



## Early View

Review

### **Implementing lung health interventions in low- and middle-income countries – a FRESH AIR systematic review and meta-synthesis**

Evelyn A. Brakema, Debbie Vermond, Hilary Pinnock, Christos Lionis, Bruce Kirenga, An Pham Le, Talant Sooronbaev, Niels H. Chavannes, Rianne M. J. J. van der Kleij

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## **Implementing lung health interventions in low- and middle-income countries – a FRESH AIR systematic review and meta-synthesis**

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Take home message: This systematic review and meta-synthesis shows why implementation of lung health interventions often fails in low-and middle income countries, and it provides critical factors to prevent failure with their level of evidence.

## Abstract

The vast majority of patients with chronic respiratory disease live in low- and middle-income countries (LMICs). Paradoxically, relevant interventions often fail to be effective particularly in these settings, as LMICs lack solid evidence on how to implement interventions successfully. Therefore, we aimed to identify factors critical to the implementation of lung health interventions in LMICs, and weight their level of evidence.

This systematic review followed Cochrane methodology and PRISMA reporting standards. We searched eight databases without date- or language restrictions in July 2019, and included all relevant original, peer-reviewed articles. Two researchers independently selected articles, critically appraised them (using CASP/MetaQAT), extracted data, coded factors (following CFIR), and assigned levels of confidence in the factors (via GRADE-CERQual). We meta-synthesized levels of evidence of the factors based on their frequency and the assigned level of confidence. (PROSPERO:CRD42018088687)

We included 37 articles out of 9111 screened. Studies were performed across the globe in a broad range of settings. Factors identified with a high level of evidence were 1) *Understanding needs of local users*, 2) ensuring *Compatibility* of interventions with local contexts (cultures, infrastructures), 3) identifying influential stakeholders and applying *Engagement* strategies, 4) ensuring adequate *Access to knowledge and information*, and 5) addressing *Resource Availability*. All implementation factors and their level of evidence were synthesized in an implementation tool.

To conclude, this study identified implementation factors for lung health interventions in LMICs, weighted their level of evidence, and integrated the results into an implementation tool for practice. Policymakers, non-governmental organizations, practitioners, and researchers may use this FRESH AIR Implementation tool to develop evidence-based implementation strategies for related interventions. This could increase interventions' implementation success, thereby optimising the use of already-scarce resources and improving health outcomes.

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Author's contributions: EB was lead researcher; EB & DV designed the study and developed the protocol, including the search (helped by those acknowledged). They performed the screening process, data extraction and analysis under supervision of RvdK and NC. EB wrote the manuscript, RvdK reviewed it at each stage. HP & DV provided input throughout the process. All others reviewed the manuscript and helped translating the findings to meaningful practical recommendations. All authors approved the final version.

Data sharing: All data and meta-data can be shared upon reasonable request. This includes the study protocol, meeting minutes describing considerations for data analysis. Within reasonable time after email request data will be shared via a secure webbased system.

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## Introduction

Chronic respiratory diseases (CRDs) are a silent and growing epidemic in low- and middle-income countries (LMICs). COPD is now the third leading cause of death worldwide; over 90% of these deaths and 80% of asthma-related deaths occur in LMICs.[1-5] LMICs are disproportionately burdened by CRDs because of the early and high exposure to risk factors for lung impairment.[6-13] Suboptimal access to diagnostic- and treatment options in LMICs additionally exacerbates disease severity.[6, 11] Although promising interventions targeting CRD have existed for decades, many fail to translate into meaningful health outcomes. The disappointing intervention effects are often attributed to implementation failure.[14-18] In some estimates, over 60% of organizations' implementation efforts are unsuccessful.[19] Implementation success of clean cookstove programmes is often reported as strikingly low, with stove adoption rates of 4-10%.[20-25]

However, implementation – the act of carrying an intervention into effect[26] – is complex. Throughout the entire implementation process, from the dissemination of an intervention to its sustained use,[27] numerous factors determine success or failure. These implementation factors are often interacting and influential at multiple levels. To better understand the factors so that they can be adequately addressed in implementation strategies, factors can be pragmatically structured. The Consolidated Framework for Implementation Research (CFIR) integrated 42 implementation factors from existing implementation theories,[18] and categorised them in five domains: 1) innovation characteristics (e.g. the adaptability of an intervention); 2) outer setting (e.g. understanding the needs of local users); 3) inner setting (e.g. resource availability); 4) characteristics of individuals (e.g. self-efficacy); and 5) process (e.g. engagement of stakeholder). The importance of each factor depends on the context.[28, 29] Hence, implementation strategies are more successful when context-specific factors are known and addressed.

Therefore, it is essential to understand which specific factors play a role in the context of CRDs in LMICs. Paradoxically, despite the highest burden of CRD in LMICs, precisely in these countries evidence on what factors determine implementation success is limited, fragmented and of varying methodological quality.[30-33] Extrapolating the evidence from high-income countries to LMICs is inappropriate because of differences in health, economic, and cultural contexts. Several calls already highlighted the need for high-quality implementation research in LMICs.[25, 34-37] Therefore, in this study, we aimed to identify factors critical to the successful implementation of interventions targeting CRDs in LMICs, and to weight their level of evidence.

## Methods

This systematic review and meta-synthesis is part of the Horizon2020 FRESH AIR project (Free Respiratory Evaluation and Smoke-exposure reduction by primary Health cAre Integrated gRoups), addressing the implementation of prevention, diagnosis, and treatment of CRD in low-resource settings (trial registration number: NTR5759).[38] This review is registered at PROSPERO (CRD42018088687) and follows Cochrane methodology[39, 40] and the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) reporting standards.[41]

All steps of the review process were performed by two researchers (EB & DV) independently. Results were compared, and discrepancies solved through discussion. A third researcher (RvdK) was consulted when consensus could not be reached. We systematically applied validated tools throughout the entire process, to enhance the reproducibility and transparency of our outcomes (Figure 1).

### *Search strategy and selection criteria*

We developed the search strategy together with a certified medical librarian; it contained (synonyms of) implementation, LMICs, and CRD or specific relevant interventions such as 'smoking cessation' (Appendix 1). We focused on asthma and COPD as the most prevalent chronic lung diseases. In PubMed, Embase, Global Health Database, Cochrane, PsycINFO, Emcare, Web of Science, and CINAHL we searched without language restriction for articles published by Oct 23, 2017, and updated our search on July 10, 2019. We included all relevant, original, peer-reviewed articles focusing on the implementation of interventions targeting CRD in LMICs (as classified by the World Bank[42]). As recommended for studying implementation, quantitative, qualitative, and mixed-method articles were considered relevant.[26] Articles were excluded if they focused on legislation at a national

governmental level (e.g. implementation of tobacco taxes) or on hypothetical interventions (e.g. theoretical willingness to adopt an intervention), if no factors were reported, or if no full text was available after contacting the authors. Our orienting search resulted in a disproportionate number of articles on the implementation of clean cooking interventions targeting household air pollution. To avoid this specific intervention dominating all review findings, we decided to split our review into two parts. This first review regards the implementation of all but clean cooking interventions, while the second (to be published later) will be exclusively dedicated to those.

Full operationalisation of the search criteria is presented in Appendix 1. In addition, we manually searched Google and Google Scholar for the full articles from identified conference abstracts and study protocols, and screened all references from relevant reviews and the included articles.

#### *Critical appraisal*

To critically appraise the included articles on relevance, reliability (reporting quality), validity and applicability, we used the validated Meta Quality Appraisal Tool (MetaQAT)[43] (Appendix 2), and as recommended we embedded the Critical Appraisal Skills Programme (CASP) into it.[44] Results served as input for the assessment of level of evidence of the identified factors (see data-analysis).

#### *Data extraction*

We extracted descriptive study characteristics (author, year, study design, country, setting/population, intervention, type of outcomes measures used, and funding source) and the implementation factors using a pilot-tested, standardised sheet. Speculations (such as 'Factor A might have influenced implementation') or repetitions in the reporting of factors within the same article were not extracted. We extracted modifiable factors (e.g. factors to address user demographics would be extracted, but demographics on their own would not), to serve the design of future implementation initiatives. Only factors based on original data were extracted. If several articles were based on the same study, we compared the article's aim, methods and results in detail. If these were similar, we extracted data from the article that scored highest in our appraisal. If they differed (e.g. one was a pilot version and the other the scale-up of the same study), data from both (or more) articles were used.

#### *Data analysis*

For our meta-synthesis (weighting of the factors) we used content analysis, in which all data are categorised into themes and the frequencies of the themes are determined. Content analysis is suitable for both qualitative and quantitative evidence.[45]

First, we categorised all identified implementation factors by deductive coding using the CFIR.[18] We inductively added several codes to the CFIR (such as 'language' or 'role model') when our extracted factors did not match existing codes (Appendix 3). Second, we used the Grading of Recommendations Assessment, Development and Evaluation-Confidence in the Evidence from Reviews of Qualitative research (GRADE-CERQual) tool to determine the level of confidence in the importance of the coded factors. The GRADE-CERQual tool has four components (Figure 1), and the results of the critical appraisal served as input for scoring those (e.g. a high MetaQAT score for relevance translated into 'no to very minor concerns' in the GRADE-CERQual component 'relevance').[46] Third, each factor was awarded a maximum of four points per component per study in which it appeared (four points for 'no to very minor concerns' regarding the component in that specific study, three for 'minor concerns', two for 'moderate concerns', and one for 'substantial concerns'). Hence, factors were awarded higher scores when they appeared in more studies (the principle of content analysis), and when the components methodology, relevance and adequacy of the study were appraised as high. The fourth GRADE-CERQual component 'coherence' was not rated, because the number of studies in which the factor appeared already accounted for coherence. To conclude, the higher a factor scored, the higher the level of evidence to regard it as an important factor.

#### *Role of the funding source*

This study was funded by the EU Research and Innovation program Horizon2020 (Health, Medical research and the challenge of ageing) under grant agreement no. 680997. The funders had no role in study design, data collection, data analysis, data interpretation, or writing of the report. All authors had full access to all the data and EB, DV, RvdK and NC, the guarantor, had the final responsibility for the decision to submit the study for publication.

#### *Reflexivity*

Members of our research team came from diverse backgrounds (researchers and clinicians from psychology and medicine, with work experience in high-income countries, LMICs, or both). In these roles, we had experienced working conditions characterised by many of the factors we identified, such

as lack of resources and personnel. We recognised that we were potentially more receptive to factors we had experienced ourselves, so adhered to our standardised extraction procedures.

## Results

### *Search results*

Our search resulted in 9111 unique articles. After full-text screening we included 37 articles derived from 33 different studies (Figure 2, Table 1). One article was excluded from the analysis,[47] as its factors were based on the exact same study data as another article which scored higher in the critical appraisal.[48]

### *Study characteristics*

The studies resulting from our search were conducted in 17 different LMICs across five geographical regions: Latin-America (Brazil,[49-53] the Dominican Republic,[54] Mexico,[55] Surinam[56]), Africa (Malawi,[57] South-Africa[58-60]), the Middle East (Lebanon[61], Syria[62]), Asia (China,[63-67] India,[47, 48, 68-73] Indonesia,[71, 74] Malaysia,[75] Nepal,[76, 77] Pakistan,[78] Russia,[79] Thailand[80-82]), and Oceania (Fiji[83]) (Table 1, Figure 3). Most studies were based in healthcare settings (n=17; primary care (n=9), secondary care (n=5), primary/secondary care combined (n=3)), followed by schools (n=13), and the community (n=6). The majority of the study interventions focused on tobacco (n=27; cessation (n=10), prevention (n=8), both (n=2) and control (i.e. smoking-free setting) (n=7)). Three studies focused on interventions to improve the implementation of guidelines. One study focused on quality improvement of COPD management, one on delivery of integrated asthma/COPD care, and one on the adaptation of post-partum rituals using biomass smoke to 'protect' newborns. Three articles used quantitative methods for determining implementation factors, 31 used qualitative methods, and two used both.

### *Critical appraisal of the studies*

The quality of the articles varied: 19 articles scored high in the MetaQAT on relevance to the research question, 17 scored medium and one scored low (Table 1, and for further details Appendix 4). Articles scored variably on reliability (15 high, 11 medium, 11 low) and the lower scores were often due to unclear reporting of methods. Data analyses and researcher reflexivity were particularly poorly reported in many qualitative articles, which affected the reproducibility and transparency (thus validity). Twelve articles scored high on validity, ten scored medium, one scored low and for 14 articles validity was unclear.

### *Implementation factors*

Forty-five implementation factors were identified, with a large variation in factors' levels of evidence (Appendix 5). The factors with the highest level of evidence are described in further detail below, these belonged to CFIR domains *Process*, *Inner setting*, and *Outer settings* (Figure 5). A full overview of all weighted factors, their definitions, and illustrations of how they occurred in the included studies is detailed in Appendix 6.

*Engaging* – 'attracting and involving appropriate individuals in the implementation and use of the innovation (...)'[18] – in the domain *Process* was coded 72 times across 29 articles. Identifying influential stakeholders before and during the implementation process, and developing effective engagement strategies was often reported as 'crucial'. Moreover, authors stated that the context determined who was considered as influential. The articles addressed relevant deliverers (e.g. teachers, staff, health workers), potential collaborators (e.g. government officials, village leaders, or other authorities who could block implementation if not successfully engaged) and recipients of the intervention (e.g. 'all villagers at once' vs 'initially only highly respected villagers') as important stakeholders to consider. Among a broad range of reported strategies, engagement was frequently established after gaining trust and commitment from the participants, and when a sense of ownership was created (e.g. through participatory approaches). Equally, failure to engage stakeholders was attributed to the lack of engagement activities, e.g. demotivation of intervention recipients due to lack of ongoing communication.

*Compatibility* was another factor with a high level of evidence, coded 48 times across 23 articles. Categorised in the subdomain *Implementation Climate* (domain *Inner setting*), compatibility is defined as the degree of fit between meaning and values attached to the innovation and of the involved individuals, and how the innovation fits with existing workflows and systems.[18] Implementation success was often attributed to embedding interventions into local, existing infrastructures (e.g. the

primary care infrastructure), carried out by people in already established networks (e.g. community health workers), and when aligned with local cultural values. This can, for example, be achieved in highly participant-centred interventions. “Perhaps the most important lesson was eventually letting go of some of our own techniques and agendas and allowing an indigenous culture to develop their own program.” The local participants developed their own programme and implementation strategy, aligned with their local context, and hence, implementation was highly successful.[83]

The second important subdomain in the domain *Inner setting* was *Readiness for implementation* (coded 76 times across 32 articles), of which *Access to knowledge and information* (28 times, 22 articles) and *Available resources* (37 times, 21 articles) were defining factors. Studies generally reported the lack of these factors as implementation barriers. Particularly training in knowledge and skills (e.g. knowledge on risks to lung health or motivational interviewing skills) were reported as insufficient, including lack of access to educational materials. The most commonly lacking available resources were time and personnel. Other notable resources lacking were limited physical space (such as crowded consultation rooms), insufficient materials (medication, equipment), or assets (electricity). Funding to overcome these barriers was often not feasible, but authors reported that the (lack of) resources should always be considered in the implementation strategy. Where possible, adaptations can then be made accordingly.

