Questions & Objectives

- How do health professionals in Pakistan perceive SRM and climate-health risks?
- What ethical, justice, and governance concerns shape acceptance or rejection?
- Where can SRM fit (or not) within existing climate & health policy frameworks?
- How do patterns vary regionally; and what does that imply for South Asia-wide engagement?

Methods — Convergent Mixed-Methods

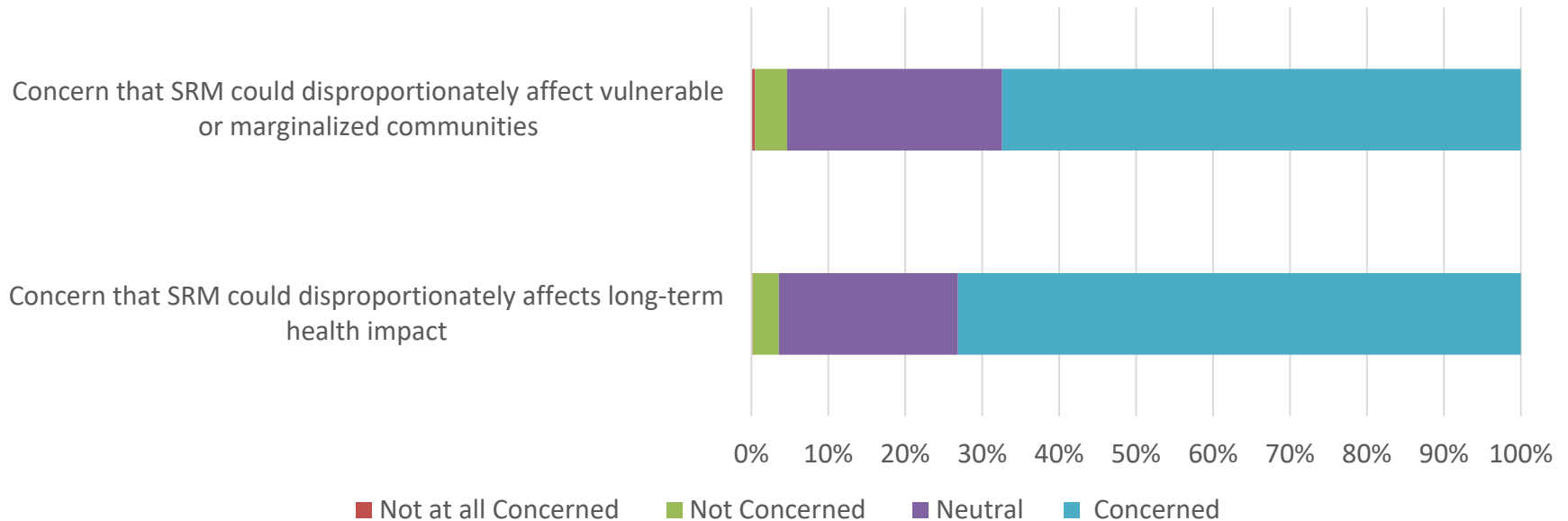
- Nationwide survey (n = 823) of health professionals across provinces (online + hardcopy)
- Qualitative engagements for beta testing (n = 84) with conference sessions + stakeholder workshop
- Policy instrument review (e.g., Pakistan Climate Change Act 2017; National Health Policy 2018)
- Clustering & correlation analyses to surface regional patterns and drivers

