

mHealth and the performance of maternal healthcare workers in low and middle-income countries: a realist review

Review Terms, Search Strategy and Exclusion Criteria

1. Review Terms

Terms	Definitions
mHealth	The use mobile devices (such as mobile phones, tablets, laptops, and devices capable of remote connectivity) to help deliver health services (1). This includes but is not limited to its use for data entry, information processing, patient reminders and scheduling, as well as for clinical decision-support.
Health care workers	In line with the health workforce classification (2), these were defined under two broad groups: “Health professionals” such as physicians, nurses and midwives, with extensive knowledge in the diagnosis and treatment of health problems who have at least three years of higher education and a first degree or higher; and “Health associate professionals” such as community health workers and other associate professionals who mainly support health professionals through technical and practical tasks. These workers might have formal training, relevant work experience or prolonged on-the-job training.
Performance	Was broadly operationalized as the ability of health care workers to provide quality care, defined by their availability, productivity, competence and responsiveness (3). We recognise that these four elements are interrelated and are also influenced by other factors such as staff turnover, absenteeism, motivation and job satisfaction, knowledge, skills and attitudes, and working conditions. In the context of this review our main outcome of interest was in productivity and efficiency as constructs of performance, which are expected to lead to improved service delivery and quality of care.
Low and Middle Income Countries (LMIC)	The 2016 World Bank classification of countries by gross national income (GNI) (4) was used to identify LMIC of interest.
Maternal Health service delivery	We narrowed the extensive range of services provided during maternal care under three groups: antenatal care (ANC), delivery (i.e. labour/childbirth) and postnatal care (PNC) up to 24 hours after delivery.

1. Hagan D, Uggowitz S. Information and Communication Technologies for Women’s and Children’s Health- A Planning Workbook. Geneva; 2014. Available from:

http://www.who.int/pmnch/knowledge/publications/ict_mhealth.pdf

2. World Health Organization. Classification of health workforce statistics. Geneva; 2010. Available from: http://www.who.int/hrh/statistics/Health_workers_classification.pdf

3. Dieleman M, Harnmeijer JW. Improving health worker performance : in search of promising practices. Geneva; 2006. Available from:

http://scholar.google.com/scholar?hl=en&q=Improving+health+worker+performance:+in+search+of+promising+practices&btnG=Search&as_sdt=2000&as_ylo=&as_vis=0#0