Another notable factor was understanding and accurately prioritising on the *Needs of local users* (*Outer setting*). For example, deliverers in one study realised that Chinese parents did not necessarily feel a need for smoking cessation. They also recognised the parents’ need for connecting with their child (and children had a unique position in the Chinese one-child families). Deliverers then educated the children on smoking and cessation, which eventually helped to motivate their parents to quit.[64] Level of evidence was also high for *Cosmopolitanism* (networks of the organization with external organizations; *Outer setting*) and *Networks and Communications* (*Inner setting*).

Notably, all factors appeared strongly interrelated; e.g. engaged stakeholders provided adequate knowledge about the needs of those served by the organization, which improved compatibility, which in turn increased the perceived advantage of the intervention, etc. Also, when comparing the implementation factors and their level of evidence across the geographical regions, findings were highly similar.<sup>1</sup> Only for China, factors related to the *Outer setting* (e.g. *External policies and incentives*) were reported less frequently compared to the other regions.

To facilitate future implementors in the translation of the comprehensive overview of all factors to practice, we summarised the factors in a practical, simplified, and manageable implementation tool (Figure 5 and Appendix 7). The tool contains factors prioritised by their level of evidence, and illustrates those factors with examples of how to address them.

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<sup>1</sup> We compared Latin-America, Africa and Asia (China and India were considered both individually and as part of Asia). The Middle East (n=2) and Oceania (n=1) were not considered because of the small number of studies.

**Table 1. Characteristics of the included studies and critical appraisal, by author**

Author	Study design	Country	Setting; population	Intervention	Summary of appraisal			
					Rv	R	V	A
Aghi, 2016 <sup>*1</sup>	Qualitative study within an RCT	India	Public urban and rural schools; health educators, lead teachers and staff	Tobacco cessation				
Aldinger (IUHPE – Promotion & Education, 2008 <sup>*2</sup>	Qualitative (institutional ethnography)	China	Primary to vocational schools; administrators, staff, teachers, students, and parents	Tobacco prevention within programme of health-promoting schools	 1			
Aldinger (Health Education Research, 2008 <sup>*2</sup>	Qualitative (institutional ethnography)	China	Primary to vocational schools; administrators, staff (such as school doctors), teachers, students and parents	Tobacco prevention within programme of health-promoting schools				
Asfar, 2016	Qualitative study within an RCT	Syria	Primary healthcare setting; physicians and medical students	Tobacco cessation	 1			
Assanang-kornchai, 2014	Qualitative (action research)	Thailand	Primary healthcare setting; healthcare workers (nurses, administrators, directors)	Tobacco, alcohol, and substance use screening and brief intervention	 1			
Bheekie, 2006	Qualitative study preparing for an RCT	South Africa	Primary healthcare setting; trained nurses, with a supervisory position as care coordinators	Train-the-trainer programme on implementation of respiratory guidelines on (obstructive) lung diseases				
Bteddini, 2017	Mixed-method, with quantitative survey and	Lebanon	7 public and 7 private schools throughout the country; trained external facilitators training	Waterpipe smoking prevention/delay of starting to	 1			

	participatory approach for qualitative data		10 sessions for 844 students	smoke	
Castaldelli-Maia, 2017	Qualitative	Brazil	Urban psychosocial care units (primary care) across the country; diverse health professionals (e.g. dentist, nurses, physicians, managers)	Tobacco cessation	    1
Chatterjee, 2017	Qualitative	India	Rural villages; community members (programme managers, coordinators, health workers and stakeholders at village level)	Tobacco-free village	    1
Cruvinel, 2013	Quantitative, survey design (correlations)	Brazil	Urban, primary healthcare; 149 diverse workers (e.g. community health workers, nurses, physicians)	Training on tobacco, alcohol and drug use screening and brief intervention	   
Eley, 2016	Mixed-method, factors derived from qualitative data (action research)	Nepal	Urban and rural primary healthcare; patients, healthcare providers, managers and policy makers	Tobacco cessation - Behaviour support	    1
Goenka, 2010 <sup>*3</sup>	Mixed-method study within an RCT	India	32 Urban, public & private schools; professionals with a master in psychology, sociology, or nutrition who taught teachers and peer leaders	Tobacco prevention by teachers and peer-leaders	   
Groth-Marnat, 1996	Qualitative	Fiji	Traditional village; community members	Tobacco cessation	    1
Ishaak, 2014	Mixed-method, factors derived from qualitative data	Suriname	Urban junior high school; management and teachers	Tobacco and other drug prevention	   
Khan, 2019	Mixed-method, embedded in RCT, factors derived from qualitative data	Pakistan	30 Primary and secondary level public healthcare facilities; care providers (15 received intervention, interviews in 4 of the centres)	Integrated COPD/asthma care	    1

Malan, 2015	Qualitative	South Africa	Primary care practice; care providers (nurses and physicians)	Brief behaviour change counselling (5A's) for tobacco, diet, physical activity and alcohol abuse	    1
Marsiglia, 2014	Qualitative for the factors reported, within a quantitative study	Mexico	Urban public middle schools; teachers	Tobacco and other substance use prevention	   
Mash, 2010	Qualitative, prospective (outcome mapping)	South Africa	Urban and rural, primary care to specialised care with a focus on the public sector; doctors, clinical nurse practitioners, pharmacists, National Council for Medical Schemes, the Department of Health, universities and training bodies patients	Asthma-guideline implementation and dissemination	    1
McAlister, 2000	Qualitative for the factors reported, within a quantitative study	Russia	Community level; hospital staff, intervention for community smokers	Stop smoking campaign	   
Medeiros, 2016	Mixed-methods, factors derived from qualitative data	Brazil	Urban schools; teachers, school administrators, coaches, other stakeholders (e.g. municipality) and students	Tobacco prevention within a drug use prevention programme	   
Mehanni, 2019	Qualitative	Nepal	Small rural hospital (managed through a public-private partnership)	Quality improvement initiative for management of COPD	   
Melson, 2017	Mixed-methods within pilot RCT; factors derived from qualitative data (quantitative data n.a., regard hypothetic factors prior to implementation). Pro- and retrospective	Malaysia	Secondary school; students	Peer-led anti-smoking intervention (smoke-free class)	    1
Nagler, 2012* <sup>1</sup>	Qualitative, formative pilot study preparing for an RCT	India	One public urban and one rural school, not included in the RCT; health educators and teachers	Tobacco cessation – school based	   

Nichter, 2010	Qualitative	India & Indonesia	Lead public & private medical schools and outreach to their communities	Training network for tobacco prevention (curricula), outreach and clinic on smoking cessation	    1
Ossip, 2016	Qualitative (Rapid Assessment Process)	Dominican Republic	Urban, peri-urban & rural communities with active Community Technology Centers; a multidisciplinary team including specialists of psychology, anthropology, nursing, epidemiology, statistics and public health (from the US) and medicine (DR)	Tobacco cessation – participatory approach	    1
Pawar, 2015* <sup>1</sup>	Qualitative factors reported within a quantitative study, embedded in an RCT	India	72 Public urban and rural schools; health educators, lead teachers and staff	Tobacco cessation - lay interventionist teaching teachers	   
Pereira, 2016	Quantitative, population-based cross-sectional survey design	Brazil	Urban public and private schools; 263 school managers (headmasters, pedagogical coordinators, coordinators of the prevention programmes)	Tobacco prevention within a drug use prevention programme	    1
Perry, 2008* <sup>3</sup>	Qualitative study (translational research) within an RCT following translational research	India	32 urban schools, half were public and half were private; school administration, teachers, and peer-leaders	Tobacco prevention	    1
Persai, 2015	Qualitative	India	At district level; senior district officials	Tobacco control	    1
Portes, 2014	Qualitative, retrospective	Brazil	Urban primary healthcare units in a medium-sized municipality; municipal programme coordinator, and senior health professionals trained on smoking cessation or local managers	Tobacco control – training healthcare professionals on facilitating treatment & prevention activities (Furthermore, interventions on governmental level, n.a. to our study)	    1
Prasodjo, 2015	Mixed-method, factors derived from qualitative	Indonesia	Rural community; local institutions (policy makers, medical staff, community leaders	Post-partum smoke ('Sei') traditions – Behavioural change	   

	data (amongst which participatory action research)		and other stakeholders)	communication campaign targeting household air pollution	
Rosati, 2012	Mixed-methods, factors derived from qualitative data	Thailand	Urban family setting; health educators towards families	Tobacco, alcohol and other substance abuse prevention, sex education	1    
Sodhi, 2014	Mixed-methods, factors derived from qualitative data	Malawi	30 urban and rural, government funded and non-government funded health centres; primary healthcare workers: clinical officers, medical assistants, and nurses	Train-the-trainer on guideline use for providing integrated primary lung healthcare	1    
Vitavasiri, 2010	Quantitative questionnaire	Thailand	676 Thai hospitals; personnel	Smoke-free hospitals	1    
Wang, 2008	Qualitative	China	County-level hospitals; health professionals, hospital president, director of preventive health, representatives of the hospitals	Smoke-free hospitals	1    
Xiao, 2013	Mixed-method, factors concerned qualitative data	China	41 Hospital across the country, the majority from a tobacco control network; medical doctors and directors	Smoke-free hospitals	1    
Ziedonis, 2012	Qualitative	China	Hospital-based mental health centre; personnel and patients	Smoke-free hospitals	1    

Studies were prospective unless otherwise indicated. Rv = relevance, R = reliability, V = validity, A = applicability to a wider public health context. RCT = randomised controlled trial.  High  Medium  Low  Unclear score in appraisal. Relevance 1 = Evaluation of implementation was a primary outcome of the article. \*Articles from the same study. \*<sup>1</sup>Findings from Aghi et al. were excluded from the analysis, as Pawar et al. based their findings on the same study data and had higher appraisal scores. Nagler et al. based findings on a different study data (pilot study) and was included. \*<sup>2&3</sup>Findings from both studies were included as these were based on different study data.

## Discussion:

### *Main results*

In this systematic literature review and meta-synthesis, we identified and weighted factors critical to the implementation of interventions targeting CRD in LMICs. Factors for which the level of evidence was high were 1) understanding needs of local users, 2) compatibility of the intervention with the local context (such as the political- and health infrastructure or the culture), 3) identification of influential stakeholders and application of engagement strategies, 4) adequate access to knowledge and information (including skills), and 5) sufficient available resources. Additional factors were identified with a lower level of evidence. Most important recommendations for future implementors were compiled in the FRESH AIR Implementation Tool.

### *Strengths and limitations*

To the best of our knowledge, this systematic review is the first to focus on factors critical to the implementation of diverse CRD-interventions. It focused on LMICs, precisely where the burden of disease is highest, while evidence is fragmented and often poor for these settings. This review had a rigorous design and conduct, following Cochrane methodology and PRISMA reporting standards.[39-41] Every step was standardised and performed independently by two researchers. Validated tools were applied at each stage,[18, 43, 44, 46] with a transparent description of their operationalisation. Moreover, we adopted a comprehensive approach with an extensive search in eight databases with no language/date restrictions. We synthesised real-world evidence from highly diverse settings and countries in the included studies, resulting in a high generalisability of the findings to other settings.[84] In fact, the LMICs in this review were broadly representative of the population distribution across the world's continents, among others with many studies conducted in China and India.

However, several relevant types of interventions were underrepresented or even absent in the implementation literature, such as patient education, self-management, or pulmonary rehabilitation. Due to the small number of existing studies that focus on such interventions, we were unable to assess whether their implementation factors meaningfully differed from tobacco-related interventions. However, as the desired implementation behaviour is focussed on a similar health goal in similar settings, we assume that there will be at least some overlap in implementation factors. Meanwhile, the high representation of tobacco-related studies in literature remains welcome, with 80% of the world's smokers living in LMICs.[85] As another limitation, we recognise along with other authors that implementation studies are poorly indexed and we possibly missed relevant studies.[86] Yet, data saturation was still achieved in the identified factors and the hierarchy of their level of evidence. Notably, absence of evidence (factors not reported) should not be interpreted as evidence of absence (factors not important);[45] we could only determine the level of confidence in the importance of factors, for which we relied on the existing evidence.

### *Comparison to previous literature*

Our findings partly overlap with implementation factors considered important for clean cooking interventions as reported in two reviews.[87, 88] First, our factors 'Compatibility' and 'Understanding local users' needs' correspond to 'user needs' (e.g. the ability of clean cookstoves to give the food the right taste or save fuel). Second, our factors 'Engaging' and 'Access to knowledge and information' correspond to 'community involvement' and 'user training'. The authors of these studies similarly observed that barriers could turn into facilitators when these are adequately addressed and vice versa. They also concluded that factors should be addressed simultaneously because they all interrelate. The overlap between their findings and ours may not be surprising, as clean cooking interventions similarly target CRD in LMICs. Possibly, this supports the assumption mentioned earlier that implementation factors would not differ substantially for those chronic lung health interventions in LMICs that have not yet been studied.

Implementation is a relatively unexplored topic in LMICs, and we predominantly relied on qualitative articles. Qualitative studies allow for a deeper understanding of the *how, what and why* of implementation processes.[89] As opposed to in quantitative studies, the concept 'high level of evidence' cannot be quantified or tested on significance in qualitative studies. Therefore, a combination of qualitative with quantitative (mixed-method) evidence would be highly welcome; such studies are still largely unavailable. The need for more high-quality implementation evidence for LMICs has been highlighted repeatedly.[25, 34-37, 90] Systematic reviews are particularly scarce.

### *Interpretation and implications for implementation initiatives*

Our findings could serve future implementation initiatives, especially those initiatives targeting CRD in LMICs. To facilitate the design of effective implementation strategies for CRD-related interventions, we have developed a comprehensive overview of all implementation factors, their level of evidence, and examples of how they played a role in the included studies (Appendix 6). In addition, we translated factors from the comprehensive overview into a more pragmatic and hands-on tool for practice (Figure 5). Throughout the implementation process, implementors should address these factors in their strategy, and should continuously monitor the effectiveness of their strategy to improve it accordingly.[91]

Therefore, awareness of the implementation factors requires additional evidence on *how* to adequately address them.[91, 92] A suggestion for how to address the critical factors ‘compatibility’ and ‘understanding of needs of local users’, is developing, testing, and disseminating “homegrown” interventions.[93] This was done in another FRESH AIR study by conducting an initial explorative mixed-method rapid assessment of the local context.[94] The results of this assessment informed implementation strategies for improved cookstove interventions in Uganda, Vietnam and Kyrgyzstan.[95] First, the context assessment revealed that communities and their health workers poorly understood the risk of household air pollution and therefore felt no need for change. Hence, the intervention was preceded by an awareness-raising programme. Second, the rapid assessment helped to identify the relevant influential stakeholders in the settings (e.g. village leaders, district health officers). These stakeholders were then involved in the design of the implementation strategy, which ensured high compatibility of the strategy with the local reality, and engaged the stakeholders (the third critical factor) for the subsequent delivery.[96]

A creative example of addressing the fourth critical factor, lack of access to knowledge and information and skilled staff, could be introducing task-sharing between physician and non-physician health workers. This proved to be effective in lowering blood pressure in LMICs.[97] The fifth critical factor, resource availability, can be particularly challenging to address. One included study reported that workshop facilitators overcame the barrier of transportation costs by ride-sharing and delivering several sessions per visit to reduce the number of visits.[61] Reducing the impact of the lack of resources generally requires innovative system strengthening.[16]

Overall, opinions on how to address implementation factors most effectively turned out to be highly heterogeneous among experts:[98] additional how-to evidence is required.