Key Findings: Climate-Health & Governance



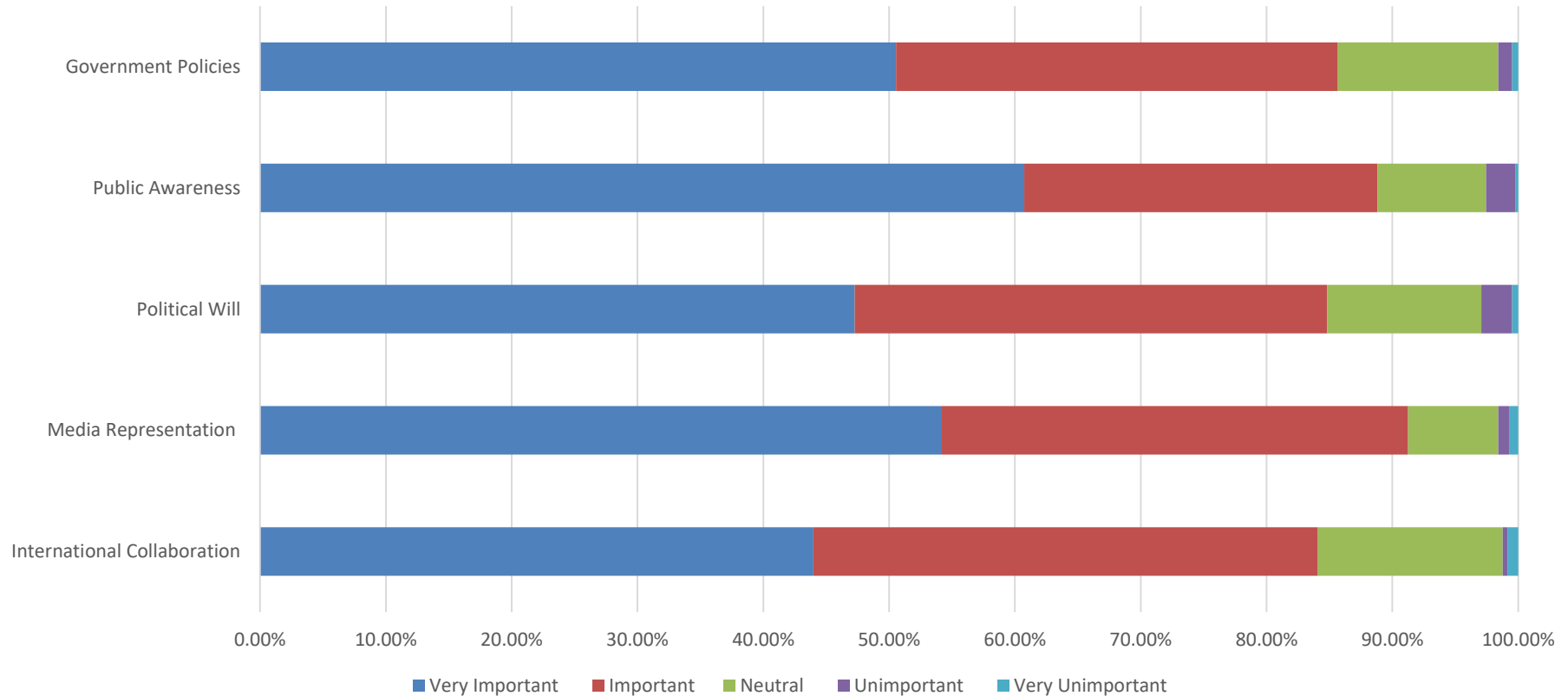
- 92% agree climate change poses a serious public-health threat (high familiarity with climate change governance structures in Pakistan)
- Only ~15% consider Pakistan well-equipped for climate change and SRM-related health impacts
- Trust in governance is low (mean $\approx 2.8/5$), highlighting institutional fragility

