

# How is Implementation Research and Delivery Science (IRDS) applied in health in low and middle-income countries: A review of the literature

## Supplementary File 1: Search String, flow diagram and review methodology

### **Concept 1 (Terminology)**

TITLE-ABS({implementation} OR {implementing} OR {implemented} OR {operations} OR {delivery} OR {deliver} OR {implementation science} OR {translational science} OR {translational research} OR {Translational Medical Research} OR {quality improvement} OR {task shifting} OR {policy})

### **Concept 2 (Methods)**

TITLE-ABS({research} OR {case study} OR {case studies} OR {focus group} OR {focus groups} OR {group interview} OR {group interviews} OR {grounded theory} OR {ethnography} OR {ethnographies} OR {narrative approaches} OR {key informant interview} OR {survey} OR {surveys} OR {participatory action research} OR {participatory learning} OR {cross-sectional studies} OR {cross-sectional study} OR {monitoring and evaluation} OR {mixed methods} OR {pragmatic trial} OR {process evaluation} OR {randomized trial} OR {randomized trials} OR {randomised trial} OR {randomised trials} OR {Randomized Controlled Trial} OR {Randomised Controlled Trial} OR {community trial} OR {impact evaluation} OR {phenomenology} OR {effectiveness-implementation} OR {hybrid research} OR {agent based modeling} OR {trend analysis} OR {time series} OR {realist review} OR {systematic review} OR {clinical studies})

### **Concept 3 (Health)**

TITLE-ABS({health} OR {Medicine})