### *Implications for implementation research*

Studies that systematically evaluate approaches of how to address implementation factors are needed to provide solid and detailed evidence for future initiatives. We are currently working on part two of this review, which focuses on the implementation of clean cooking interventions. However, we argue that future studies should also focus on topics beyond tobacco and clean cooking, such as personalised asthma action plans or pulmonary rehabilitation.[85] The studies included in this review consistently missed economic evaluations, so we recommend future studies to include those.[99] Furthermore, results from the critical appraisal of the studies showed that research quality could generally benefit from more standardised methods and more structured reporting of e.g. context characteristics, implementation strategies, and their conduct. These and additional recommendations are further outlined in an article on improving health-care provider practices for LMICs,[91] and in the STAndards for Reporting Implementation Studies.[86]

### *Implications for practice*

Guiding implementation processes by evidence-informed implementation strategies could enhance implementation success. Successful implementation can substantially increase interventions’ effectiveness.[17] This could, in turn, optimise the use of already-scarce resources and decrease the high direct and indirect costs associated with CRD in LMICs.[100, 101] Above all, implementation success could improve health outcomes.

### *Conclusion*

In this study, we systematically searched the literature for factors critical to the successful implementation of lung health interventions. We meta-synthesised the factors’ level of evidence and developed an implementation tool for practice. Priority for future implementors should be to understand needs of local users, ensure compatibility of the intervention with the local context, engage influential stakeholders, facilitate adequate access to knowledge and information, and secure sufficient resources. Use of the FRESH AIR Implementation Tool could facilitate policymakers, non-governmental organizations, practitioners, researchers, and community members to design evidence-

based, tailored implementation strategies to enhance implementation success. This could hence optimise the use of already scarce resources and, ultimately, improve health outcomes.

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### Figure 1. Tools used in each phase

Meta-QAT = Meta Quality Appraisal Tool; CASP = Critical Appraisal Skills Programme; CFIR = Consolidated Framework for Implementation Research; GRADE-CERQual = Grading of Recommendations Assessment, Development and Evaluation-Confidence in the Evidence from Reviews of Qualitative research

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### Figure 2. Flow diagram of screening process

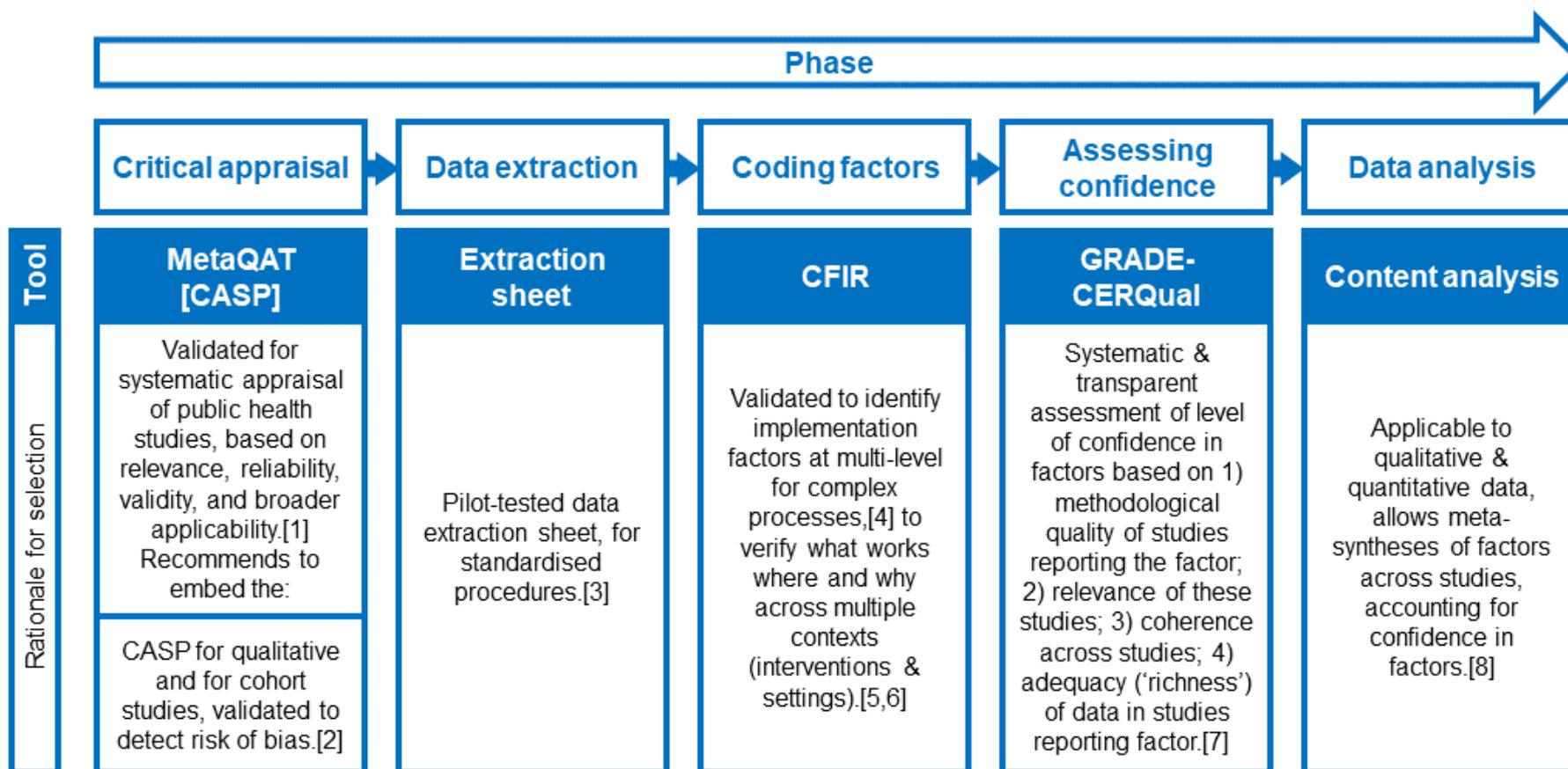
### Figure 3. Study settings and interventions

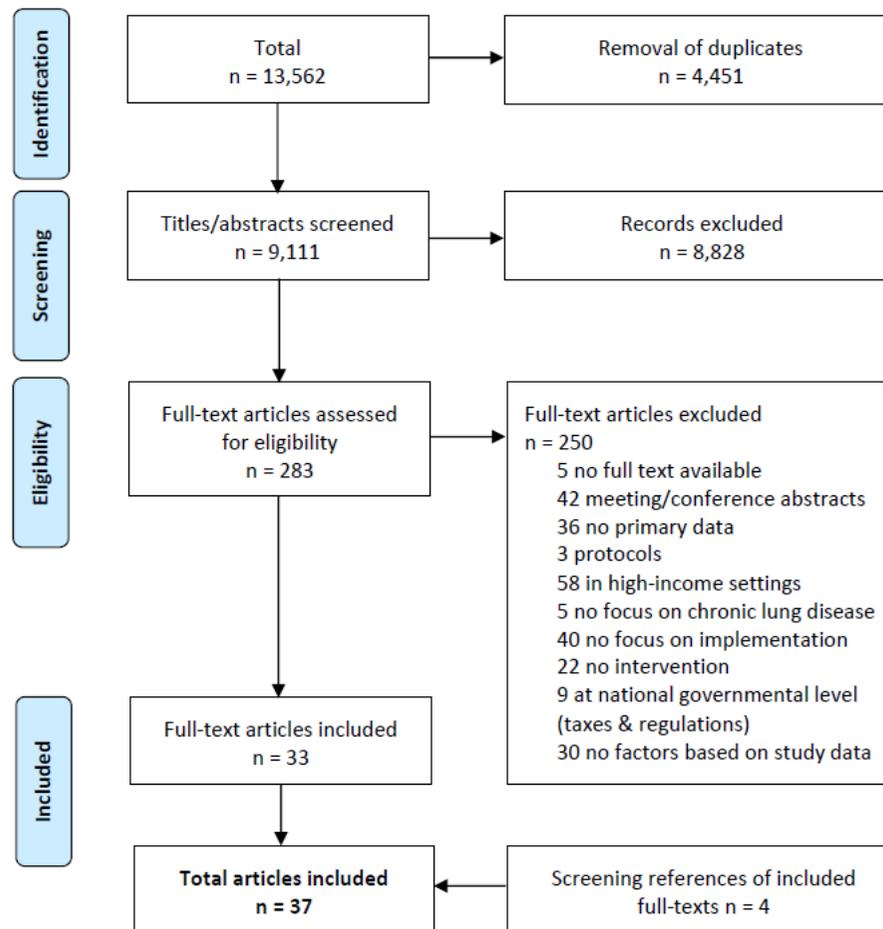
Symbols with 2 colours indicate the study covered both interventions. Half a symbol means half of the study was conducted in this setting, and the other half in another setting.

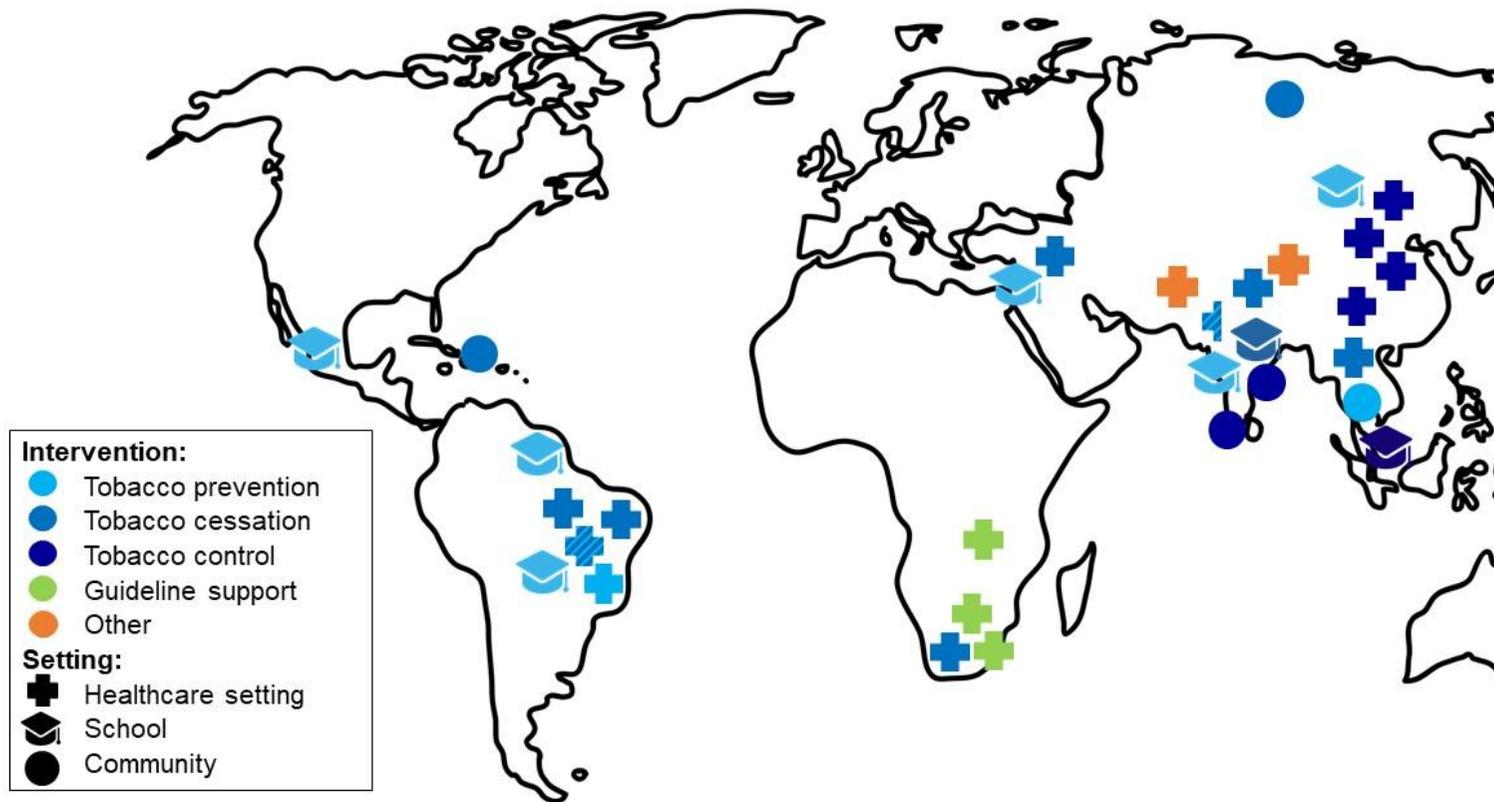
### Figure 4. Full overview of implementation factors per domain, and the relative level of evidence for the factor

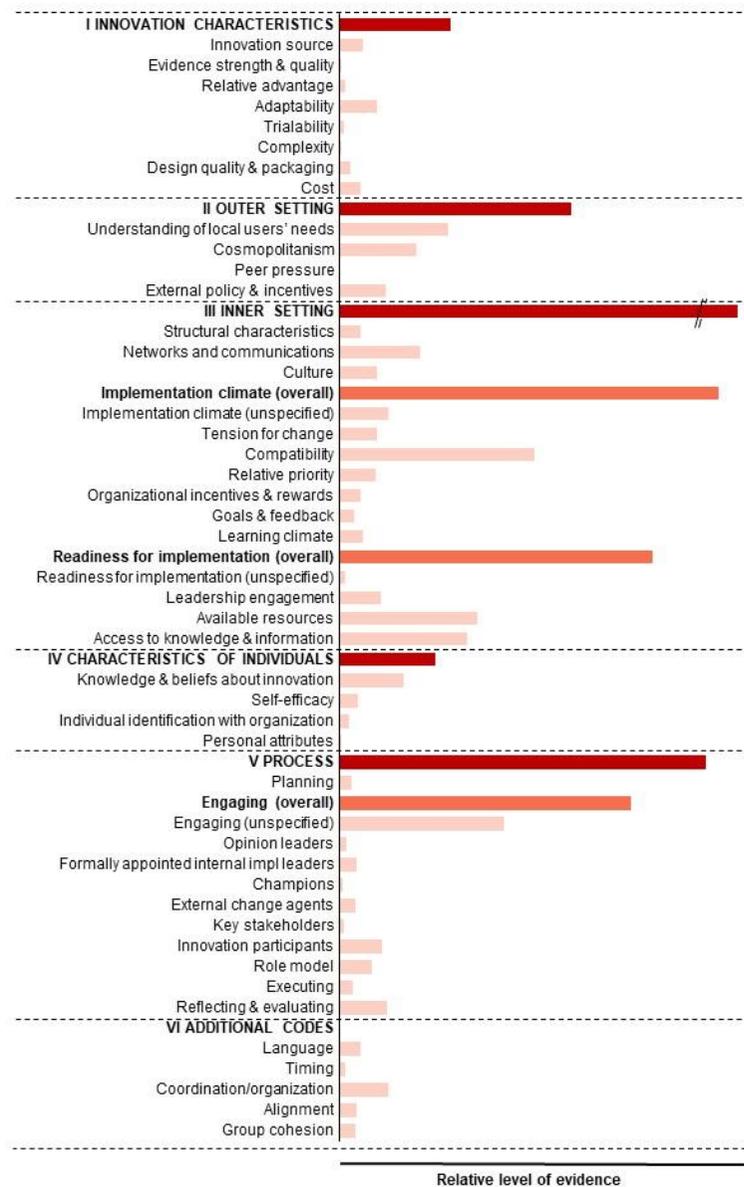
### Figure 5. FRESH AIR Implementation Tool

\*These suggestions are based on the literature specific interventions targeting chronic respiratory disease in low-and middle-income countries, and on additional, general implementation literature. See Appendix 7 for recommended use and details on references.

