Connected Health

Supplementary Materials

A scoping review of digital health interventions for cardiovascular diseases in the WHO South-East Asia region

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Supplementary Table 1A: Details of the included studies

	Year of Publication	Title	First author's last name	Country of origin	Journal Title Name	Disease category
3	2021	Efficacy of IVRS-based mHealth intervention in	Sharma	India	*Diabetes & Metabolic Syndrome: Clinical*	Non-communicable diseases

		reducing cardiovascular risk in metabolic syndrome: A cluster randomized trial			*Research & Reviews*	
21	2014	Intelligent telemetry system for ECG monitoring	HariKumar	India	*Indian Heart Journal*	Non-communicable diseases
30	2020	Telemedicine in Camp Mode While Screening for Noncommunicable Diseases: A Preliminary Report from India	Ganapathy	India	*Telemedicine and e-Health*	Non-communicable diseases
32	2020	Effectiveness of an mHealth application to improve hypertension health literacy in India.	Garner	India	*International Nursing Review*	Non-communicable diseases
37	2015	Care for Stroke', a web-based,	Sureshkumar	India	*BMJ Innovations*	Non-communicable

		smartphone-enabled educational intervention for management of physical disabilities following stroke: Feasibility in the Indian context				diseases
38	2016	Mwellcare trial: A multi-center, cluster randomized, controlled clinical trial of mwellcare, an mhealth system for an integrated management of patients with hypertension and diabetes in India	Vamadeva n	India	G*lobal Hear*t	Non-communicable diseases
48	2016	The CPR outcomes of online medical	Yuksen C.	Thailand	*BMC Emergency Medicine*	Non-communicable

		video instruction versus on-scene medical instruction using simulated cardiac arrest stations				diseases
53	2017	Assessment of knowledge about healthy heart habits in urban and rural population of Punjab after SMS campaign—A cross-sectional study	Mohan	India	*Indian Heart Journal*	Non-communicable diseases
55	2015	A Cluster-Randomized, Controlled Trial of a Simplified Multifaceted Management Program for Individuals at High Cardiovascular Risk (SimCard	Tian	India	*Circulation*	Non-communicable diseases

		Trial) in Rural Tibet, China, and Haryana, India				
66	2020	Effect of Home-Based Cardiac Rehabilitation in a Lower-Middle Income Country: RESULTS from A CONTROLLED TRIAL	Uddin	Bangladesh	*Journal of Cardiopulmonary Rehabilitation and Prevention*	Non-communicable diseases
67	2018	A Randomized Trial of Pocket-Echocardiography Integrated Mobile Health Device Assessments in Modern Structural Heart Disease Clinics	Bhavnani	India	*Cardiovascular Imaging*	Non-communicable diseases
68	2021	The Impact of Nurse-Led Cardiac Rehabilitation	Arjunan	India	*The Journal of Nursing Research*	Non-communicable diseases

		on Quality of Life and Biophysiological Parameters in Patients With Heart Failure: A Randomized Clinical Trial				
78	2016	Telestroke in resource-poor developing country model	Sharma	India	*Neurology India*	Non-communicable diseases
79	2018	Effectiveness of an mHealth-Based Electronic Decision Support System for Integrated Management of Chronic Conditions in Primary Care: The mWellcare Cluster-Randomized Controlled Trial	Prabhakaran	India	*Circulation*	Non-communicable diseases
80	2019	SMARThealth	Peiris	India	*PLoS One*	Non-

		India: A stepped-wedge, cluster randomised controlled trial of a community health worker managed mobile health intervention for people assessed at high cardiovascular disease risk in rural India				communicable diseases
81	2019	Association of Multifaceted Mobile Technology-Enabled Primary Care Intervention with Cardiovascular Disease Risk Management in Rural Indonesia	Patel	Indonesia	*JAMA cardiology*	Non-communicable diseases
82	2014	Application of Handheld	Singh	India	*International Journal of*	Non-communica