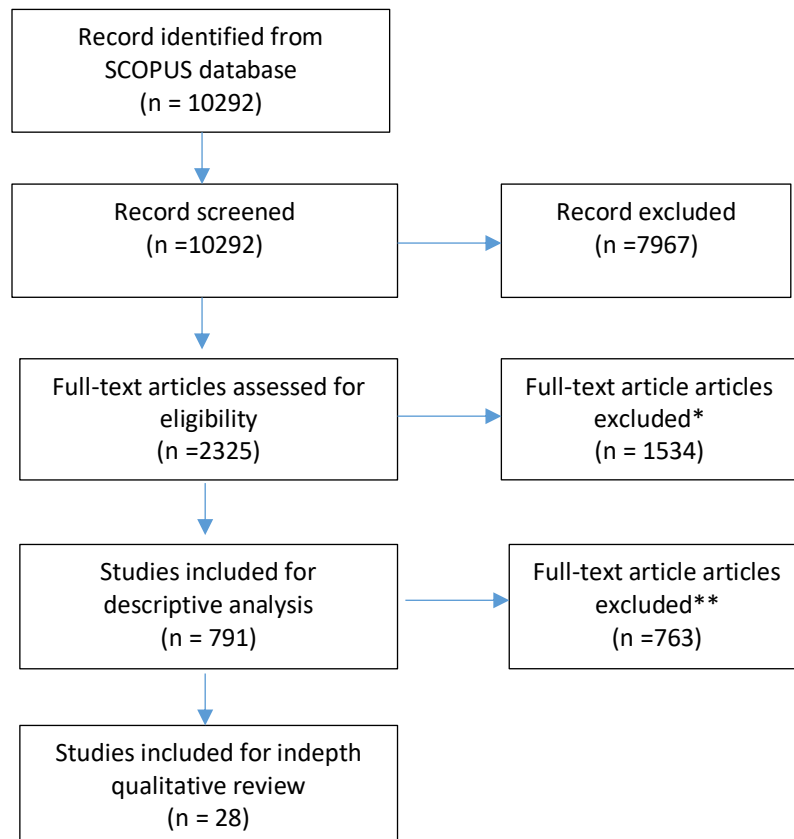
### **Concept 4 (LMICs)**

TITLE({developing country} OR {developing countries} OR {developing nation} OR {developing nations} OR {developing population} OR {developing populations} OR {developing world} OR {less developed country} OR {less developed countries} OR {less developed nation} OR {less developed nations} OR {less developed population} OR {less developed populations} OR {less developed world} OR {lesser developed country} OR {lesser developed countries} OR {lesser developed nation} OR {lesser developed nations} OR {lesser developed population} OR {lesser developed populations} OR {lesser developed world} OR {under developed country} OR {under developed countries} OR {under developed nation} OR {under developed nations} OR {under developed population} OR {under developed populations} OR {under developed world} OR {underdeveloped country} OR {underdeveloped countries} OR {underdeveloped nation} OR {underdeveloped nations} OR {underdeveloped population} OR {underdeveloped populations} OR {underdeveloped world} OR {middle income country} OR {middle income countries} OR {middle income nation} OR {middle income nations} OR {middle income population} OR {middle income populations} OR {low income country} OR {low income countries} OR {low income nation} OR {low income nations} OR {low income population} OR {low income populations} OR {lower income country} OR {lower income countries} OR {lower income nation} OR {lower income nations} OR {lower income population} OR {lower income populations} OR {underserved country} OR {underserved countries} OR {underserved nation} OR {underserved nations} OR {underserved population} OR {underserved populations} OR {underserved world} OR {under served country} OR {under served countries} OR {under served nation} OR {under served nations} OR {under served population} OR {under served populations} OR {under served world} OR {deprived country} OR {deprived countries} OR