Key Findings: Ethics & Equity



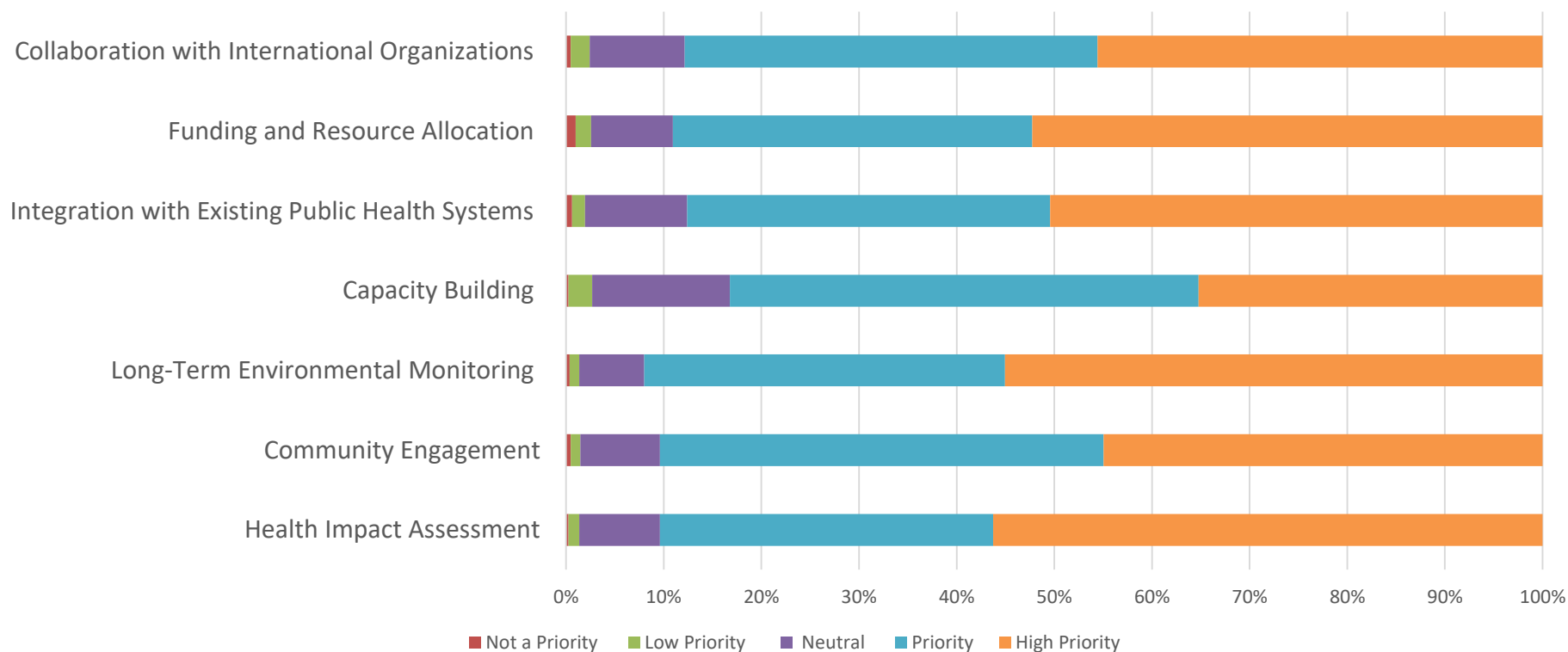
- 80% concerned about long-term health effects of SRM
- 76% worry about disproportionate impacts on vulnerable communities
- Ethical concerns correlate with perceived health risks (moderate, significant)

Key Findings: Drivers of Acceptance



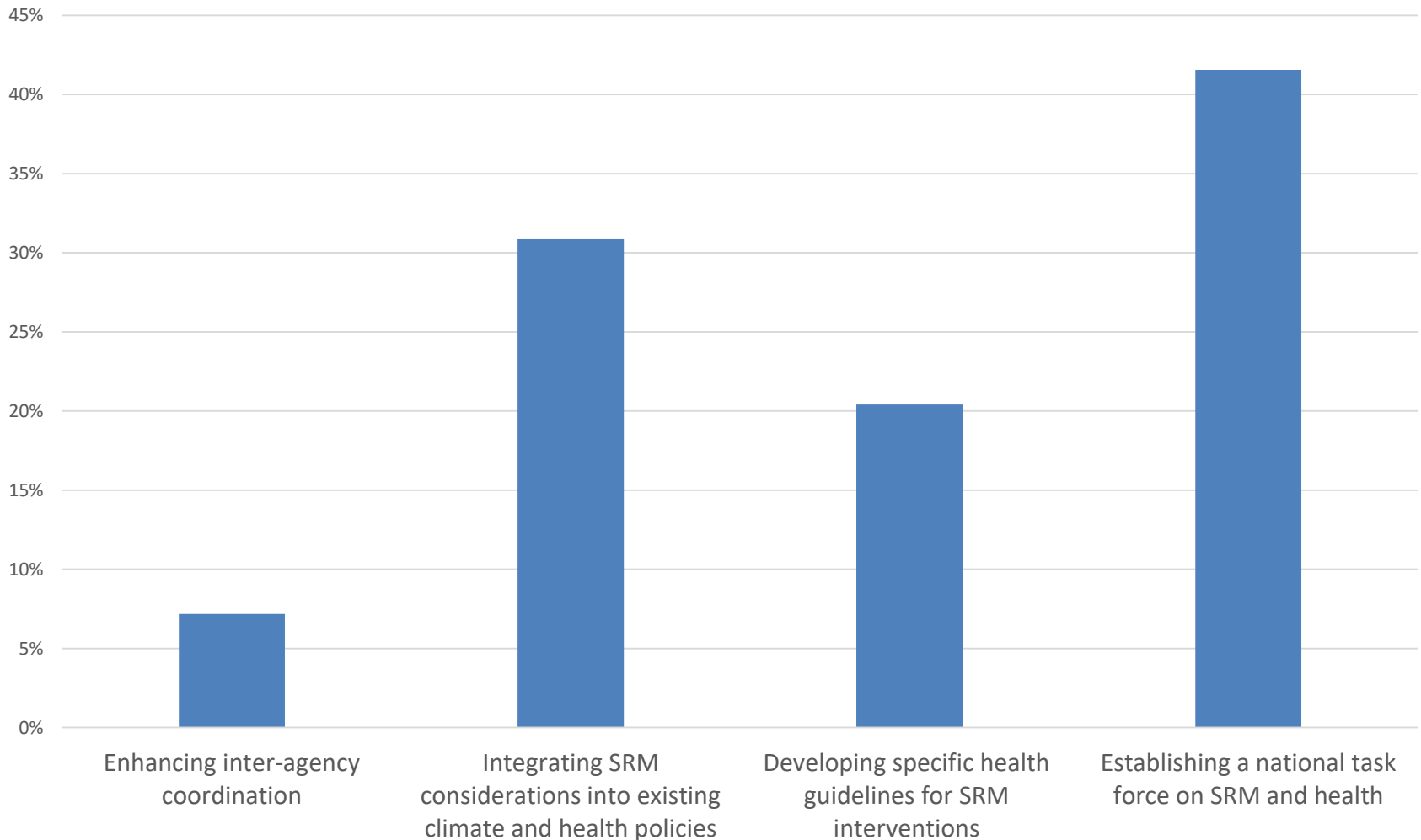
- Government policy, public awareness, and political will are pivotal in shaping views
- Media representation and international collaboration also matter (significant associations)
- Sector-specific vs. general influences align but vary in strength across factors