		Tele-ECG for Health Care Delivery in Rural India			*Telemedicine and Applications*	ble diseases
85	2019	Technology enabled non-physician health workers extending telemedicine to rural homes to control hypertension and diabetes (TETRA): A pre-post demonstration project in Telangana, India	Dandge	India	*PloS one*	Non-communicable diseases
106	2015	Health checkup and telemedical intervention program for preventive medicine in developing countries: verification study	Nohara	Bangladesh	*Journal of medical Internet research*	Non-communicable diseases
111	2020	Awareness	Jahan	Banglad	*Journal of*	Non-

		Development and Usage of Mobile Health Technology Among Individuals With Hypertension in a Rural Community of Bangladesh: Randomized Controlled Trial		esh	*Medical Internet Research*	communicable diseases
116	2020	Tele-ECG consulting and outcomes on primary care patients in a low-to-middle income population: the first experience from Makassar telemedicine program, Indonesia	Mappangara	Indonesia	*BMC family practice*	Non-communicable diseases
117	2016	Development of a Smartphone-Enabled	Jindal	India	*Journal of the American Heart Association*	Non-communicable diseases

		Hypertension and Diabetes Mellitus Management Package to Facilitate Evidence-Based Care Delivery in Primary Healthcare Facilities in India: The mPower Heart Project.				
123	2012	Low-cost cloud-based remote auscultation	Sarma	India	*Journal of Investigative Medicine*	Non-communicable diseases
124	2017	Cost-effective, innovative, indigenous, population-based and telemedicine-guided, AMI strategy for India's most populous state	Mehta	India	*Journal of the American College of Cardiology*	Non-communicable diseases
133	2018	The effect of home-based cardiac	Jamal Uddin	India	*Journal of Cardiopulmonary*	Non-communicable

		rehabilitation following coronary artery bypass graft surgery in a low income country: A controlled trial			*Rehabilitation and Prevention*	diseases
135	2018	Blood Pressure Control and Drug Prescription Patterns Among Thai Hypertensive Patients: An Analysis of Telehealth Assisted Interventions In Home Blood Pressure Monitoring (Thai HBPM) Nationwide Project	Sakulsupsiri	Thailand	*Global Heart*	Non-communicable diseases
136	2018	Health Worker Led, m-health Enabled Screening, Follow-Up and	Jarhyan	India	*Global Heart*	Non-communicable diseases

		Linkage to the Health System of People With Hypertension In India				
124 B	2018	Telemedicine-guided STEMI networks-pragmatic and cost-effective strategies for population-based AMI care in developing countries	Mehta	India	*European Heart Journal*	Non-communicable diseases
148	2018	Smartphone monitoring for atrial fibrillation in real-time in india (smart-india): Age and sex-stratified prevalence of atrial fibrillation in rural western india	Sardana	India	*Int J Cardio*	Non-communicable diseases
150	2019	Tele-Emergency	Ganapathy	India	*Telemedicine and e-Health*	Non-communica

		Services in the Himalayas				ble diseases
155	2019	Reduced ischemic time of acute coronary syndrome patients with indonesia telecardiology network: Insights and challenges from a three year single center experience in West Jakarta	Sunjaya	Indonesia	*Materials Science and Engineering*	Non-communicable diseases
161	2019	Finding solutions: Whatsapp consult with neurologist can guide physicians to thrombolyse acute ischemic stroke patients	Jaiswal	India	*Journal of the Neurological Sciences*	Non-communicable diseases
176	2020	Can dietary instructions delivered through	Sivasamy	India	*Medico-legal Update*	Non-communicable diseases

		mobile application reduce sweet score among adolescents in chennai, india?-a randomized controlled preventive trial				
177	2020	PROVIDING OPTIMAL REGIONAL CARE FOR TIME SENSITIVE CARDIAC EMERGENCIES BY USING SMART PHONES - A STUDY UTILIZING WHATSAPP AS A TOOL TO INTEGRATE LOCAL HEALTH NETWORK IN REMOTE AREAS OF	Hafeez	India	*Journal of the American College of Cardiology*	Non-communicable diseases