{deprived nation} OR {deprived nations} OR {deprived population} OR {deprived populations} OR {deprived world} OR {poor country} OR {poor countries} OR {poor nation} OR {poor nations} OR {poor population} OR {poor populations} OR {poor world} OR {poorer country} OR {poorer countries} OR {poorer nation} OR {poorer nations} OR {poorer population} OR {poorer populations} OR {poorer world} OR {developing economy} OR {developing economies} OR {less developed economy} OR {less developed economies} OR {lesser developed economy} OR {lesser developed economies} OR {under developed economy} OR {under developed economies} OR {underdeveloped economy} OR {underdeveloped economies} OR {middle income economy} OR {middle income economies} OR {low income economy} OR {low income economies} OR {lower income economy} OR {lower income economies} OR {low gdp} OR {low gnp} OR {low gross domestic} OR {low gross national} OR {lower gdp} OR {lower gnp} OR {lower gross domestic} OR {lower gross national} OR {Imic} OR {Imics} OR {third world} OR {lami country} OR {lami countries} OR {transitional country} OR {transitional countries} OR {Africa} OR {Asia} OR {Caribbean} OR {West Indies} OR {South America} OR {Latin America} OR {Central America} OR {Atlantic Islands} OR {Commonwealth of Independent States} OR {Pacific Islands} OR {Indian Ocean Islands} OR {Eastern Europe} OR {Afghanistan} OR {Albania} OR {Algeria} OR {Angola} OR {Antigua} OR {Barbuda} OR {Argentina} OR {Armenia} OR {Armenian} OR {Aruba} OR {Azerbaijan} OR {Bahrain} OR {Bangladesh} OR {Barbados} OR {Benin} OR {Byelarus} OR {Byelorussian} OR {Belarus} OR {Belorussian} OR {Belorussia} OR {Belize} OR {Bhutan} OR {Bolivia} OR {Bosnia} OR {Herzegovina} OR {Hercegovina} OR {Botswana} OR {Brasil} OR {Brazil} OR {Bulgaria} OR {Burkina Faso} OR {Burkina Fasso} OR {Upper Volta} OR {Burundi} OR {Urundi} OR {Cambodia} OR {Khmer Republic} OR {Kampuchea} OR {Cameroon} OR {Cameroons} OR {Cameron} OR {Camerons} OR {Cape Verde} OR {Central African Republic} OR {Chad} OR {Chile} OR {China} OR {Colombia} OR {Comoros} OR {Comoro Islands} OR {Comores} OR {Mayotte} OR {Congo} OR {Zaire} OR {Costa Rica} OR {Cote d'Ivoire} OR {Ivory Coast} OR {Croatia} OR {Cuba} OR {Cyprus} OR {Czechoslovakia} OR {Czech Republic} OR {Slovakia} OR {Slovak Republic} OR {Djibouti} OR {French Somaliland} OR {Dominica} OR {Dominican Republic} OR {East Timor} OR {East Timur} OR {Timor Leste} OR {Ecuador} OR {Egypt} OR {United Arab Republic} OR {El Salvador} OR {Eritrea} OR {Estonia} OR {Ethiopia} OR {Fiji} OR {Gabon} OR {Gabonese Republic} OR {Gambia} OR {Gaza} OR {Georgia Republic} OR {Georgian Republic} OR {Ghana} OR {Gold Coast} OR {Greece} OR {Grenada} OR {Guatemala} OR {Guinea} OR {Guam} OR {Guiana} OR {Guyana} OR {Haiti} OR {Honduras} OR {Hungary} OR {India} OR {Maldives} OR {Indonesia} OR {Iran} OR {Iraq} OR {Isle of Man} OR {Jamaica} OR {Jordan} OR {Kazakhstan} OR {Kazakh} OR {Kenya} OR {Kiribati} OR {Korea} OR {Kosovo} OR {Kyrgyzstan} OR {Kirghizia} OR {Kyrgyz Republic} OR {Kirghiz} OR {Kirgizstan} OR {Lao PDR} OR {Laos} OR {Latvia} OR {Lebanon} OR {Lesotho} OR {Basutoland} OR {Liberia} OR {Libya} OR {Lithuania} OR {Macedonia} OR {Madagascar} OR {Malagasy Republic} OR {Malaysia} OR {Malaya} OR {Malay} OR {Sabah} OR {Sarawak} OR {Malawi} OR {Nyasaland} OR {Mali} OR {Malta} OR {Marshall Islands} OR {Mauritania} OR {Mauritius} OR {Agalega Islands} OR {Melanesia} OR {Mexico} OR {Micronesia} OR {Middle East} OR {Moldova} OR {Moldovia} OR {Moldovian} OR {Mongolia} OR {Montenegro} OR {Morocco} OR {Ifni} OR {Mozambique} OR {Myanmar} OR {Myanma} OR {Burma} OR {Namibia} OR {Nepal} OR {Netherlands Antilles} OR {New Caledonia} OR {Nicaragua} OR {Niger} OR {Nigeria} OR {Northern Mariana Islands} OR {Oman} OR {Muscat} OR {Pakistan} OR {Palau} OR {Palestine} OR {Panama} OR {Paraguay} OR {Peru} OR {Philippines} OR {Philipines} OR {Phillipines} OR {Phillippines} OR {Poland} OR {Portugal} OR {Puerto Rico} OR {Romania} OR {Rumania} OR {Roumania} OR {Russia} OR {Russian} OR {Rwanda} OR {Ruanda} OR {Saint Kitts} OR {St Kitts} OR {Nevis} OR {Saint Lucia} OR {St Lucia} OR {Saint Vincent} OR {St Vincent} OR {Grenadines} OR {Samoa} OR {Samoan Islands} OR {Navigator Island} OR {Navigator Islands} OR {Sao Tome} OR {Saudi Arabia} OR {Senegal} OR {Serbia} OR {Montenegro} OR {Seychelles} OR {Sierra Leone} OR {Slovenia} OR {Sri Lanka} OR {Ceylon} OR {Solomon Islands} OR {Somalia} OR {Sudan} OR {Suriname} OR {Surinam} OR {Swaziland} OR {Syria} OR {Syrian} OR {Tajikistan} OR {Tadzhikistan} OR {Tadjikistan} OR {Tadzhik} OR {Tanzania} OR {Thailand} OR {Togo} OR {Togolese Republic} OR {Tonga} OR {Trinidad} OR {Tobago} OR {Tunisia} OR {Turkey} OR {Turkmenistan} OR {Turkmen} OR {Tuvalu} OR {Uganda} OR {Ukraine} OR {Uruguay} OR {USSR} OR {Soviet Union} OR {Union of Soviet Socialist Republics} OR {Uzbekistan} OR {Uzbek} OR {Vanuatu} OR

{New Hebrides} OR {Venezuela} OR {Vietnam} OR {Viet Nam} OR {West Bank} OR {Yemen} OR {Yugoslavia} OR {Zambia} OR {Zimbabwe} OR {Rhodesia} OR {Caribbean Region} OR {Central America} OR {Baltic States} OR {Republic of Belarus} OR {French Guiana} OR {Independent State of Samoa})

### **Review flow diagram**



\*Articles excluded for the following reasons: study does not describe an evidence-informed intervention and/or implementation strategies that accompanied the intervention (n = 1,283), duplicates (n = 149), only abstract (n = 94), non-English article (n = 8).