Key Findings: Research and Monitoring



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Key Findings: National Actions



Determinants of Perceived Institutional Capacity to Address Climate and SRM-Related Health Impacts

- Multinomial Logistic Regression Analysis – Goodness-of-Fit test
- Four predictors
 - Governance structures and policies
 - Trust in governance
 - Perceptions of climate and public health threats
 - Specific health-related concerns
- Significantly improved model fit, with **trust in governance** ($\chi^2 = 108.626, p < .001$) emerging as the **most influential factor**. These results emphasize that institutional trust and governance familiarity are critical drivers of public perceptions of health-related climate readiness

Determinants of Perceived Institutional Capacity to Address Climate and SRM-Related Health Impacts

Section	Measure / Variable	Value
Dependent Variable	Perceived national capacity to address health impacts of CC and SRM	Categories: Not at all Well-Equipped, Not Well-Equipped, Neutral, Well-Equipped, Very Well-Equipped (Reference Category)
Case Processing Summary	Valid responses	823
	Not at all Well-Equipped	189 (23.0%)
	Not Well-Equipped	382 (46.4%)
	Neutral	128 (15.6%)
	Well-Equipped	92 (11.2%)
	Very Well-Equipped	32 (3.9%)
Model Fit Statistics	-2 Log Likelihood (Intercept Only)	1208.822
	-2 Log Likelihood (Final Model)	1007.882
	Model χ^2 (df = 16)	200.940, Statistical Significance (p-value) < .001
Goodness-of-Fit Tests	Pearson χ^2 (df = 612)	21122.330, p < .001
	Deviance (df = 612)	703.549, p = .006
Pseudo R-Square	Cox and Snell R ²	.217
	Nagelkerke R ²	.232
	McFadden R ²	.090
Likelihood Ratio Tests	Familiarity with Climate Governance in Pakistan (Q1)	$\chi^2 = 31.322$, df = 4, p < .001
	Trust in Health Governance for Climate-related Challenges(Q3)	$\chi^2 = 108.626$, df = 4, p < .001
	Perceived Threat of CC to Public Health (Q4)	$\chi^2 = 18.117$, df = 4, p = .001
	Perception of Health Issues Affected by CC (Q5)	$\chi^2 = 20.820$, df = 4, p < .001

These summarized multinomial logistic regression model diagnostics emphasize that **trust in institutional governance is the critical driver** of public perceptions of health-related climate (and SRM) challenges