		NORTH INDIA: SAVE HEART KASHMIR				
181	2020	PUK7 Budget Impact Of A New Mobile Application Reimbursement Strategy For Diabetic Patients In Andhra Pradesh (India)	Bhattacharyya	India	*Value in Health Regional Issues*	Non-communicable diseases
186	2020	PCV81 Virtual Anticoagulation Clinic Care a Telehealth MODEL to Deliver Continuity of Anticoagulation Care during the COVID 19 Pandemic: Insights from Southern India	Gona	India	*Value in Health*	Non-communicable diseases
188	2020	Effects of supervised exercise-based tele-	Patel	India	*International Journal of Telerehabilitation*	Non-communicable diseases

		rehabilitation group (settle) program on physical fitness and health related quality of life in patients with chronic disease in India in covid-19				
211	2021	Effects of a Transitional Telehealth Program on Functional Status, Rehospitalization, and Satisfaction With Care in Thai Patients with Heart Failure	Somsiri	Thailand	*Home Health Care Management & Practice*	Non-communicable diseases
213	2020	Mobile App Based Strategy Improves Door-to-Needle Time in the Treatment of	Noone	India	*Journal of Stroke and Cerebrovascular Diseases*	Non-communicable diseases

		Acute Ischemic Stroke				
219	2021	Phone calls for improving blood pressure control among hypertensive patients attending private medical practitioners in India: Findings from Mumbai hypertension project	Kannure	India	*The Journal of Clinical Hypertension*	Non-communicable diseases
224	2016	Randomized controlled trial of a self-efficacy enhancement program for the cardiac rehabilitation of Thai patients with myocardial infarction.	Vibulchai	Thailand	*Nursing & Health Sciences*	Non-communicable diseases
68B	2021	Efficacy of nurse-led cardiac	Arjunan	India	*Clinical Epidemiology and Global*	Non-communicable

		rehabilitation on health care behaviours in adults with chronic heart failure: An experimental design			*Health*	diseases
231	2020	Active surveillance with telemedicine in patients on anticoagulants during the national lockdown (COVID-19 phase) and comparison with pre-COVID-19 phase	Singh	India	*The Egyptian Heart Journal*	Non-communicable diseases
247	2020	A prospective study to assess the medication adherence pattern among hypertensives and to evaluate the use of cellular phone	Shukla	India	*Indian Journal of Pharmacology*	Non-communicable diseases

		text messaging as a tool to improve adherence to medications in a tertiary health-care center				
253	2021	Effect of mHealth on modifying behavioural risk-factors of non-communicable diseases in an adult, rural population in Delhi, India.	Sharma	India	*Mhealth*	Non-communicable diseases
265	2019	Smartphone application self checklist for detecting atrial fibrillation in general population	Fadlan	Indonesia	*European Heart Journal Supplements*	Non-communicable diseases
276	2021	Evaluating the Feasibility and Acceptability of a Mobile Health-Based	Ni	Nepal	*JMIR mHealth and uHealth*	Non-communicable diseases

		Female Community Health Volunteer Program for Hypertension Control in Rural Nepal: Cross-Sectional Study				
277	2021	Comparison of an app based low density lipoprotein cholesterol (Ldl-c) estimation with direct assay and friedewald formula in Indian population	Pallavi	India	*Indian Journal of Public Health Research & Development*	Non-communicable diseases
285	2020	Innovative tool for health promotion for at-risk Thai people with hypertension	Thatthong	Thailand	*Journal of Public Health*	Non-communicable diseases
286	2019	Impact of multimodal	Sheilini	India	*Patient preference*	Non-communica

		interventions on medication nonadherence among elderly hypertensives: A randomized controlled study			*and adherence*	ble diseases
296	2019	Is a smartphone application effective in improving physical activity among medical school students? Results from a quasi-experimental study.	Pentakota	India	*International Journal of Adolescent Medicine and Health*	Non-communicable diseases

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21 **B. Digital health intervention details based on WHO classification:**

Study ID	**DHI Classification 1**	**DHI Classification 2**	**DHI Classification 3**	**DHI Classification 4**	**DHI Classification 5**
3	1.1 Targeted Client information				
21	2.4 Telemedicine				