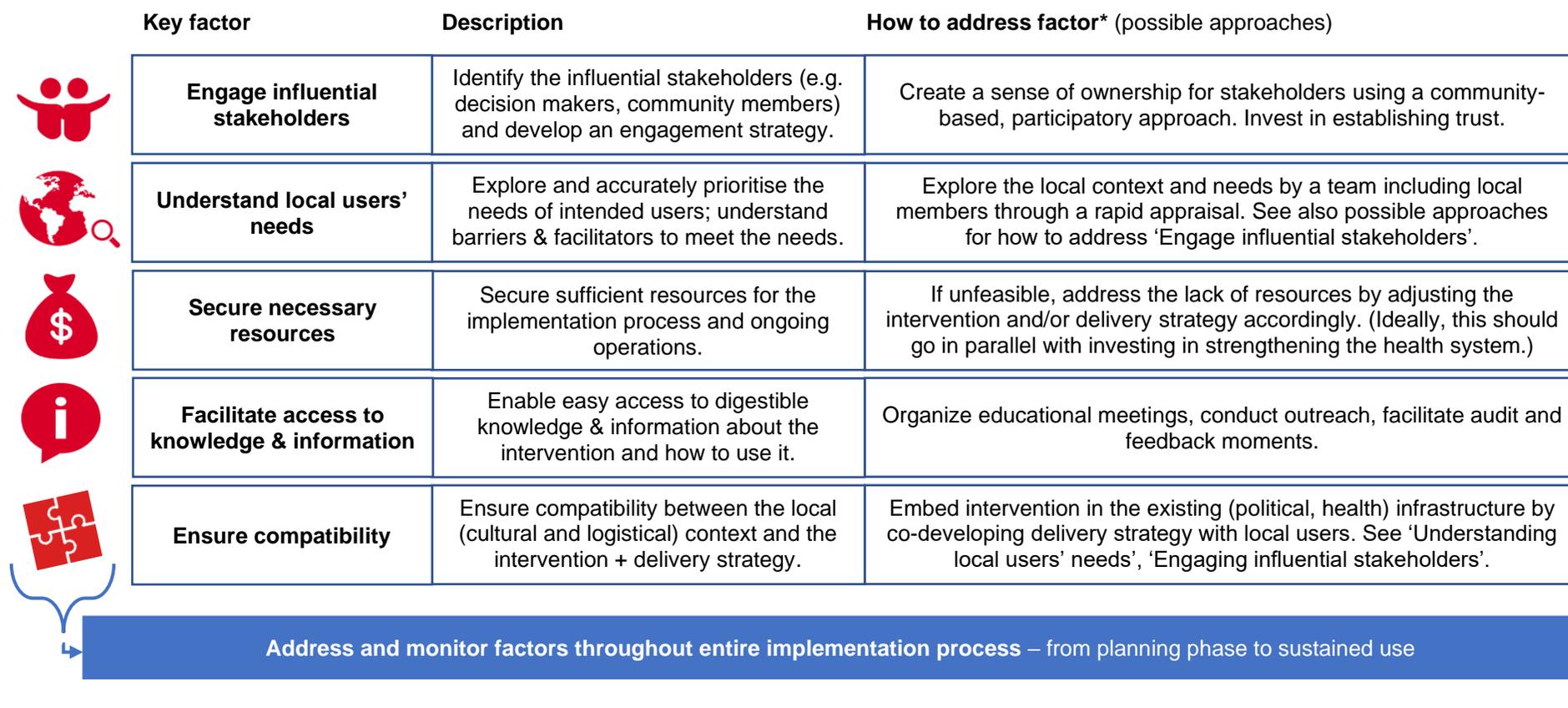








## FRESH AIR Implementation Tool version 1.0 Jan 2020



**Figure 5. FRESH AIR Implementation Tool**

\*These suggestions are based on the literature specific interventions targeting chronic respiratory disease in low-and middle-income countries, and on additional, general implementation literature. See Appendix 7 for recommended use and details on references.

## **Implementing lung health interventions in low- and middle-income countries – a FRESH AIR systematic review and meta-synthesis**

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- Appendix 1** Search strategy and the operationalisation (P2)
- Appendix 2** Critical appraisal tool and operationalization (P24)
- Appendix 3** Consolidated Framework for Implementation Research (CFIR) Codebook and operationalisation (P32)
- Appendix 4** Critical appraisal of the included studies (P34)
- Appendix 5** From data to factors (CFIR) and confidence in their importance (GRADE-CERQual) (P39)
- Appendix 6** Full overview of the implementation factors (P48)
- Appendix 7** the FRESH AIR Implementation Tool and its recommended use (P55)

## Appendix 1: Search strategy and the operationalisation.

Standardised rules for the operationalisation of the in- and exclusion criteria are presented Table E1. The full search strategy is presented in Table E2.

**Table E1. Criteria for the search strategy and rules for the operationalisation of the inclusion and exclusion criteria**

<i>Search strategy</i>	<i>Definition</i>	<i>Rules to Operationalise</i>
Implementation	Study (partially) focusing on 'the constellation of processes intended to get an intervention into use within an organisation' <sup>1</sup>	<i>Included:</i> - 'Organisation' in its broad sense, e.g. 'community' is also considered an organisation. Title and/or abstract states that at least one of the aims and/or outcomes is about implementation. - (A synonym of) implementation had to be in the paper's title. This was necessary to increase specificity, as implementation and its synonyms are often used beyond any focus on implementation (e.g. in 'Effectiveness of implementing chronic care...')
Intervention targeting chronic lung health	For CRD, we focused on the common diseases asthma and/or COPD and on related relevant programmes	<i>Included:</i> - Programmes targeting prevention, diagnosis, and/or treatment. - Programmes specifically relevant to CRD, e.g. pulmonary rehabilitation programmes would be included, whereas exercise programmes for obesity (which potentially benefit patients with CRD too) would be excluded. <i>Excluded:</i> - Hypothetical interventions (e.g. studies assessing: 'how would you respond to...'). To increase validity we focused on actual rather than reported behaviour. <sup>2</sup> - Studies without a programme (e.g. guideline-adherence would be excluded, whereas a programme to increase guideline-adherence would be included) - If the intervention regarded legislation at national governmental level (tobacco taxes, smoking ban regulations), because the expected influence by 'common' implementers is limited.
LMICs	As classified by the World Bank list of economies <sup>3</sup>	We added each individual country as noun and adjective in the search, and we added regional descriptions (e.g. Central-Asia). <i>Excluded:</i> - To remain focused and enhance generalisability, we excluded high income settings within LMICs (e.g. Hong Kong as the World Bank defines this a high-income economy, or a private university as we consider it accessible only to students from high socioeconomic backgrounds).
Factor	A determinant that the paper's authors considered as either facilitating or hampering implementation.	<i>Excluded:</i> - Reported factors not evidently derived from the study concerned - Speculations about possible factors (such as 'Factor A might have influenced implementation.')
		- As we aimed to identify factors providing leads for future implementers, we did not extract non-modifiable factors (e.g. no demographics of the users). However, a factor related to <i>how</i> to tailor the implementation strategy to a demographic factor, e.g. to enhance the fit with the local context, would be extracted.

CRD = Chronic Respiratory Disease; COPD = chronic obstructive pulmonary disease; LMICs = low- and middle-income countries.

### References

<sup>1</sup> Damschroder, L. J. *et al.* Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation science* : IS 4, 50, (2009).

<sup>2</sup> Bou Malham, P. & Saucier, G. The conceptual link between social desirability and cultural normativity. *Int J Psychol* 51, 474-480, (2016).

<sup>3</sup> World Bank. *World Bank list of economies - World Bank country and lending groups*, <<https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>> (2017).

**Table E2a. Search strategy as used in Pubmed**

Pubmed search results: 1916	
<i>Construct</i>	<i>Terms used</i>
Implementation	(("health plan implementation"[mesh] OR "implementation"[ti] OR "implementations"[ti] OR "implement"[ti] OR "implementing"[ti] OR "implemented"[ti] OR "implements"[ti] OR "adherence"[ti] OR "adhere"[ti] OR "adhering"[ti] OR "adhered"[ti] OR "adheres"[ti] OR "penetration"[ti] OR "penetrations"[ti] OR "penetrate"[ti] OR "penetrating"[ti] OR "penetrated"[ti] OR "penetrates"[ti] OR "adoption"[ti] OR "adoptions"[ti] OR "adopt"[ti] OR "adopting"[ti] OR "adopted"[ti] OR "adopts"[ti] OR "Information Dissemination"[mesh] OR "dissemination"[ti] OR "disseminations"[ti] OR "disseminating"[ti] OR "disseminated"[ti] OR "disseminates"[ti] OR "effectiveness research"[ti] OR "Diffusion of Innovation"[mesh] OR "diffusion"[ti] OR "diffusions"[ti] OR "diffuse"[ti] OR "diffusing"[ti] OR "diffused"[ti] OR "diffuses"[ti] OR "knowledge to action"[ti] OR "knowledge transfer"[ti] OR "knowledge translation"[ti] OR "research to practice"[ti] OR "research-to-practice"[ti] OR "research utilization"[ti] OR "research utilisation"[ti] OR "scale up"[ti] OR "scaling up"[ti] OR "technology transfer"[ti] OR "translational research"[ti] OR "Continuation"[ti] OR "Continuing"[ti] OR "Continued"[ti] OR "Continues"[ti] OR "process assessment (health care)"[mesh] OR ("Program"[ti] OR "Programs"[ti] OR "Programme"[ti] OR "Programmes"[ti] OR "Process"[ti] OR "Processes"[ti]) AND ("Appropriateness"[ti] OR "Evaluation"[ti] OR "Evaluations"[ti] OR "Effectiveness"[ti] OR "Efficacy"[ti])))
<b>AND</b>	
Symptoms-, diseases-, or interventions related to chronic lung health	((("chronic"[tw] OR "non-communicable"[tw]) AND ("Lung"[mesh] OR "Lung"[tw] OR "Lungs"[tw] OR "Airway"[tw] OR "Airways"[tw] OR "Breathing"[tw] OR "Breath"[tw] OR "Pulmonal"[tw] OR "Pulmonary"[tw] OR "Respiratory"[tw] OR "Respiration"[tw])) OR "Pulmonary disease, chronic obstructive"[mesh] OR "COPD"[tw] OR "COAD"[tw] OR ("chronic"[tw] AND ("Airflow Obstruction"[tw] OR "Airflow Obstructions"[tw]) OR "ACOS"[tw] OR "Asthma-COPD overlap syndrome"[tw] OR "Bronchitis, chronic"[mesh] OR "chronic bronchitis"[tw] OR "Pulmonary emphysema"[mesh] OR "emphysema"[tw] OR "emphysemas"[tw] OR "Asthma"[mesh] OR "Asthma"[tw] OR "Asthmas"[tw] OR "Astma"[tw] OR "asthmatic"[tw] OR ("chronic"[tw] AND ("Cough"[mesh] OR "cough"[tw] OR "coughs"[tw] OR "coughing"[tw] OR "Dyspnea"[mesh] OR "Dyspnea"[tw] OR "Dyspneas"[tw] OR "Dyspnoea"[tw] OR "Dispnea"[tw] OR "Dyspnoe"[tw] OR "Breathlessness"[tw] OR "wheeze"[tw] OR "wheezing"[tw] OR "wheezer"[tw] OR "wheezers"[tw] OR "Hyperventilation"[mesh] OR "Hyperventilation"[tw] OR "Hypoventilation"[tw] OR "Tachypnea"[mesh] OR "Tachypnea"[tw] OR "Sputum"[mesh] OR "sputum"[tw] OR "Sputums"[tw] OR "phlegm"[tw])) OR ("chest"[tw] AND "tightness"[tw]) OR ("chest"[tw] AND "pain"[tw]) OR "Chest Pain"[mesh]) OR ("nicotine" AND "cessation"[tw]) OR "nicotine-free"[tw] OR "nicotine-dependence"[tw] OR "tobacco"[tw] OR "tobacco-free"[tw] OR "tobacco-dependence"[tw] OR "smoke"[tw] OR "smoke-free"[tw] OR "smokeless"[tw] OR "smoker"[tw] OR "smokers"[tw] OR "smoking"[tw] OR "Smoking"[mesh] OR "Tobacco Use Disorder"[mesh] OR "Tobacco Use"[mesh] OR "Smoking cessation"[mesh] OR "Tobacco smoke pollution"[mesh] OR ("Chest"[tw] AND ("physiotherapy"[tw] OR "physical therapy"[tw] OR "Exercise"[tw] OR "rehabilitation"[tw] OR "training"[tw])) OR "Air Pollution, Indoor"[mesh] OR (("air"[tw] OR "atmospheric"[tw] OR "atmosphere"[tw] OR "atmospheres"[tw]) AND ("pollution"[tw] OR "pollutions"[tw] OR "pollutant"[tw] OR "pollutants"[tw] OR "quality"[tw])) OR "fume"[tw]) OR ("clean"[tw] OR "improved"[tw]) AND ("stove"[tw] OR "stoves"[tw] OR "cookstove"[tw] OR "cookstoves"[tw] OR "cooking stove"[tw] OR "cooking stoves"[tw] OR "cooking"[tw])))
<b>AND</b>	
Low- and middle-income countries	("Afghanistan"[tw] OR "Albania"[tw] OR "Algeria"[tw] OR "American Samoa"[tw] OR "Angola"[tw] OR "Argentina "[tw] OR "Armenia"[tw] OR "Azerbaijan"[tw] OR "Bangladesh"[tw] OR "Belarus"[tw] OR "Belize"[tw] OR "Benin"[tw] OR "Bhutan"[tw] OR "Bolivia"[tw] OR "Bosnia"[tw] OR "Botswana"[tw] OR "Brazil"[tw]