\*\*Articles excluded for the following reasons: study does not describe implementation descriptors, including contextual factors that affect implementation, any deviations from planned intervention design and activities, measurement of implementation outcome variables, discussion of the policy and practice implication of study findings (n = 763).

### **Article review process and quality assurance steps**

We conducted a literature search guided by four critical concepts that informed the search string (see above). Concept 1, which was IRDS-related words (e.g. implement, deliver, translation, operations). Concept 2 related to research methods, including quantitative, qualitative and mixed methods (e.g. household survey, ethnography, etc.) Concept 3 focused the search to publications in health or medicine, and Concept 4 listed all LMICs. Lastly, the search was restricted to research in humans. The literature search was conducted for articles published between 1998 and 2016 in the SCOPUS database because it captures more social science literature than other databases, like PubMed.

Five articles had been identified at the outset as representative publications of IRDS to ensure that the search string was identifying appropriate articles. Once the initial search results were generated, we confirmed that all five articles were found using the search string.

The literature search identified 10,292 records, which were screened further. The title and abstract for each record was screened for the following criteria:

- a. Article must address research or evaluation
- b. Article must be about health or public health
- c. Research described must be set in a LMIC
- d. Article must address an implementation issue around delivery of an intervention or strategy

Based on the 4 criteria, articles were classified as “Yes, No and Maybe” for inclusion in the full-text review.

The initial screening yielded 2,325 records classified as “Yes” and 7,967 as “No” or “Maybe”. Of the 2,325 “Yes” records, 1,283 articles did not describe an evidence-informed intervention or strategy, 149 were duplicates, 94 only had abstracts (full article not found), and eight were not in English. 791 articles were identified for abstraction.

Twenty nine abstraction fields were defined and tested by three co-investigators to ensure consistency in abstraction (see Box 1). Once tested, 7 research assistants were trained in conducting the abstraction. Pairs of research assistants abstracted the same articles for selected records, and where discrepancies arose in the data entries by a pair of research assistants, one of the co-investigators resolved the discrepancies. The fields were uploaded to Qualtrics, a web-based survey program, for simultaneous, remote abstraction. A descriptive analysis of the 29 abstraction fields was conducted on the 791 articles that were identified for abstraction, and 763 of those articles were excluded from the qualitative review and synthesis because they did not describe key implementation descriptors defined for this study.

The quality of the 28 articles that were included in the qualitative review and synthesis were assessed using the Effective Public Health Practice project tool<sup>1</sup> (for quantitative studies) and the Critical Appraisal Skills Program (CASP) checklist<sup>2</sup> (for qualitative studies). All of the quantitative studies (n = 17) were rated as high to moderate quality based on the assessment of selection bias, appropriateness of the study design, handling of confounders, the data collection method, and analyses, except for 2 studies (Hopkins 1998 and Miri 1998)<sup>35,40</sup> which were ranked as weak quality. Both of these studies did not describe an explicit study design. All of the qualitative studies (n = 9) and mixed method studies (n = 4) were ranked as high to moderate quality. The qualitative studies were assessed based on the appropriateness of the qualitative methodology, recruitment strategy, consideration for relationship between researcher and participants, rigor of data collection and analyses approach. The mixed method

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<sup>1</sup> Effective Public Health Practice Project. Quality assessment tool for quantitative studies available

<sup>2</sup> Critical Appraisal Skills Programme (2018). CASP Qualitative Checklist. Available <https://casp-uk.net/wp-content/uploads/2018/01/CASP-Qualitative-Checklist-2018.pdf>

studies were assessed based on the combination of criteria for both the quantitative and qualitative studies.

Box 1: Abstraction fields

- Article identifier
- Implementation is described
- Main implementation problem or question
- Who is doing implementation
- Any deviations from the initial planned intervention
- Length of implementation period
- Country(ies) where research was conducted
- Health topic addressed
- Type of researchers involved
- Setting for IRDS activity
- Implementation led by usual implementing agency(ies)
- Additional funding available for implementation
- Additional management support available for implementation
- Type of IRDS issue addressed
- Research methods used
- Contextual factors affecting implementation, internal and external
- Implementation variables used
- Measure changes in implementation variables over time
- Effectiveness variables included
- Main results
- Target audience for research
- Dissemination of results