4. World Bank. World Bank List of Economies. 2015. Available from:

data.worldbank.org/about/country-and-lending-groups

2. Search Strategy

Concept	Syntax
mHealth	User-Computer Interface[Mesh] OR Multimedia[Mesh] OR Cell phones[Mesh] OR Public health informatics[Mesh] OR Medical informatics[Mesh] OR Nursing informatics[Mesh] OR Computers, handheld[Mesh] OR Mobile Applications[Mesh] OR telemedicine[Mesh] OR mobile health[tiab] OR mhealth[tiab] OR m-health[tiab] OR ehealth[tiab] OR e-health[tiab] OR digital health[tiab] OR smartphone[tiab] OR smartphones[tiab] OR phone[tiab] OR phones[tiab] OR cellphone[tiab] OR cellphones[tiab] OR telephone[tiab] OR telephones[tiab] OR mobile application[tiab] OR mobile applications[tiab] OR mobile technolog*[tiab] OR health technolog*[tiab] OR health application[tiab] OR health applications[tiab] OR iPad[tiab] OR sms[tiab] OR mms[tiab] OR text messag*[tiab] OR USSD[tiab] OR pda[tiab] OR laptop*[tiab] OR palmtop*[tiab] OR palm-top*[tiab] OR Personal Digital Assistant*[tiab] OR tablet[tiab] OR computer[tiab] OR computers[tiab] OR computerised[tiab] OR computerized[tiab] OR interactive voice response[tiab] OR multimedia[tiab] OR telehealth[tiab] OR telemedicine[tiab] OR technology[tiab] OR electronic[tiab]
Maternal Health	maternal health[Mesh] OR pregnancy[Mesh] OR pregnant[tiab] OR pregnancy[tiab] OR maternal[tiab] OR antenatal[tiab] OR postnatal[tiab] OR motherhood[tiab] OR perinatal[tiab] OR obstetric[tiab] OR postpartum[tiab] OR antepartum[tiab] OR peripartum[tiab]
Health Care Workers	Health Personnel[Mesh] OR nurse[tiab] OR nurses[tiab] OR physician[tiab] OR physicians[tiab] OR health provider[tiab] OR health providers[tiab] OR health care provider[tiab] OR health care providers[tiab] OR healthcare provider[tiab] OR healthcare providers[tiab] OR health worker[tiab] OR health workers[tiab] OR midwife[tiab] OR midwives[tiab] OR health care worker[tiab] OR health care workers[tiab] OR healthcare worker[tiab] OR healthcare workers[tiab] OR community health worker[tiab] OR community health workers[tiab] OR community health volunteer[tiab] OR community health volunteers[tiab] OR practitioner[tiab] OR practitioners[tiab] OR clinician[tiab] OR clinicians[tiab] OR doctor[tiab] OR doctors[tiab] OR clinical officer[tiab] OR clinical officers[tiab] OR medical personnel[tiab] OR health professional[tiab] OR health professionals[tiab] OR frontline provider[tiab] OR frontline providers[tiab] OR frontline worker[tiab] OR frontline workers[tiab] OR traditional birth attendant[tiab] OR traditional birth attendants[tiab] OR Accredited Social Health Activist*[tiab] OR ASHA[tiab]
Low and Middle Income Countries	“Developing countries”[Mesh] OR low income[tiab] OR middle income[tiab] OR developing countr*[tiab] OR resource poor[tiab] OR resource limited[tiab] OR rural[tiab] OR Armenia[tw] OR Bangladesh[tw] OR Bhutan[tw] OR Bolivia[tw] OR Cabo Verde[tw] OR Cape Verde[tw] OR Cameroon[tw] OR Republic of Congo[tw] OR Cote d'Ivoire[tw] OR Djibouti[tw] OR Egypt[tw] OR El Salvador[tw] OR Georgia[tw] OR Ghana[tw] OR Guatemala[tw] OR Guyana[tw] OR Honduras[tw] OR India[tw] OR Indonesia[tw] OR Ivory Coast[tw] OR Kenya[tw] OR Kiribati[tw] OR Kosovo[tw] OR Kyrgyz Republic[tw] OR Kyrgyzstan[tw] OR Lao[tw] OR Lesotho[tw] OR Mauritania[tw] OR Micronesia[tw] OR Moldova[tw] OR Morocco[tw] OR Myanmar[tw] OR Nicaragua[tw] OR Nigeria[tw] OR Pakistan[tw] OR Papua New Guinea[tw] OR Philippines[tw] OR Samoa[tw] OR Sao Tome and Principe[tw] OR Senegal[tw] OR Solomon Islands[tw] OR Sri Lanka[tw] OR Sudan[tw] OR Swaziland[tw] OR Syria[tw] OR Tajikistan[tw] OR Timor-Leste[tw] OR Ukraine[tw] OR Uzbekistan[tw] OR Vanuatu[tw] OR Vietnam[tw] OR West Bank and Gaza[tw] OR Yemen[tw] OR Zambia[tw] OR Albania[tw] OR Algeria[tw] OR American Samoa[tw] OR Angola[tw] OR

	Azerbaijan[tw] OR Belarus[tw] OR Belize[tw] OR Bosnia and Herzegovina[tw] OR Botswana[tw] OR Brazil[tw] OR Bulgaria[tw] OR China[tw] OR Colombia[tw] OR Costa Rica[tw] OR Cuba[tw] OR Dominica[tw] OR Dominican Republic[tw] OR Ecuador[tw] OR Fiji[tw] OR Gabon[tw] OR Grenada[tw] OR Iran[tw] OR Iraq[tw] OR Jamaica[tw] OR Jordan[tw] OR Kazakhstan[tw] OR Lebanon[tw] OR Libya[tw] OR Macedonia[tw] OR Malaysia[tw] OR Maldives[tw] OR Marshall Islands[tw] OR Mauritius[tw] OR Mexico[tw] OR Mongolia[tw] OR Montenegro[tw] OR Namibia[tw] OR Palau[tw] OR Panama[tw] OR Paraguay[tw] OR Peru[tw] OR Romania[tw] OR Serbia[tw] OR South Africa[tw] OR Saint Lucia[tw] OR Saint Vincent and the Grenadines[tw] OR Suriname[tw] OR Thailand[tw] OR Tonga[tw] OR Tunisia[tw] OR Turkey[tw] OR Turkmenistan[tw] OR Tuvalu[tw]
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3. Exclusion Criteria

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| <ul style="list-style-type: none"> • Use of technology for medical diagnosis such as in ultrasound imaging and cardiotocography. • Mobile health interventions for patient decision-making or behavior change. • mHealth for patient use (e.g. for shared decision-making, medication adherence and education). • mHealth interventions in high-income countries. • mHealth interventions outside the domain of maternal health (such as HIV/AIDS, PMTCT, non-communicable diseases and tuberculosis). • Telemedicine and remote monitoring strategies. • Articles related to contraceptives, sexually transmitted infections and family planning were excluded because the review was focused on antenatal care (ANC), delivery or postnatal care (PNC). |
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