30	2.4 Telemedicine	4.1 Data collection, management and use	2.3 HCP decision support		
32	1.1 Targeted Client information				
37	1.1 Targeted Client information				
38	1.1 Targeted Client information				
48	2.4 Telemedicine				
53	1.2 Untargeted client information				
55	2.3 HCP decision support				
66	2.4 Telemedicine				
67	2.10 Lab and Diagnostic imaging management				
68	2.4 Telemedicine				
78	2.4 Telemedicine				
79	2.3 HCP decision support	1.1 Targeted Client information			
80	2.3 HCP decision support	2.7 Scheduling for HCP	1.1 Targeted Client information		
81	2.3 HCP decision support	1.1 Targeted Client information			
82	2.10 Lab and Diagnostic imaging management	2.4 Telemedicine			
85	2.4 Telemedicine	2.7 Scheduling for HCP	2.2 Client health records	3.1 Human resource management	

106	2.4 Telemedicine	4.1 Data collection, management, and use	2.9 Prescription/Med management		
111	1.1 Targeted Client information				
116	2.4 Telemedicine				
117	2.3 HCP decision support	2.2 Client health records			
123	2.10 Lab and Diagnostic imaging management				
124	2.4 Telemedicine				
133	2.4 Telemedicine				
135	2.4 Telemedicine				
136	2.3 HCP decision support				
124B	2.4 Telemedicine				
148	2.10 Lab and Diagnostic imaging management				
150	2.4 Telemedicine				
155	2.4 Telemedicine				
161	2.4 Telemedicine				
176	1.1 Targeted Client information				
177	2.4 Telemedicine	2.6 Referral coordination			
181	1.7 Client financial transactions				

186	2.4 Telemedicine				
188	1.1 Targeted Client information				
211	1.4 Personal Health tracking	2.4 Telemedicine	1.6 On demand information services to client		
213	2.5 HCP communication				
219	1.1 Targeted Client information				
224	2.4 Telemedicine				
68B	1.1 Targeted Client information				
231	2.4 Telemedicine				
247	1.1 Targeted Client information				
253	1.1 Targeted Client information				
265	2.2 Client health records				
276	1.1 Targeted Client information				
277	2.10 Lab and Diagnostic imaging management				
285	1.1 Targeted Client information				
286	1.1 Targeted Client information				
296	1.4 Personal Health tracking				

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24 **C. Details of Communication mediums:**

Study ID	**Title**	**Communication medium 1**	**Communication medium 2**	**Communication medium 3**
3	Efficacy of IVRS-based mHealth	Interactive voice response system		

	intervention in reducing cardiovascular risk in metabolic syndrome: A cluster randomized trial		
21	Intelligent telemetry system for ECG monitoring	Smart phone application	
30	Telemedicine in Camp Mode While Screening for Noncommunicable Diseases: A Preliminary Report from India	Server-based HMIS	
32	Effectiveness of an mHealth application to improve hypertension health literacy in India.	Video lessons	
37	Care for Stroke', a web-based, smartphone-enabled educational	Smart phone application	

	intervention for management of physical disabilities following stroke: Feasibility in the Indian context	
38	Mwellcare trial: A multi-center, cluster randomized, controlled clinical trial of mwellcare, an mhealth system for an integrated management of patients with hypertension and diabetes in India	Smart phone application
48	The CPR outcomes of online medical video instruction versus on-scene medical instruction using simulated	Smart phone application

	cardiac arrest stations		
53	Assessment of knowledge about healthy heart habits in urban and rural population of Punjab after SMS campaign—A cross-sectional study	SMS messaging	
55	A Cluster-Randomized, Controlled Trial of a Simplified Multifaceted Management Program for Individuals at High Cardiovascular Risk (SimCard Trial) in Rural Tibet, China, and Haryana, India	Smart phone application	
66	Effect of Home-Based Cardiac Rehabilitation in a Lower-Middle	Audio/ telephone call	