OR "Bulgaria"[tw] OR "Burkina Faso"[tw] OR "Burundi"[tw] OR "Cabo Verde"[tw] OR "Cambodia"[tw] OR "Cameroon"[tw] OR "Cape Verde"[tw] OR "Central African Republic"[tw] OR "Chad"[tw] OR "China"[tw] OR "Colombia"[tw] OR "Comoros"[tw] OR "Congo"[tw] OR "Costa Rica"[tw] OR "Cote d'Ivoire"[tw] OR "Côte d'Ivoire"[tw] OR "Cote d'Ivoire"[tw] OR "Cote d'Ivoire"[tw] OR "Côte d'Ivoire"[tw] OR "Ivory Coast"[tw] OR "Cuba"[tw] OR "Democratic Republic of the Congo"[tw] OR "Djibouti"[tw] OR "Dominica"[tw] OR "Dominican Republic"[tw] OR "Ecuador"[tw] OR "Egypt"[tw] OR "El Salvador"[tw] OR "Equatorial Guinea"[tw] OR "Eritrea"[tw] OR "Ethiopia"[tw] OR "Fiji"[tw] OR "Gabon"[tw] OR "Gambia"[tw] OR "Gaza"[tw] OR "Georgia"[tw] OR "Ghana"[tw] OR "Grenada"[tw] OR "Grenadines"[tw] OR "Guatemala"[tw] OR "Guinea-Bissau"[tw] OR "Guinea"[tw] OR "Guyana"[tw] OR "Haiti"[tw] OR "Herzegovina"[tw] OR "Herzegovina"[tw] OR "Honduras"[tw] OR "India"[tw] OR "Indonesia"[tw] OR "Iran"[tw] OR "Iraq"[tw] OR "Ivory coast"[tw] OR "Jamaica"[tw] OR "Jordan"[tw] OR "Kazakhstan"[tw] OR "Kenya"[tw] OR "Kiribati"[tw] OR "Kosovo"[tw] OR "Kyrgyz republic"[tw] OR "Kyrgyzstan"[tw] OR "Kirghizia"[tw] OR "Lao"[tw] OR "Laos"[tw] OR "Lebanon"[tw] OR "Lesotho"[tw] OR "Liberia"[tw] OR "Libya"[tw] OR "Macedonia"[tw] OR "Madagascar"[tw] OR "Malawi"[tw] OR "Malaysia"[tw] OR "Maldives"[tw] OR "Mali"[tw] OR "Marshall Islands"[tw] OR "Mauritania"[tw] OR "Mauritius"[tw] OR "Mexico"[tw] OR "Micronesia"[tw] OR "Moldova"[tw] OR "Mongolia"[tw] OR "Montenegro"[tw] OR "Morocco"[tw] OR "Mozambique"[tw] OR "Myanmar"[tw] OR "Namibia"[tw] OR "Nepal"[tw] OR "Nicaragua"[tw] OR "Niger"[tw] OR "Nigeria"[tw] OR "North Korea"[tw] OR "North-Korea"[tw] OR "Pakistan"[tw] OR "Palau"[tw] OR "Palestine"[tw] OR "Panama"[tw] OR "Papua New Guinea"[tw] OR "Paraguay"[tw] OR "Peru"[tw] OR "Philippines"[tw] OR "Romania"[tw] OR "Rwanda"[tw] OR "Saint Lucia"[tw] OR "St. Lucia"[tw] OR "Saint Vincent"[tw] OR "St. Vincent"[tw] OR "Samoa"[tw] OR "Sao Tome and Principe"[tw] OR "São Tomé and Príncipe"[tw] OR "Senegal"[tw] OR "Serbia"[tw] OR "Sierra Leone"[tw] OR "Solomon Islands"[tw] OR "Somalia"[tw] OR "South Africa"[tw] OR "South Sudan"[tw] OR "Sri Lanka"[tw] OR "Sudan"[tw] OR "Suriname"[tw] OR "Swaziland"[tw] OR "Syria"[tw] OR "Tajikistan"[tw] OR "Tanzania"[tw] OR "Thailand"[tw] OR "Timor-Leste"[tw] OR "Togo"[tw] OR "Tonga"[tw] OR "Tunisia"[tw] OR "Turkey"[tw] OR "Turkmenistan"[tw] OR "Tuvalu"[tw] OR "Uganda"[tw] OR "Ukraine"[tw] OR "Uzbekistan"[tw] OR "Vanuatu"[tw] OR "Venezuela"[tw] OR "Vietnam"[tw] OR "West Bank"[tw] OR "Yemen"[tw] OR "Zambia"[tw] OR "Zimbabwe"[tw] OR "Russia"[tw] OR "Central America"[Mesh] OR "Central America"[tw] OR "Central-America"[tw] OR "Caribbean"[tw] OR "Latin America"[Mesh] OR "Latin America"[tw] OR "Latin-America"[tw] OR "South America"[Mesh] OR "South America"[tw] OR "South-America"[tw] OR "Africa"[Mesh] OR "Africa"[tw] OR "North Africa"[tw] OR "North-Africa"[tw] OR "Sub-Sahara"[tw] OR "Subsahara"[tw] OR "Asia, Central"[mesh] OR "Central Asia"[tw] OR "Asia, Southeastern"[mesh] OR "Southeast Asia"[tw] OR "South east Asia"[tw] OR "South-east Asia"[tw] OR "Asia, Western"[mesh] OR "Western Asia"[tw] OR "China"[mesh] OR "Democratic People's Republic of Korea"[mesh] OR "Europe, Eastern"[Mesh] OR "Balkan"[tw] OR "Afghan"[tw] OR "Afghani"[tw] OR "Albanian"[tw] OR "Algerian"[tw] OR "Samoan"[tw] OR "Angolan"[tw] OR "Argentinian"[tw] OR "Armenian"[tw] OR "Azerbaijani"[tw] OR "Bangladeshi"[tw] OR "Belarussian"[tw] OR "Belizean"[tw] OR "Beninese"[tw] OR "Bhutanese"[tw] OR "Bolivian"[tw] OR "Bosnian"[tw] OR "Motswana"[tw] OR "Botswanan"[tw] OR "Brazilian"[tw] OR "Bulgarian"[tw] OR "Burkinabe"[tw] OR "Burkinabé"[tw] OR "Burundian"[tw] OR "Cabo Verdean"[tw] OR "Cambodian"[tw] OR "Cameroonian"[tw] OR "Cape Verdean"[tw] OR "African"[tw] OR "Chadian"[tw] OR "Chinese"[tw] OR "Colombian"[tw] OR "Comoran"[tw] OR "Congolese"[tw] OR "Costa Rican"[tw] OR "Ivorian"[tw] OR "Cuban"[tw] OR "Djiboutian"[tw] OR "Dominican"[tw] OR "Ecuadorean"[tw] OR "Egyptian"[tw] OR "Salvadorean"[tw] OR "Equatorial Guinean"[tw] OR "Eritrean"[tw] OR "Ethiopian"[tw] OR "Fijian"[tw] OR "Gabonese"[tw] OR "Gambian"[tw] OR "Gazan"[tw] OR "Georgian"[tw] OR "Ghanian"[tw] OR "Grenadian"[tw] OR "Grenadine"[tw] OR "Guatemalan"[tw] OR "Guinean"[tw] OR "Guyanese"[tw] OR "Haitian"[tw] OR "Honduran"[tw] OR "Indian"[tw] OR "Indonesian"[tw] OR "Iranian"[tw] OR "Iraqi"[tw] OR

	"Jamaican"[tw] OR "Jordanian"[tw] OR "Kazakhstani"[tw] OR "Kazakh"[tw] OR "Kenyan"[tw] OR "I-Kiribati"[tw] OR "Kosovan"[tw] OR "Kyrgyzstani"[tw] OR "Kirghiz"[tw] OR "Kyrgyz"[tw] OR "Laotian"[tw] OR "Lebanese"[tw] OR "Basotho"[tw] OR "Liberian"[tw] OR "Libyan"[tw] OR "Macedonian"[tw] OR "Malagasy"[tw] OR "Malawian"[tw] OR "Malaysian"[tw] OR "Maldivian"[tw] OR "Malian"[tw] OR "Marshallese"[tw] OR "Mauritanian"[tw] OR "Mauritian"[tw] OR "Mexican"[tw] OR "Micronesia"[tw] OR "Moldovan"[tw] OR "Mongolian"[tw] OR "Montenegrin"[tw] OR "Moroccan"[tw] OR "Mozambican"[tw] OR "Burmese"[tw] OR "Namibian"[tw] OR "Nepalese"[tw] OR "Nicaraguan"[tw] OR "Nigerien"[tw] OR "Nigerian"[tw] OR "North Korean"[tw] OR "North-Korean"[tw] OR "Pakistani"[tw] OR "Palauan"[tw] OR "Palestinian"[tw] OR "Panamanian"[tw] OR "Papua New Guinean"[tw] OR "Paraguayan"[tw] OR "Peruvian"[tw] OR "Philippine"[tw] OR "Romanian"[tw] OR "Rwandan"[tw] OR "Saint Lucian"[tw] OR "St. Lucian"[tw] OR "Saint Vincentian"[tw] OR "St. Vincentian"[tw] OR "Samoan"[tw] OR "Sao Tomean"[tw] OR "São Tomean"[tw] OR "Senegalese"[tw] OR "Serbian"[tw] OR "Sierra Leonean"[tw] OR "Soloman Islander"[tw] OR "Somali"[tw] OR "South African"[tw] OR "Sri Lankan"[tw] OR "Sudanese"[tw] OR "Surinamese"[tw] OR "Swazi"[tw] OR "Syrian"[tw] OR "Tajikistani"[tw] OR "Tanzanian"[tw] OR "Thai"[tw] OR "Timorese"[tw] OR "Togolese"[tw] OR "Tongan"[tw] OR "Tunisian"[tw] OR "Turkish"[tw] OR "Turkmen"[tw] OR "Turkmenian"[tw] OR "Tuvaluan"[tw] OR "Ugandan"[tw] OR "Ukrainian"[tw] OR "Uzbekistani"[tw] OR "Ni-Vanuatu"[tw] OR "Venezuelan"[tw] OR "Vietnamese"[tw] OR "Yemeni"[tw] OR "Zambian"[tw] OR "Zimbabwean"[tw] OR "Russian"[tw] OR "Central American"[tw] OR "Central-American"[tw] OR "Caribbean"[tw] OR "Latin American"[tw] OR "Latin-American"[tw] OR "South American"[tw] OR "South-American"[tw] OR "African"[tw] OR "Sub-Saharan"[tw] OR "Subsaharan"[tw] OR "Central Asian"[tw] OR "Southeast Asian"[tw] OR "South east Asian"[tw] OR "South-east Asian"[tw] OR "Western Asian"[tw] OR "developing countries"[mesh] OR ("poor"[tw] OR "Low income"[tw] OR "lower income"[tw] OR "lower middle income"[tw] OR "low and middle income"[tw] OR "low & middle income"[tw] OR "low and medium income"[tw] OR "middle income"[tw] OR "medium income"[tw] OR "low resource"[tw] OR "lower resource"[tw] OR "least developed"[tw] OR "less developed"[tw] OR "underdeveloped"[tw] OR "under developed"[tw] OR "developing"[tw] OR "limited resource"[tw] OR "resource limited"[tw] OR "resource poor"[tw] OR "third world"[tw] OR "second world"[tw]) AND ("continent"[tw] OR "continents"[tw] OR "country"[tw] OR "countries"[tw] OR "nation"[tw] OR "nations"[tw] OR "setting"[tw] OR "settings"[tw] OR "region"[tw] OR "regions"[tw] OR "area"[tw] OR "areas"[tw]))
<b>NOT</b>	
	("Animals"[mesh] NOT "Humans"[mesh])

**Table E2b. Search strategy as used in Embase**

Embase search results: 2311	
<i>Construct</i>	<i>Terms used</i>
Implementation	("implementation".ti. OR "implementations".ti. OR "implement".ti. OR "implementing".ti. OR "implemented".ti. OR "implements".ti. OR "adherence".ti. OR "adhere".ti. OR "adhering".ti. OR "adhered".ti. OR "adheres".ti. OR "penetration".ti. OR "penetrations".ti. OR "penetrate".ti. OR "penetrating".ti. OR "penetrated".ti. OR "penetrates".ti. OR "adoption".ti. OR "adoptions".ti. OR "adopt".ti. OR "adopting".ti. OR "adopted".ti. OR "adopts".ti. OR "Information Dissemination"/ OR "dissemination".ti. OR "disseminations".ti. OR "disseminating".ti. OR "disseminated".ti. OR "disseminates".ti. OR "effectiveness research".ti. OR "diffusion".ti. OR "diffusions".ti. OR "diffuse".ti. OR "diffusing".ti. OR "diffused".ti. OR "diffuses".ti. OR "knowledge to action".ti. OR "knowledge-to-action".ti. OR "knowledge transfer".ti. OR "knowledge-transfer".ti. OR "knowledge translation".ti. OR "research to practice".ti. OR "research-to-practice".ti. OR "research utilization".ti. OR "research utilisation".ti. OR "scale up".ti. OR "scale-up".ti. OR "scaling up".ti. OR "scaling-up".ti. OR "technology transfer".ti. OR