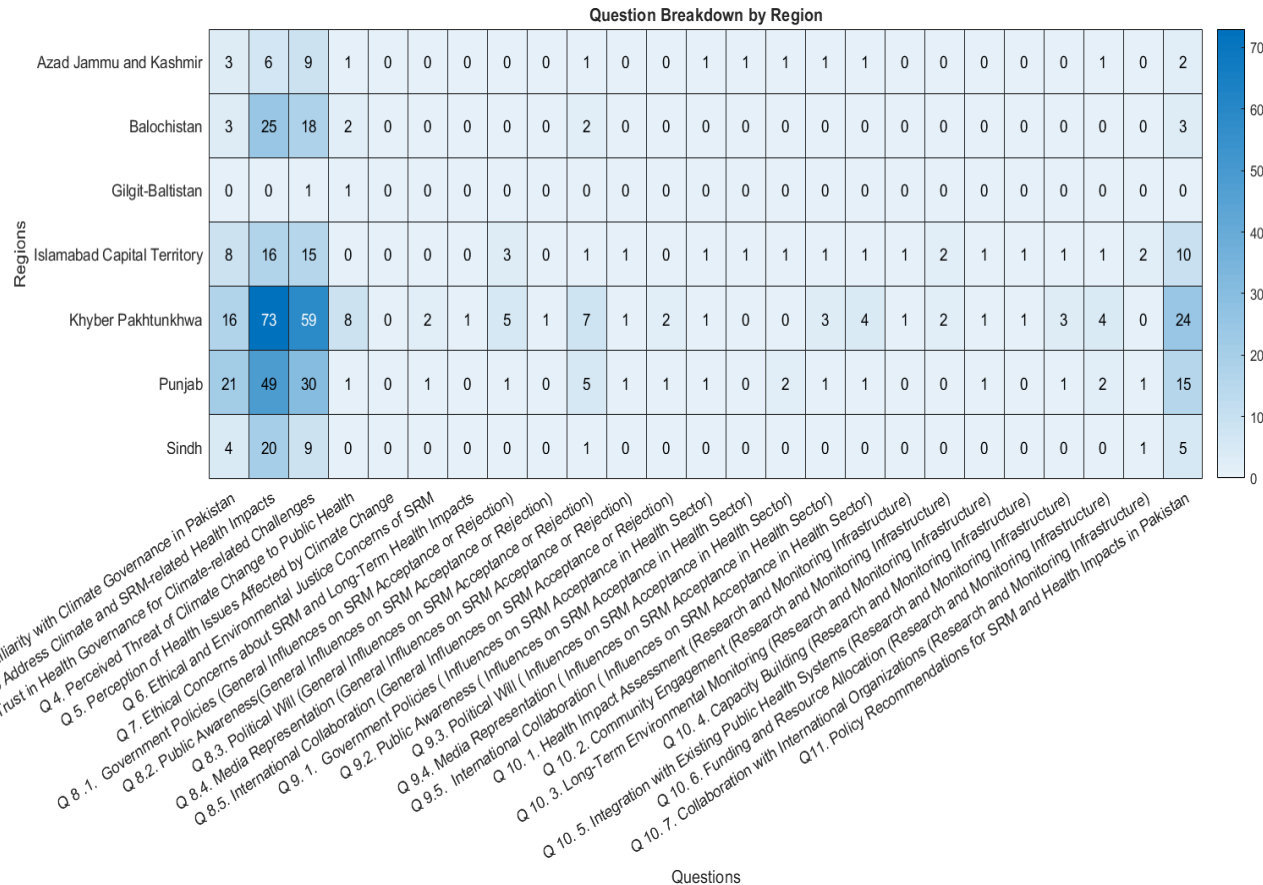
Determinants of Perceived Institutional Capacity to Address Climate and SRM-Related Health Impacts