	Income Country: RESULTS from A CONTROLLED TRIAL	
67	A Randomized Trial of Pocket-Echocardiography Integrated Mobile Health Device Assessments in Modern Structural Heart Disease Clinics	Smart phone application
68	The Impact of Nurse-Led Cardiac Rehabilitation on Quality of Life and Biophysiological Parameters in Patients With Heart Failure: A Randomized Clinical Trial	Audio/ telephone call
78	Telestroke in resource-poor developing country model	Smart phone application messaging

79	Effectiveness of an mHealth-Based Electronic Decision Support System for Integrated Management of Chronic Conditions in Primary Care: The mWellcare Cluster-Randomized Controlled Trial	Smart phone application	
80	SMARThealth India: A stepped-wedge, cluster randomised controlled trial of a community health worker managed mobile health intervention for people assessed at high cardiovascular disease risk in rural India	Smart phone application	Interactive voice response system

81	Association of Multifaceted Mobile Technology-Enabled Primary Care Intervention with Cardiovascular Disease Risk Management in Rural Indonesia	Smart phone application
82	Application of Handheld Tele-ECG for Health Care Delivery in Rural India	Digital Diagnostic device
85	Technology enabled non-physician health workers extending telemedicine to rural homes to control hypertension and diabetes (TETRA): A pre-post demonstration project in Telangana, India	Smart phone application

106	Health checkup and telemedical intervention program for preventive medicine in developing countries: verification study	Server-based HMIS	Digital Diagnostic device	Video call
111	Awareness Development and Usage of Mobile Health Technology Among Individuals With Hypertension in a Rural Community of Bangladesh: Randomized Controlled Trial	SMS messaging		
116	Tele-ECG consulting and outcomes on primary care patients in a low-to-middle income population: the	Web application		

	first experience from Makassar telemedicine program, Indonesia		
117	Development of a Smartphone-Enabled Hypertension and Diabetes Mellitus Management Package to Facilitate Evidence-Based Care Delivery in Primary Healthcare Facilities in India: The mPower Heart Project.	Smart phone application	
123	Low-cost cloud-based remote auscultation	Digital Diagnostic device	
124	Cost-effective, innovative, indigenous, population-based and telemedicine-guided, AMI	Server based HMIS	

	strategy for India's most populous state	
133	The effect of home-based cardiac rehabilitation following coronary artery bypass graft surgery in a low income country: A controlled trial	Audio/ telephone call
135	Blood Pressure Control and Drug Prescription Patterns Among Thai Hypertensive Patients: An Analysis of Telehealth Assisted Interventions In Home Blood Pressure Monitoring (Thai HBPM) Nationwide Project	Server based HMIS

136	Health Worker Led, m-health Enabled Screening, Follow-Up and Linkage to the Health System of People With Hypertension In India	Smart phone application
124B	Telemedicine-guided STEMI networks-pragmatic and cost-effective strategies for population-based AMI care in developing countries	Server based HMIS
148	Smartphone monitoring for atrial fibrillation in real-time in india (smart-india): Age and sex-stratified prevalence of atrial fibrillation in rural western india	Smart phone application

150	Tele-Emergency Services in the Himalayas	Video call	
155	Reduced ischemic time of acute coronary syndrome patients with indonesia telecardiology network: Insights and challenges from a three year single center experience in West Jakarta	Video call	
161	Finding solutions: Whatsapp consult with neurologist can guide physicians to thrombolyse acute ischemic stroke patients	Smart phone application	
176	Can dietary instructions delivered through mobile application reduce sweet	Smart phone application	

	score among adolescents in chennai, india?- a randomized controlled preventive trial	
177	PROVIDING OPTIMAL REGIONAL CARE FOR TIME SENSITIVE CARDIAC EMERGENCIES BY USING SMART PHONES - A STUDY UTILIZING WHATSAPP AS A TOOL TO INTEGRATE LOCAL HEALTH NETWORK IN REMOTE AREAS OF NORTH INDIA: SAVE HEART KASHMIR	Smart phone application