	"translational research".ti. OR "Continuation".ti. OR "Continuing".ti. OR "Continued".ti. OR "Continues".ti. OR exp program evaluation/ OR (("Program".ti. OR "Programs".ti. OR "Programme".ti. OR "Programmes".ti. OR "Process".ti. OR "Processes".ti.) AND ("Appropriateness".ti. OR "Evaluation".ti. OR "Evaluations".ti. OR "Effectiveness".ti. OR "Efficacy".ti.))
<b>AND</b>	
Symptoms-, diseases-, or interventions related to chronic lung health	((("chronic".mp. OR "non-communicable".mp.) AND (exp"Lung"/ OR "Lung".mp. OR "Lungs".mp. OR "Airway".mp. OR "Airways".mp. OR "Breathing".mp. OR "Breath".mp. OR "Pulmonal".mp. OR "Pulmonary".mp. OR "Respiratory".mp. OR "Respiration".mp.)) OR exp obstructive airway disease/ OR "COPD".mp. OR "COAD".mp. OR "Chronic Airflow Obstruction".mp. OR "Chronic Airflow Obstructions".mp. OR "ACOS".mp. OR " <u>Asthma-COPD overlap syndrome</u> ".mp. OR "Chronic bronchitis".mp. OR "emphysema".mp. OR "emphysemas".mp. OR "Asthma".mp. OR "Asthmas".mp. OR "Astma".mp. OR "asthmatic".mp. OR "lung tuberculosis"/ OR "Tuberculoses".mp. OR "Tuberculosis".mp. OR "Phthisis".mp. OR "Silicotuberculosis".mp. OR (("chronic".mp.) AND (coughing/ OR "Cough"/ OR "cough".mp. OR "coughs".mp. OR "coughing".mp. OR "Dyspnea"/ OR "Dyspnea".mp. OR "Dyspneas".mp. OR "Dyspnoea".mp. OR "Dispnea".mp. OR "Dyspnoe".mp. OR "Breathlessness".mp. OR "wheeze".mp. OR "wheezing".mp. OR "wheezer".mp. OR "wheezers".mp. OR "Hyperventilation"/ OR "Hyperventilation".mp. OR "Hypoventilation".mp. OR "Tachypnea"/ OR "Tachypnea".mp. OR "Sputum"/ OR "sputum".mp. OR "Sputums".mp. OR "phlegm".mp. OR ("chest".mp. AND "tightness".mp.) OR ("chest".mp. AND "pain".mp) OR "Thorax Pain"/)) OR ("nicotine".mp. AND "cessation".mp.) OR " <u>nicotine-free</u> ".mp. OR " <u>nicotine-dependence</u> ".mp. OR "tobacco".mp. OR " <u>tobacco-free</u> ".mp. OR " <u>tobacco-dependence</u> ".mp. OR "smoke".mp. OR "smoke"/ OR " <u>smoke-free</u> ".mp. OR " <u>smoke-dependence</u> ".mp. OR "smokeless".mp. OR "smoker".mp. OR "smokers".mp. OR "smoking".mp. OR exp"Smoking"/ OR " <u>tobacco dependence</u> "/ OR exp"Tobacco Use"/ OR "Smoking cessation"/ OR "Passive smoking"/ OR ("Chest".mp. AND ("physiotherapy".mp. OR "physical therapy".mp. OR "Exercise".mp. OR "rehabilitation".mp. OR "training".mp.)) OR "Air Pollution"/ OR "air pollutant"/ OR "Air Pollution control"/ OR "Air particle control"/ OR "Chimney"/ OR "Indoor air pollution "/ OR ("air".mp. OR "atmospheric".mp. OR "atmosphere".mp. OR "atmospheres".mp.) AND ("pollution".mp. OR "pollutions".mp. OR "pollutant".mp. OR "pollutants".mp. OR "quality".mp.)) OR "fume".mp. OR (("clean".mp. OR "improved".mp.) AND ("stove".mp. OR "stoves".mp. OR "cookstove".mp. OR "cookstoves".mp. OR "cooking stove".mp. OR "cooking".mp.))
<b>AND</b>	
Low- and middle-income countries	("Afghanistan".mp. OR "Albania".mp. OR "Algeria".mp. OR "American Samoa".mp. OR "Angola".mp. OR "Argentina".mp. OR "Armenia".mp. OR "Azerbaijan".mp. OR "Bangladesh".mp. OR "Belarus".mp. OR "Belize".mp. OR "Benin".mp. OR "Bhutan".mp. OR "Bolivia".mp. OR "Bosnia".mp. OR "Botswana".mp. OR "Brazil".mp. OR "Bulgaria".mp. OR "Burkina Faso".mp. OR "Burundi".mp. OR "Cabo Verde".mp. OR "Cambodia".mp. OR "Cameroon".mp. OR "Cape Verde".mp. OR "Central African Republic".mp. OR "Chad".mp. OR "China".mp. OR "Colombia".mp. OR "Comoros".mp. OR "Congo".mp. OR "Costa Rica".mp. OR "Cote d'Ivoire".mp. OR "Côte d'Ivoire".mp. OR "Cote d'Ivoire".mp. OR "Cote d'ivore".mp. OR "Côte d'Ivoire".mp. OR "Ivory Coast".mp. OR "Cuba".mp. OR "Democratic Republic of the Congo".mp. OR "Djibouti".mp. OR "Dominica".mp. OR "Dominican Republic".mp. OR "Ecuador".mp. OR "Egypt".mp. OR "El Salvador".mp. OR "Equatorial Guinea".mp. OR "Eritrea".mp. OR "Ethiopia".mp. OR "Fiji".mp. OR "Gabon".mp. OR "Gambia".mp. OR "Gaza".mp. OR "Georgia".mp. OR "Ghana".mp. OR "Grenada".mp. OR "Grenadines".mp. OR "Guatemala".mp. OR "Guinea-Bissau".mp. OR "Guinea".mp. OR "Guyana".mp. OR "Haiti".mp. OR "Herzegovina".mp. OR "Herzegovina".mp. OR "Honduras".mp. OR "India".mp. OR "Indonesia".mp. OR "Iran".mp. OR "Iraq".mp. OR "Jamaica".mp. OR "Jordan".mp. OR "Kazakhstan".mp. OR "Kenya".mp. OR "Kiribati".mp. OR "Kosovo".mp. OR "Kyrgyz republic".mp. OR "Kyrgyzstan".mp. OR "Kirghizia".mp. OR "Lao".mp. OR

"Laos".mp. OR "Lebanon".mp. OR "Lesotho".mp. OR "Liberia".mp. OR "Libya".mp. OR "Macedonia".mp. OR "Madagascar".mp. OR "Malawi".mp. OR "Malaysia".mp. OR "Maldives".mp. OR "Mali".mp. OR "Marshall Islands".mp. OR "Mauritania".mp. OR "Mauritius".mp. OR "Mexico".mp. OR "Micronesia".mp. OR "Moldova".mp. OR "Mongolia".mp. OR "Montenegro".mp. OR "Morocco".mp. OR "Mozambique".mp. OR "Myanmar".mp. OR "Namibia".mp. OR "Nepal".mp. OR "Nicaragua".mp. OR "Niger".mp. OR "Nigeria".mp. OR "North Korea".mp. OR "North-Korea".mp. OR "Pakistan".mp. OR "Palau".mp. OR "Palestine".mp. OR "Panama".mp. OR "Papua New Guinea".mp. OR "Paraguay".mp. OR "Peru".mp. OR "Philippines".mp. OR "Romania".mp. OR "Rwanda".mp. OR "Saint Lucia".mp. OR "St. Lucia".mp. OR "Saint Vincent".mp. OR "St. Vincent".mp. OR "Samoa".mp. OR "Sao Tome and Principe".mp. OR "São Tomé and Príncipe".mp. OR "Senegal".mp. OR "Serbia".mp. OR "Sierra Leone".mp. OR "Solomon Islands".mp. OR "Somalia".mp. OR "South Africa".mp. OR "South Sudan".mp. OR "Sri Lanka".mp. OR "Sudan".mp. OR "Suriname".mp. OR "Swaziland".mp. OR "Syria".mp. OR "Tajikistan".mp. OR "Tadzhikistan".mp. OR "Tanzania".mp. OR "Thailand".mp. OR "Timor-Leste".mp. OR "Togo".mp. OR "Tonga".mp. OR "Tunisia".mp. OR "Turkey".mp. OR "Turkmenistan".mp. OR "Tuvalu".mp. OR "Uganda".mp. OR "Ukraine".mp. OR "Uzbekistan".mp. OR "Vanuatu".mp. OR "Venezuela".mp. OR "Vietnam".mp. OR "West Bank ".mp. OR "Yemen".mp. OR "Zambia".mp. OR "Zimbabwe".mp. OR "Russia".mp. OR "South and Central America"/ OR "Central America"/ OR "South America"/ OR "Caribbean"/ OR "Central America".mp. OR "Central-America".mp. OR "Caribbean".mp. OR "Latin America".mp. OR "Latin-America".mp. OR "South America".mp. OR "South-America".mp. OR "Africa"/ OR "Africa".mp. OR "North Africa".mp. OR "North-Africa".mp. OR "Sub-Sahara".mp. OR "Subsahara".mp. OR "South Asia"/ OR "Central Asia".mp. OR "Southeast Asia"/ OR "Southeast Asia".mp. OR "South east Asia".mp. OR "South-east Asia".mp. OR "Western Asia".mp. OR "China"/ OR "North Korea"/ OR "Eastern Europe"/ OR "Balkan".mp. OR "Afghan".mp. OR "Afghani".mp. OR "Albanian".mp. OR "Algerian".mp. OR "Samoan".mp. OR "Angolan".mp. OR "Argentinian".mp. OR "Armenian".mp. OR "Azerbaijani".mp. OR "Bangladeshi".mp. OR "Belarussian".mp. OR "Belizean".mp. OR "Beninese".mp. OR "Bhutanese".mp. OR "Bolivian".mp. OR "Bosnian".mp. OR "Motswana".mp. OR "Botswanan".mp. OR "Brazilian".mp. OR "Bulgarian".mp. OR "Burkinabe".mp. OR "Burkinabé".mp. OR "Burundian".mp. OR "Cabo Verdean".mp. OR "Cambodian".mp. OR "Cameroonian".mp. OR "Cape Verdean".mp. OR "African".mp. OR "Chadian".mp. OR "Chinese".mp. OR "Colombian".mp. OR "Comoran".mp. OR "Congolese".mp. OR "Costa Rican".mp. OR "Ivorian".mp. OR "Cuban".mp. OR "Djiboutian".mp. OR "Dominican".mp. OR "Ecuadorean".mp. OR "Egyptian".mp. OR "Salvadorean".mp. OR "Equatorial Guinean".mp. OR "Eritrean".mp. OR "Ethiopian".mp. OR "Fijian".mp. OR "Gabonese".mp. OR "Gambian".mp. OR "Gazan".mp. OR "Georgian".mp. OR "Ghanian".mp. OR "Grenadian".mp. OR "Grenadine".mp. OR "Guatemalan".mp. OR "Guinean".mp. OR "Guyanese".mp. OR "Haitian".mp. OR "Honduran".mp. OR "Indian".mp. OR "Indonesian".mp. OR "Iranian".mp. OR "Iraqi".mp. OR "Jamaican".mp. OR "Jordanian".mp. OR "Kazakhstani".mp. OR "Kazakh".mp. OR "Kenyan".mp. OR "I-Kiribati".mp. OR "Kosovan".mp. OR "Kyrgyzstani".mp. OR "Kirghiz".mp. OR "Kyrgyz".mp. OR "Laotian".mp. OR "Lebanese".mp. OR "Basotho".mp. OR "Liberian".mp. OR "Libyan".mp. OR "Macedonian".mp. OR "Malagasy".mp. OR "Malawian".mp. OR "Malaysian".mp. OR "Maldivian".mp. OR "Malian".mp. OR "Marshallese".mp. OR "Mauritanian".mp. OR "Mauritian".mp. OR "Mexican".mp. OR "Micronesian".mp. OR "Moldovan".mp. OR "Mongolian".mp. OR "Montenegrin".mp. OR "Moroccan".mp. OR "Mozambican".mp. OR "Burmese".mp. OR "Namibian".mp. OR "Nepalese".mp. OR "Nicaraguan".mp. OR "Nigerien".mp. OR "Nigerian".mp. OR "North Korean".mp. OR "North-Korean".mp. OR "Pakistani".mp. OR "Palauan".mp. OR "Palestinian".mp. OR "Panamanian".mp. OR "Papua New Guinean".mp. OR "Paraguayan".mp. OR "Peruvian".mp. OR "Philippine".mp. OR "Romanian".mp. OR "Rwandan".mp. OR "Saint Lucian".mp. OR "St. Lucian".mp. OR "Saint Vincentian".mp. OR "St. Vincentian".mp. OR "Samoan".mp. OR "Sao

	Tomean".mp. OR "São Tomean".mp. OR "Senegalese".mp. OR "Serbian".mp. OR "Sierra Leonean".mp. OR "Soloman Islander".mp. OR "Somali".mp. OR "South African".mp. OR "Sri Lankan".mp. OR "Sudanese".mp. OR "Surinamese".mp. OR "Swazi".mp. OR "Syrian".mp. OR "Tajikistani".mp. OR "Tanzanian".mp. OR "Thai".mp. OR "Timorese".mp. OR "Togolese".mp. OR "Tongan".mp. OR "Tunisian".mp. OR "Turkish".mp. OR "Turkmen".mp. OR "Turkmenian".mp. OR "Tuvaluan".mp. OR "Ugandan".mp. OR "Ukrainian".mp. OR "Uzbekistani".mp. OR "Uzbek".mp. OR "Ni-Vanuatu".mp. OR "Venezuelan".mp. OR "Vietnamese".mp. OR "Yemeni".mp. OR "Zambian".mp. OR "Zimbabwean".mp. OR "Russian".mp. OR "Central American".mp. OR "Central-American".mp. OR "Caribbean".mp. OR "Latin American".mp. OR "Latin-American".mp. OR "South American".mp. OR "South-American".mp. OR "African".mp. OR "Sub-Saharan".mp. OR "Subsaharan".mp. OR "Central Asian".mp. OR "Southeast Asian".mp. OR "South east Asian".mp. OR "South-east Asia".mp. OR "Western Asian".mp. OR "developing countries"/ OR ("poor".mp. OR "Low income".mp. OR "lower income".mp. OR "lower middle income".mp. OR "low and middle income".mp. OR "low & middle income".mp. OR "low and medium income".mp. OR "medium income".mp. OR "middle income".mp. OR "upper middle income".mp. OR "low resource".mp. OR "lower resource".mp. OR "least developed".mp. OR "less developed".mp. OR "underdeveloped".mp. OR "under developed".mp. OR "developing".mp. OR "limited resource".mp. OR "resource limited".mp. OR "resource poor".mp. OR "third world".mp. OR "second world".mp. OR " <u>Low-income</u> ".mp. OR " <u>lower-income</u> ".mp. OR " <u>lower-middle-income</u> ".mp. OR " <u>lower-middle income</u> ".mp. OR " <u>low-and-middle income</u> ".mp. OR " <u>low-and-middle-income</u> ".mp. OR " <u>low-and-medium income</u> ".mp. OR " <u>low-and-medium-income</u> ".mp. OR " <u>medium-income</u> ".mp. OR " <u>middle-income</u> ".mp. OR " <u>upper-middle income</u> ".mp. OR " <u>upper-middle-income</u> ".mp. OR "low-resource".mp. OR "lower-resource".mp. OR "least-developed".mp. OR "less-developed".mp. OR "under-developed".mp. OR "limited-resource".mp. OR "resource-limited".mp. OR "resource-poor".mp. OR "third-world".mp. OR "second-world".mp.) AND ("continent".mp. OR "continents".mp. OR "country".mp. OR "countries".mp. OR "nation".mp. OR "nations".mp. OR "setting".mp. OR "settings".mp. OR "region".mp. OR "regions".mp. OR "area".mp. OR "areas".mp.))
<b>NOT</b>	
	("Animal"/ NOT "Human"/)

**Table E2c. Search strategy as used in the Global Health Database**

Global Health Database search results: 719	
<i>Construct</i>	<i>Terms used</i>
Implementation	("implementation".ti. OR "implementations".ti. OR "implement".ti. OR "implementing".ti. OR "implemented".ti. OR "implements".ti. OR "adherence".ti. OR "adhere".ti. OR "adhering".ti. OR "adhered".ti. OR "adheres".ti. OR "penetration".ti. OR "penetrations".ti. OR "penetrate".ti. OR "penetrating".ti. OR "penetrated".ti. OR "penetrates".ti. OR "adoption".ti. OR "adoptions".ti. OR "adopt".ti. OR "adopting".ti. OR "adopted".ti. OR "adopts".ti. OR "Information Dissemination".mp. OR "diffusion of information"/ OR "dissemination".ti. OR "disseminations".ti. OR "disseminating".ti. OR "disseminated".ti. OR "disseminates".ti. OR "effectiveness research".ti. OR "diffusion".ti. OR "diffusions".ti. OR "diffuse".ti. OR "diffusing".ti. OR "diffused".ti. OR "diffuses".ti. OR "knowledge to action".ti. OR " <u>knowledge-to-action</u> ".ti. OR "knowledge transfer".ti. OR " <u>knowledge-transfer</u> ".ti. OR "knowledge translation".ti. OR "research to practice".ti. OR "research-to-practice".ti. OR "research utilization".ti. OR "research utilisation".ti. OR "scale up".ti. OR " <u>scale-up</u> ".ti. OR "scaling up".ti. OR " <u>scaling-up</u> ".ti. OR "technology transfer".ti. OR "translational research".ti. OR "Continuation".ti. OR "Continuing".ti. OR "Continued".ti. OR "Continues".ti. OR "exp program evaluation/ OR ("Program".ti. OR "Programs".ti. OR "Programme".ti. OR "Programmes".ti. OR "Process".ti. OR "Processes".ti.) AND