Outcome Category	Predictor Variable	Unstandardized Logit Coefficient (B)	Statistical Significance (p-value)	Exponentiated Coefficient (Odds Ratio, Exp(B))	95% Confidence Interval for Exp(B)
Not at all Well-Equipped	Familiarity with Climate Governance in Pakistan (Q1)	-0.564	.068	0.569	[0.311, 1.043]
	Trust in Health Governance for Climate-related Challenges (Q3)	-1.368	<.001	0.255	[0.151, 0.428]
	Perceived Threat of CC to Public Health (Q4)	0.222	.472	1.248	[0.682, 2.285]
	Perception of Health Issues Affected by CC (Q5)	-1.322	.001	0.267	[0.123, 0.577]
Not Well-Equipped	Familiarity with Climate Governance in Pakistan (Q1)	-0.835	.006	0.434	[0.239, 0.788]
	Trust in Health Governance for Climate-related Challenges (Q3)	-1.532	<.001	0.216	[0.129, 0.362]
	Perceived Threat of CC to Public Health (Q4)	0.039	.896	1.040	[0.581, 1.861]
	Perception of Health Issues Affected by CC (Q5)	-1.053	.007	0.349	[0.162, 0.752]
Neutral	Familiarity with Climate Governance in Pakistan (Q1)	-1.036	.001	0.355	[0.193, 0.651]
	Trust in Health Governance for Climate-related Challenges (Q3)	-1.020	<.001	0.361	[0.212, 0.612]
	Perceived Threat of CC to Public Health (Q4)	-0.365	.224	0.694	[0.386, 1.250]
	Perception of Health Issues Affected by CC (Q5)	-1.087	.006	0.337	[0.154, 0.737]
Well-Equipped	Familiarity with Climate Governance in Pakistan (Q1)	-0.962	.002	0.382	[0.207, 0.706]
	Trust in Health Governance for Climate-related Challenges (Q3)	-0.651	.018	0.521	[0.304, 0.894]
	Perceived Threat of CC to Public Health (Q4)	-0.202	.509	0.817	[0.448, 1.490]
	Perception of Health Issues Affected by CC (Q5)	-1.082	.007	0.339	[0.154, 0.745]

- Trust in governance is the strongest and most consistent predictor
- Limited familiarity with governance structures and policies is associated with lower perceived readiness
- Specific concerns about health impacts also predict reduced institutional confidence, indicating that increased awareness of health vulnerabilities often corresponds with skepticism toward governance

Results suggest that **perceived readiness is shaped less by threat recognition and more by institutional trust, familiarity, and transparency**—key elements for fostering public support for SRM governance

Regional Disparities & Clusters



Distinct provincial patterns:
higher engagement in
Punjab & KP; lower in GB
and Balochistan

Links directly to the **UN
Human Development Index
findings**

Three clusters identified
with clear geographic and
topical differences – Elbow
and Silhouette Method

Implication: tailor
engagement/governance
approaches to provincial
contexts

National Policies Assessed (RFF 2024)

Policy Document	Integration of CC and Health	Relevance of Governance Structures	Effectiveness of Governance Structures	Specific Policy Objectives Addressing CC and Health
National Health Vision Pakistan (2016-2025)	None	Partial	Partial	None
National Plan of Action 2024-2028: Management of Vector Borne Diseases in Pakistan	Partial	Comprehensive	Comprehensive	Partial
Pakistan's National CC Policy 2021	Partial	Comprehensive	Comprehensive	Comprehensive
Framework for Implementation of Climate Change Policy (2014 -2030)	Partial	Comprehensive	Comprehensive	Comprehensive

Health integrated into climate change policies better than the reverse

Indications from perceptions work sees strong consideration for integration into health governance, but actual avenues not so clear

ARIA Project: Toward Mapping Fractured South Asia

- Extend comparable perception & policy assessments across Bangladesh, India, Nepal, Bhutan, alongside assessments of RCP 4.5/8.5, SAI, MCB, and CDR
- Cross-country comparison to identify shared gaps and region-specific pathways
- Design justice-centered, health-informed regional governance entry points



Advanced
Research
+ Invention
Agency

ARIA



Evidence-based Assessments to Guide Perceptions, Governance, and Ethical Frameworks for South Asia: Comparing Marine Cloud Brightening Deployment Strategies vis-à-vis Carbon Dioxide Removal and Mitigation Efforts

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Evidence-based Assessments to Guide Perceptions, Governance, and Ethical Frameworks for South Asia: Comparing Marine Cloud Brightening Deployment Strategies vis-à-vis Carbon Dioxide Removal and Mitigation Efforts

Climate Impact Modelling
(Quantitative)

Mapping and Statistical Analysis
of MCB, CDR and SSP-2 4.5
Scenarios

Regional Weather Patterns
Differences Between Coastal and
Non-Coastal Areas
Peer-Reviewed Publications

Public Perceptions Surveys
(n= 2,500 across 5 countries)