181	PUK7 Budget Impact Of A New Mobile Application Reimbursement Strategy For Diabetic Patients In Andhra Pradesh (India)	Smart phone application	
186	PCV81 Virtual Anticoagulation Clinic Care a Telehealth MODEL to Deliver Continuity of Anticoagulation Care during the COVID 19 Pandemic: Insights from Southern India	Smart phone application	
188	Effects of supervised exercise-based tele-rehabilitation group (settle) program on physical fitness and health	Video call	

	related quality of life in patients with chronic disease in India in covid-19		
211	Effects of a Transitional Telehealth Program on Functional Status, Rehospitalization, and Satisfaction With Care in Thai Patients with Heart Failure	Smart phone application	Audio/ telephone call
213	Mobile App Based Strategy Improves Door-to-Needle Time in the Treatment of Acute Ischemic Stroke	Smart phone application	
219	Phone calls for improving blood pressure control among hypertensive patients	Audio/ telephone call	

	attending private medical practitioners in India: Findings from Mumbai hypertension project			
224	Randomized controlled trial of a self-efficacy enhancement program for the cardiac rehabilitation of Thai patients with myocardial infarction.	Audio/ telephone call		
68B	Efficacy of nurse-led cardiac rehabilitation on health care behaviours in adults with chronic heart failure: An experimental design	Audio/ telephone call	Video lessons	
231	Active surveillance with	Video call		

	telemedicine in patients on anticoagulants during the national lockdown (COVID-19 phase) and comparison with pre-COVID-19 phase		
247	A prospective study to assess the medication adherence pattern among hypertensives and to evaluate the use of cellular phone text messaging as a tool to improve adherence to medications in a tertiary health-care center	SMS messaging	
253	Effect of mHealth on modifying behavioural risk-factors of	SMS & Phone call	

	non-communicable diseases in an adult, rural population in Delhi, India.	
265	Smartphone application self checklist for detecting atrial fibrillation in general population	Smart phone application
276	Evaluating the Feasibility and Acceptability of a Mobile Health-Based Female Community Health Volunteer Program for Hypertension Control in Rural Nepal: Cross-Sectional Study	SMS & Phone call
277	Comparison of an app based low density lipoprotein cholesterol (Ldl-	Smart phone application

	c) estimation with direct assay and friedewald formula in Indian population		
285	Innovative tool for health promotion for at-risk Thai people with hypertension	SMS messaging	
286	Impact of multimodal interventions on medication nonadherence among elderly hypertensives: A randomized controlled study	SMS & Phone call	
296	Is a smartphone application effective in improving physical activity among medical school students? Results from a quasi-experimental study.	Smart phone application	

D- Search Strategy

Table 1: Concepts and Search terms

Concepts	Search terms
Telehealth	("Telemedicine"[Mesh] OR "Cell Phone"[Mesh] OR "Mobile Applications"[Mesh] OR "Telemetry"[Mesh] OR telehealth OR mhealth OR m-health OR “mobile health” OR smartphon* OR “text message*” OR videoconference* OR “information and communication technolog*” OR ehealth OR e-health OR telemedicine OR teleconsultation OR telemonitoring OR telerehabilitation OR “remote patient management” OR “home-based monitoring” OR telediagnostics OR telemicrobiology OR telenursing OR “digital health technolog*” OR “clinical decision support”)
SEA	("Asia, Southeastern"[Mesh] OR "South-East Asia” OR “South east asia” OR "Bangladesh" OR "Bhutan" OR "Korea" OR "India" OR "Indonesia" OR "Maldives" OR "Myanmar" OR "Nepal" OR "Sri Lanka" OR "Thailand" OR "Timor-Leste"**)**
NCD	**("Noncommunicable Diseases"[Mesh] OR "Chronic Disease"[Mesh] OR "Cardiovascular Diseases"[Mesh] OR "Hypertension”)**

References of 51 Included articles:

1. Sharma AK, Baig VN, Ahuja J, et al. Efficacy of IVRS-based mHealth intervention in reducing cardiovascular risk in metabolic syndrome: a cluster

randomized trial. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews* 2021; 15: 102182. https://doi.org/10.1016/j.dsx.2021.06.019

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