	("Appropriateness".ti. OR "Evaluation".ti. OR "Evaluations".ti. OR "Effectiveness".ti. OR "Efficacy".ti.))
<b>AND</b>	
Symptoms-, diseases-, or interventions related to chronic lung health	((("chronic".mp. OR "non-communicable".mp.) AND ("Lung".mp. OR "Lungs".mp. OR "Airway".mp. OR "Airways".mp. OR "Breathing".mp. OR "Breath".mp. OR "Pulmonal".mp. OR "Pulmonary".mp. OR "Respiratory".mp. OR "Respiration".mp.)) OR "chronic obstructive airway disease/ OR "COPD".mp. OR "COAD".mp. OR "Chronic Airflow Obstruction".mp. OR "Chronic Airflow Obstructions".mp. OR "ACOS".mp. OR "Asthma-COPD overlap syndrome".mp. OR "Chronic bronchitis".mp. OR "emphysema".mp. OR "emphysemas".mp. OR "Asthma"/ OR "bronchial asthma"/ OR "Asthma".mp. OR "Asthmas".mp. OR "Astma".mp. OR "asthmatic".mp. OR (("chronic".mp.) AND ("cough".mp. OR "coughs".mp. OR "coughing".mp. OR "Dyspnea".mp. OR "Dyspneas".mp. OR "Dyspnoea"/ OR "Dyspnoea".mp. OR "Dispnea".mp. OR "Dyspnoe".mp. OR "Breathlessness".mp. OR "wheeze".mp. OR "wheezing".mp. OR "wheezer".mp. OR "wheezers".mp. OR "Hyperventilation".mp. OR "Hypoventilation".mp. OR "Tachypnea".mp. OR "Sputum"/ OR "sputum".mp. OR "Sputums".mp. OR "Phlegm".mp.)) OR ("chest".mp. AND "tightness".mp.) OR ("chest".mp. AND "pain".mp.) OR "Thorax Pain".mp. OR ("nicotine".mp. AND "cessation".mp.) OR "nicotine-free".mp. OR "nicotine-dependence".mp. OR "tobacco".mp. OR "tobacco-free".mp. OR "tobacco-dependence".mp. OR "Tobacco smoking"/ OR "Tobacco use".mp. OR "smoke".mp. OR "smoke"/ OR "smoke-free".mp. OR "smoke-dependence".mp. OR "smokeless".mp. OR "smoker".mp. OR "smokers".mp. OR "smoking".mp. OR exp"Smoking"/ OR "Smoking cessation"/ OR "Passive smoking"/ OR ("Chest".mp. AND ("physiotherapy".mp. OR "physical therapy".mp. OR "Exercise".mp. OR "rehabilitation".mp. OR "training".mp.)) OR "Air pollution"/ OR "air pollutants"/ OR "Air particle control".mp. OR "Chimney".mp. OR "Indoor air pollution"/ OR ("air".mp. OR "atmospheric".mp. OR "atmosphere".mp. OR "atmospheres".mp.) AND ("pollution".mp. OR "pollutions".mp. OR "pollutant".mp. OR "pollutants".mp. OR "quality".mp.)) OR "fume".mp. OR ("clean".mp. OR "improved".mp.) AND ("stove".mp. OR "stoves".mp. OR "cookstove".mp. OR "cookstoves".mp. OR "cooking stove".mp. OR "cooking".mp.))
<b>AND</b>	
Low- and middle-income countries	("Afghanistan".mp. OR "Albania".mp. OR "Algeria".mp. OR "American Samoa".mp. OR "Angola".mp. OR "Argentina ".mp. OR "Armenia".mp. OR "Azerbaijan".mp. OR "Bangladesh".mp. OR "Belarus".mp. OR "Belize".mp. OR "Benin".mp. OR "Bhutan".mp. OR "Bolivia".mp. OR "Bosnia".mp. OR "Botswana".mp. OR "Brazil".mp. OR "Bulgaria".mp. OR "Burkina Faso".mp. OR "Burundi".mp. OR "Cabo Verde".mp. OR "Cambodia".mp. OR "Cameroon".mp. OR "Cape Verde".mp. OR "Central African Republic".mp. OR "Chad".mp. OR "China".mp. OR "Colombia".mp. OR "Comoros".mp. OR "Congo".mp. OR "Costa Rica".mp. OR "Cote d'Ivoire".mp. OR "Côte d'Ivoire".mp. OR "Cote d'Ivoire".mp. OR "Cote d'ivore".mp. OR "Côte d'Ivoire".mp. OR "Ivory Coast".mp. OR "Cuba".mp. OR "Democratic Republic of the Congo".mp. OR "Djibouti".mp. OR "Dominica".mp. OR "Dominican Republic".mp. OR "Ecuador".mp. OR "Egypt".mp. OR "El Salvador".mp. OR "Equatorial Guinea".mp. OR "Eritrea".mp. OR "Ethiopia".mp. OR "Fiji".mp. OR "Gabon".mp. OR "Gambia".mp. OR "Gaza".mp. OR "Georgia".mp. OR "Ghana".mp. OR "Grenada".mp. OR "Grenadines".mp. OR "Guatemala".mp. OR "Guinea-Bissau".mp. OR "Guinea".mp. OR "Guyana".mp. OR "Haiti".mp. OR "Herzegovina".mp. OR "Herzegovina".mp. OR "Honduras".mp. OR "India".mp. OR "Indonesia".mp. OR "Iran".mp. OR "Iraq".mp. OR "Jamaica".mp. OR "Jordan".mp. OR "Kazakhstan".mp. OR "Kenya".mp. OR "Kiribati".mp. OR "Kosovo".mp. OR "Kyrgyz republic".mp. OR "Kyrgyzstan".mp. OR "Kirghizia".mp. OR "Lao".mp. OR "Laos".mp. OR "Lebanon".mp. OR "Lesotho".mp. OR "Liberia".mp. OR "Libya".mp. OR "Macedonia".mp. OR "Madagascar".mp. OR "Malawi".mp. OR "Malaysia".mp. OR "Maldives".mp. OR "Mali".mp. OR "Marshall Islands".mp. OR "Mauritania".mp. OR "Mauritius".mp. OR "Mexico".mp. OR "Micronesia".mp. OR "Moldova".mp. OR "Mongolia".mp. OR "Montenegro".mp. OR "Morocco".mp. OR

"Mozambique".mp. OR "Myanmar".mp. OR "Namibia".mp. OR "Nepal".mp. OR "Nicaragua".mp. OR "Niger".mp. OR "Nigeria".mp. OR "North Korea".mp. OR "North-Korea".mp. OR "Pakistan".mp. OR "Palau".mp. OR "Palestine".mp. OR "Panama".mp. OR "Papua New Guinea".mp. OR "Paraguay".mp. OR "Peru".mp. OR "Philippines".mp. OR "Romania".mp. OR "Rwanda".mp. OR "Saint Lucia".mp. OR "St. Lucia".mp. OR "Saint Vincent".mp. OR "St. Vincent".mp. OR "Samoa".mp. OR "Sao Tome and Principe".mp. OR "São Tomé and Principe".mp. OR "Senegal".mp. OR "Serbia".mp. OR "Sierra Leone".mp. OR "Solomon Islands".mp. OR "Somalia".mp. OR "South Africa".mp. OR "South Sudan".mp. OR "Sri Lanka".mp. OR "Sudan".mp. OR "Suriname".mp. OR "Swaziland".mp. OR "Syria".mp. OR "Tajikistan".mp. OR "Tadzhikistan".mp. OR "Tanzania".mp. OR "Thailand".mp. OR "Timor-Leste".mp. OR "Togo".mp. OR "Tonga".mp. OR "Tunisia".mp. OR "Turkey".mp. OR "Turkmenistan".mp. OR "Tuvalu".mp. OR "Uganda".mp. OR "Ukraine".mp. OR "Uzbekistan".mp. OR "Vanuatu".mp. OR "Venezuela".mp. OR "Vietnam".mp. OR "West Bank ".mp. OR "Yemen".mp. OR "Zambia".mp. OR "Zimbabwe".mp. OR "Russia".mp. OR "South and Central America".mp. OR "Central America"/ OR "South America"/ OR "Caribbean"/ OR "Central America".mp. OR "Central-America".mp. OR "Caribbean".mp. OR "Latin America".mp. OR "Latin-America".mp. OR "South America".mp. OR "South-America".mp. OR "Africa"/ OR "Africa".mp. OR "North Africa".mp. OR "North-Africa".mp. OR "Sub-Sahara".mp. OR "Subsahara".mp. OR "South Asia"/ OR "Central Asia".mp. OR "Southeast Asia"/ OR "Southeast Asia".mp. OR "South east Asia".mp. OR "South-east Asia".mp. OR "Western Asia".mp. OR "China"/ OR "Korea Democratic People's Republic"/ OR "Eastern Europe".mp. OR "Balkan".mp. OR "Afghan".mp. OR "Afghani".mp. OR "Albanian".mp. OR "Algerian".mp. OR "Samoan".mp. OR "Angolan".mp. OR "Argentinian".mp. OR "Armenian".mp. OR "Azerbaijani".mp. OR "Bangladeshi".mp. OR "Belarussian".mp. OR "Belizean".mp. OR "Beninese".mp. OR "Bhutanese".mp. OR "Bolivian".mp. OR "Bosnian".mp. OR "Motswana".mp. OR "Botswanan".mp. OR "Brazilian".mp. OR "Bulgarian".mp. OR "Burkinabe".mp. OR "Burkinabé".mp. OR "Burundian".mp. OR "Cabo Verdean".mp. OR "Cambodian".mp. OR "Cameroonian".mp. OR "Cape Verdean".mp. OR "African".mp. OR "Chadian".mp. OR "Chinese".mp. OR "Colombian".mp. OR "Comoran".mp. OR "Congolese".mp. OR "Costa Rican".mp. OR "Ivorian".mp. OR "Cuban".mp. OR "Djiboutian".mp. OR "Dominican".mp. OR "Ecuadorean".mp. OR "Egyptian".mp. OR "Salvadorean".mp. OR "Equatorial Guinean".mp. OR "Eritrean".mp. OR "Ethiopian".mp. OR "Fijian".mp. OR "Gabonese".mp. OR "Gambian".mp. OR "Gazan".mp. OR "Georgian".mp. OR "Ghanian".mp. OR "Grenadian".mp. OR "Grenadine".mp. OR "Guatemalan".mp. OR "Guinean".mp. OR "Guyanese".mp. OR "Haitian".mp. OR "Honduran".mp. OR "Indian".mp. OR "Indonesian".mp. OR "Iranian".mp. OR "Iraqi".mp. OR "Jamaican".mp. OR "Jordanian".mp. OR "Kazakhstani".mp. OR "Kazakh".mp. OR "Kenyan".mp. OR "I-Kiribati".mp. OR "Kosovan".mp. OR "Kyrgyzstani".mp. OR "Kirghiz".mp. OR "Kyrgyz".mp. OR "Laotian".mp. OR "Lebanese".mp. OR "Basotho".mp. OR "Liberian".mp. OR "Libyan".mp. OR "Macedonian".mp. OR "Malagasy".mp. OR "Malawian".mp. OR "Malaysian".mp. OR "Maldivian".mp. OR "Malian".mp. OR "Marshallese".mp. OR "Mauritanian".mp. OR "Mauritian".mp. OR "Mexican".mp. OR "Micronesian".mp. OR "Moldovan".mp. OR "Mongolian".mp. OR "Montenegrin".mp. OR "Moroccan".mp. OR "Mozambican".mp. OR "Burmese".mp. OR "Namibian".mp. OR "Nepalese".mp. OR "Nicaraguan".mp. OR "Nigerien".mp. OR "Nigerian".mp. OR "North Korean".mp. OR "North-Korean".mp. OR "Pakistani".mp. OR "Palauan".mp. OR "Palestinian".mp. OR "Panamanian".mp. OR "Papua New Guinean".mp. OR "Paraguayan".mp. OR "Peruvian".mp. OR "Philippine".mp. OR "Romanian".mp. OR "Rwandan".mp. OR "Saint Lucian".mp. OR "St. Lucian".mp. OR "Saint Vincentian".mp. OR "St. Vincentian".mp. OR "Samoan".mp. OR "Sao Tomean".mp. OR "São Tomean".mp. OR "Senegalese".mp. OR "Serbian".mp. OR "Sierra Leonean".mp. OR "Soloman Islander".mp. OR "Somali".mp. OR "South African".mp. OR "Sri Lankan".mp. OR "Sudanese".mp. OR "Surinamese".mp. OR "Swazi".mp. OR "Syrian".mp. OR "Tajikistani".mp. OR "Tanzanian".mp. OR "Thai".mp. OR

	"Timorese".mp. OR "Togolese".mp. OR "Tongan".mp. OR "Tunisian".mp. OR "Turkish".mp. OR "Turkmen".mp. OR "Turkmenian".mp. OR "Tuvaluan".mp. OR "Ugandan".mp. OR "Ukrainian".mp. OR "Uzbekistani".mp. OR "Uzbek".mp. OR "Ni-Vanuatu".mp. OR "Venezuelan".mp. OR "Vietnamese".mp. OR "Yemeni".mp. OR "Zambian".mp. OR "Zimbabwean".mp. OR "Russian".mp. OR "Central American".mp. OR "Central-American".mp. OR "Caribbean".mp. OR "Latin American".mp. OR "Latin-American".mp. OR "South American".mp. OR "South-American".mp. OR "African".mp. OR "Sub-Saharan".mp. OR "Subsaharan".mp. OR "Central Asian".mp. OR "Southeast Asian".mp. OR "South east Asian".mp. OR "South-east Asia".mp. OR "Western Asian".mp. OR "developing countries"/ OR ("poor".mp. OR "Low income".mp. OR "lower income".mp. OR "lower middle income".mp. OR "upper middle income".mp. OR "low and middle income".mp. OR "low & middle income".mp. OR "low and medium income".mp. OR "middle income".mp. OR "medium income".mp. OR "low resource".mp. OR "lower resource".mp. OR "least developed".mp. OR "less developed".mp. OR "underdeveloped".mp. OR "under developed".mp. OR "developing".mp. OR "limited resource".mp. OR "resource limited".mp. OR "resource poor".mp. OR "third world".mp. OR "second world".mp. OR <u>"Low-income".mp. OR "lower-income".mp. OR "lower-middle-income".mp. OR "lower-middle income".mp. OR "upper-middle income".mp. OR "upper-middle-income".mp. OR "low-and-middle income".mp. OR "low-and-middle-income".mp. OR "low-and-medium income".mp. OR "low-and-medium-income".mp. OR "middle-income".mp. OR "medium-income" OR "low-resource".mp. OR "lower-resource".mp. OR "least-developed".mp. OR "less-developed".mp. OR "under-developed".mp. OR "limited-resource".mp. OR "resource-limited".mp. OR "resource-poor".mp. OR "third-world".mp. OR "second-world".mp.</u> ) AND ("continent".mp. OR "continents".mp. OR "country".mp. OR "countries".mp. OR "nation".mp. OR "nations".mp. OR "setting".mp. OR "settings".mp. OR "region".mp. OR "regions".mp. OR "area".mp. OR "areas".mp.))
<b>NOT</b>	
	("Animals"/ NOT "man"/)