National Level Policies Review and
Gaps Analysis

Expert Interviews (n=50) and
Stakeholder Group Discussion (n =
15 across 5 countries)

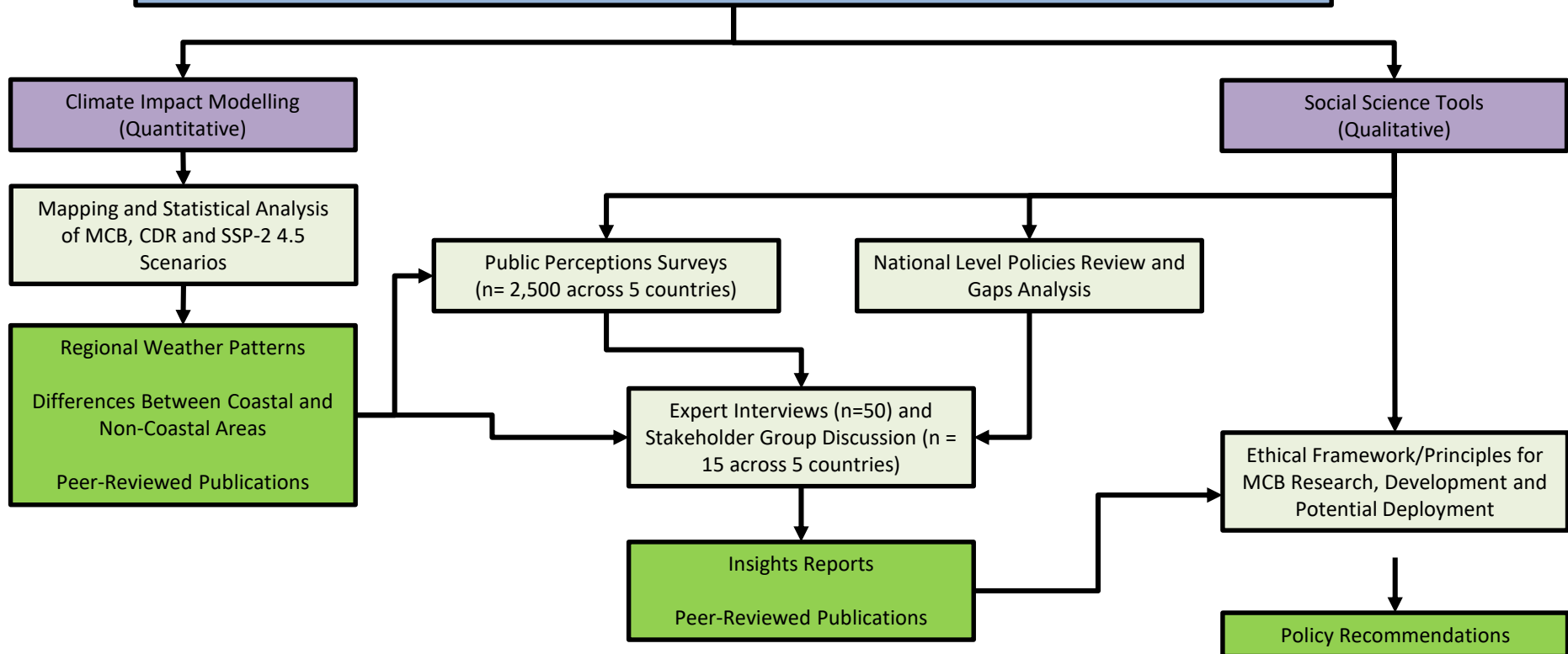
Insights Reports

Peer-Reviewed Publications

Social Science Tools
(Qualitative)

Ethical Framework/Principles for
MCB Research, Development and
Potential Deployment

Policy Recommendations



Limitations & Caveats

- Perception-based data; evolving awareness and political context
- Sampling and geographic representation constraints (e.g., underrepresentation in GB/Balochistan)
- Draft analysis (working paper) — subject to revision and external review

Discussion Prompts for RFF Workshop

- Where should health considerations concretely enter SRM governance (process, policy, practice)?
- What drives or erodes institutional trust, and how can we address it credibly?
- How do we tailor provincial engagement without deepening inequities?
- What communication norms help prevent hype, alarmism, or moral hazard framing errors?

Thank You

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- Comments welcome — especially on governance entry points and health integration pathways.