**Table E2d. Search strategy as used in Cochrane**

Cochrane search results: 2423	
<i>Construct</i>	<i>Terms used</i>
<i>Database filter: Trials, Methods studies, Economic Evaluations</i>	
Implementation	("implementation" OR "implementations" OR "implement" OR "implementing" OR "implemented" OR "implements" OR "adherence" OR "adhere" OR "adhering" OR "adhered" OR "adheres" OR "penetration" OR "penetrations" OR "penetrate" OR "penetrating" OR "penetrated" OR "penetrates" OR "adoption" OR "adoptions" OR "adopt" OR "adopting" OR "adopted" OR "adopts" OR "dissemination" OR "disseminations" OR "disseminating" OR "disseminated" OR "disseminates" OR "effectiveness research" OR "diffusion" OR "diffusions" OR "diffuse" OR "diffusing" OR "diffused" OR "diffuses" OR "knowledge to action" OR <u>"knowledge-to-action"</u> OR "knowledge transfer" OR <u>"knowledge-transfer"</u> OR "knowledge translation" OR "research to practice" OR "research-to-practice" OR "research utilization" OR "research utilisation" OR "scale up" OR <u>"scale-up"</u> OR "scaling up" OR <u>"scaling-up"</u> OR "technology transfer" OR "translational research" OR "Continuation" OR "Continuing" OR "Continued" OR "Continues" OR ("Program" OR "Programs" OR "Programme" OR "Programmes" OR "Process" OR "Processes") AND ("Appropriateness" OR "Evaluation" OR "Evaluations" OR "Effectiveness" OR "Efficacy"))
<b>AND</b>	
Symptoms-, diseases-, or interventions related to chronic lung	((("chronic" OR "non-communicable") AND ("Lung" OR "Lungs" OR "Airway" OR "Airways" OR "Breathing" OR "Breath" OR "Pulmonal" OR "Pulmonary" OR "Respiratory" OR "Respiration")) OR "COPD" OR "COAD" OR ("chronic" AND ("Airflow Obstruction" OR "Airflow Obstructions")) OR "ACOS" OR <u>"Asthma-COPD overlap syndrome"</u> OR "chronic bronchitis" OR "emphysema" OR "emphysemas"

health	OR "Asthma" OR "Asthmas" OR "Astma" OR "asthmatic" OR (("chronic") AND ("cough" OR "coughs" OR "coughing" OR "Dyspnea" OR "Dyspneas" OR "Dyspnoea" OR "Dispnea" OR "Dyspnoe" OR "Breathlessness" OR "wheeze" OR "wheezing" OR "wheezer" OR "wheezers" OR "Hyperventilation" OR "Hypoventilation" OR "Tachypnea" OR "sputum" OR "Sputums" OR "Phlegm" OR ("chest" AND "tightness") OR ("chest" AND "pain")))) OR ("nicotine" AND "cessation") OR "nicotine-free" OR "nicotine-dependence" OR "tobacco" OR "tobacco-free" OR "tobacco-dependence" OR "smoke" OR "smoke-free" OR "smokeless" OR "smoker" OR "smokers" OR "smoking" OR ("Chest" AND ("physiotherapy" OR "physical therapy" OR "Exercise" OR "rehabilitation" OR "training")) OR (("air" OR "atmospheric" OR "atmosphere" OR "atmospheres") AND ("pollution" OR "pollutions" OR "pollutant" OR "pollutants" OR "quality")) OR "fume" OR (("clean" OR "improved") AND ("stove" OR "stoves" OR "cookstove" OR "cookstoves" OR "cooking stove" OR "cooking stoves" OR "cooking")))
<b>AND</b>	
Low- and middle-income countries	("Afghanistan" OR "Albania" OR "Algeria" OR "American Samoa" OR "Angola" OR "Argentina" OR "Armenia" OR "Azerbaijan" OR "Bangladesh" OR "Belarus" OR "Belize" OR "Benin" OR "Bhutan" OR "Bolivia" OR "Bosnia" OR "Botswana" OR "Brazil" OR "Bulgaria" OR "Burkina Faso" OR "Burundi" OR "Cabo Verde" OR "Cambodia" OR "Cameroon" OR "Cape Verde" OR "Central African Republic" OR "Chad" OR "China" OR "Colombia" OR "Comoros" OR "Congo" OR "Costa Rica" OR "Cote d'Ivoire" OR "Côte d'Ivoire" OR "Cote d'Ivoire" OR "Cote d'Ivoire" OR "Côte d'Ivoire" OR "Ivory Coast" OR "Cuba" OR "Democratic Republic of the Congo" OR "Djibouti" OR "Dominica" OR "Dominican Republic" OR "Ecuador" OR "Egypt" OR "El Salvador" OR "Equatorial Guinea" OR "Eritrea" OR "Ethiopia" OR "Fiji" OR "Gabon" OR "Gambia" OR "Gaza" OR "Georgia" OR "Ghana" OR "Grenada" OR "Grenadines" OR "Guatemala" OR "Guinea-Bissau" OR "Guinea" OR "Guyana" OR "Haiti" OR "Herzegovina" OR "Herzegovina" OR "Honduras" OR "India" OR "Indonesia" OR "Iran" OR "Iraq" OR "Ivory coast" OR "Jamaica" OR "Jordan" OR "Kazakhstan" OR "Kenya" OR "Kiribati" OR "Kosovo" OR "Kyrgyz republic" OR "Kyrgyzstan" OR "Kirghizia" OR "Lao" OR "Laos" OR "Lebanon" OR "Lesotho" OR "Liberia" OR "Libya" OR "Macedonia" OR "Madagascar" OR "Malawi" OR "Malaysia" OR "Maldives" OR "Mali" OR "Marshall Islands" OR "Mauritania" OR "Mauritius" OR "Mexico" OR "Micronesia" OR "Moldova" OR "Mongolia" OR "Montenegro" OR "Morocco" OR "Mozambique" OR "Myanmar" OR "Namibia" OR "Nepal" OR "Nicaragua" OR "Niger" OR "Nigeria" OR "North Korea" OR "North-Korea" OR "Pakistan" OR "Palau" OR "Palestine" OR "Panama" OR "Papua New Guinea" OR "Paraguay" OR "Peru" OR "Philippines" OR "Romania" OR "Rwanda" OR "Saint Lucia" OR "St. Lucia" OR "Saint Vincent" OR "St. Vincent" OR "Samoa" OR "Sao Tome and Principe" OR "São Tomé and Príncipe" OR "Senegal" OR "Serbia" OR "Sierra Leone" OR "Solomon Islands" OR "Somalia" OR "South Africa" OR "South Sudan" OR "Sri Lanka" OR "Sudan" OR "Suriname" OR "Swaziland" OR "Syria" OR "Tajikistan" OR "Tanzania" OR "Thailand" OR "Timor-Leste" OR "Togo" OR "Tonga" OR "Tunisia" OR "Turkey" OR "Turkmenistan" OR "Tuvalu" OR "Uganda" OR "Ukraine" OR "Uzbekistan" OR "Vanuatu" OR "Venezuela" OR "Vietnam" OR "West Bank" OR "Yemen" OR "Zambia" OR "Zimbabwe" OR "Russia" OR "Central America" OR "Central-America" OR "Caribbean" OR "Latin America" OR "Latin-America" OR "South America" OR "South-America" OR "Africa" OR "North Africa" OR "North-Africa" OR "Sub-Sahara" OR "Subsahara" OR "Central Asia" OR "Southeast Asia" OR "South east Asia" OR "South-east Asia" OR "Western Asia" OR "Balkan" OR "Afghan" OR "Afghani" OR "Albanian" OR "Algerian" OR "Samoan" OR "Angolan" OR "Argentinian" OR "Armenian" OR "Azerbaijani" OR "Bangladeshi" OR "Belarussian" OR "Belizean" OR "Beninese" OR "Bhutanese" OR "Bolivian" OR "Bosnian" OR "Motswana" OR "Botswanan" OR "Brazilian" OR "Bulgarian" OR "Burkinabe" OR "Burkinabé" OR "Burundian" OR "Cabo Verdean" OR "Cambodian" OR "Cameroonian" OR "Cape Verdean" OR "African" OR "Chadian" OR "Chinese" OR "Colombian" OR "Comoran" OR "Congolese" OR "Costa Rican" OR "Ivorian" OR "Cuban" OR "Djiboutian" OR "Dominican" OR "Ecuadorean" OR "Egyptian" OR "Salvadorean" OR "Equatorial

	<p>Guinean" OR "Eritrean" OR "Ethiopian" OR "Fijian" OR "Gabonese" OR "Gambian" OR "Gazan" OR "Georgian" OR "Ghanian" OR "Grenadian" OR "Grenadine" OR "Guatemalan" OR "Guinean" OR "Guyanese" OR "Haitian" OR "Honduran" OR "Indian" OR "Indonesian" OR "Iranian" OR "Iraqi" OR "Jamaican" OR "Jordanian" OR "Kazakhstani" OR "Kazakh" OR "Kenyan" OR "I-Kiribati" OR "Kosovan" OR "Kyrgyzstani" OR "Kirghiz" OR "Kyrgyz" OR "Laotian" OR "Lebanese" OR "Basotho" OR "Liberian" OR "Libyan" OR "Macedonian" OR "Malagasy" OR "Malawian" OR "Malaysian" OR "Maldivian" OR "Malian" OR "Marshallese" OR "Mauritanian" OR "Mauritian" OR "Mexican" OR "Micronesia" OR "Moldovan" OR "Mongolian" OR "Montenegrin" OR "Moroccan" OR "Mozambican" OR "Burmese" OR "Namibian" OR "Nepalese" OR "Nicaraguan" OR "Nigerien" OR "Nigerian" OR "North Korean" OR "North-Korean" OR "Pakistani" OR "Palauan" OR "Palestinian" OR "Panamanian" OR "Papua New Guinean" OR "Paraguayan" OR "Peruvian" OR "Philippine" OR "Romanian" OR "Rwandan" OR "Saint Lucian" OR "St. Lucian" OR "Saint Vincentian" OR "St. Vincentian" OR "Samoa" OR "Sao Tomean" OR "São Tomean" OR "Senegalese" OR "Serbian" OR "Sierra Leonean" OR "Soloman Islander" OR "Somali" OR "South African" OR "Sri Lankan" OR "Sudanese" OR "Surinamese" OR "Swazi" OR "Syrian" OR "Tajikistani" OR "Tanzanian" OR "Thai" OR "Timorese" OR "Togolese" OR "Tongan" OR "Tunisian" OR "Turkish" OR "Turkmen" OR "Turkmenian" OR "Tuvaluan" OR "Ugandan" OR "Ukrainian" OR "Uzbekistani" OR "Ni-Vanuatu" OR "Venezuelan" OR "Vietnamese" OR "Yemeni" OR "Zambian" OR "Zimbabwean" OR "Russian" OR "Central American" OR "Central-American" OR "Caribbean" OR "Latin American" OR "Latin-American" OR "South American" OR "South-American" OR "African" OR "Sub-Saharan" OR "Subsaharan" OR "Central Asian" OR "Southeast Asian" OR "South east Asian" OR "South-east Asian" OR "Western Asian" OR ("poor" OR "Low income" OR "lower income" OR "lower middle income" OR "upper middle income" OR "low and middle income" OR "low &amp; middle income" OR "low and medium income" OR "middle income" OR "medium income" OR "low resource" OR "lower resource" OR "least developed" OR "less developed" OR "underdeveloped" OR "under developed" OR "developing" OR "limited resource" OR "resource limited" OR "resource poor" OR "third world" OR "second world" OR <u>"Low-income"</u> OR <u>"lower-income"</u> OR <u>"lower-middle-income"</u> OR <u>"lower-middle income"</u> OR <u>"upper-middle-income"</u> OR <u>"upper-middle income"</u> OR <u>"low- and middle income"</u> OR <u>"low-and-middle-income"</u> OR <u>"low-and-medium-income"</u> OR <u>"low-and-medium income"</u> OR <u>"middle-income"</u> OR <u>"medium-income"</u> OR <u>"low-resource"</u> OR <u>"lower-resource"</u> OR <u>"least-developed"</u> OR <u>"less-developed"</u> OR <u>"under-developed"</u> OR <u>"limited-resource"</u> OR <u>"resource-limited"</u> OR <u>"resource-poor"</u> OR <u>"third-world"</u> OR <u>"second-world"</u>) AND ("continent" OR "continents" OR "country" OR "countries" OR "nation" OR "nations" OR "setting" OR "settings" OR "region" OR "regions" OR "area" OR "areas"))</p>
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**Table E2e. Search strategy as used in PsycINFO**

PsycINFO search results: 602	
<i>Construct</i>	<i>Terms used</i>
Implementation	<p>((SU implementation OR TI implementations OR TI implement OR TI implementing OR TI implemented OR TI implements OR SU adherence OR TI adhere OR TI adhering OR TI adhered OR TI adheres OR SU penetration OR TI penetrations OR TI penetrate OR TI penetrating OR TI penetrated OR TI penetrates OR SU adoption OR TI adoptions OR TI adopt OR TI adopting OR TI adopted OR TI adopts OR SU Information Dissemination OR TI dissemination OR TI disseminations OR TI disseminating OR TI disseminated OR TI disseminates OR SU effectiveness research OR SU Diffusion of Innovations OR TI diffusion OR TI diffusions OR TI diffuse OR TI diffusing OR TI diffused OR TI diffuses OR SU knowledge to action OR SU knowledge transfer OR SU knowledge translation OR SU research to practice OR SU research utilization OR SU research utilisation OR SU scale up OR SU scaling up OR SU technology</p>

	transfer OR SU translational research OR TI Continuation OR TI Continuing OR TI Continued OR TI Continues OR ((TI Program OR TI Programs OR TI Programme OR TI Programmes OR TI Process OR TI Processes) AND (TI Appropriateness OR TI Evaluation OR TI Evaluations OR TI Effectiveness OR TI Efficacy)))
<b>AND</b>	
Symptoms-, diseases-, or interventions related to chronic lung health	((((TX chronic OR TX non-communicable) AND (SU Lung OR TX Lung OR TX Lungs OR TX Airway OR TX Airways OR TX Breathing OR TX Breath OR TX Pulmonal OR TX Pulmonary OR TX Respiratory OR TX Respiration)) OR SU Chronic obstructive Pulmonary disease OR TX COPD OR TX COAD OR TX Chronic Airflow Obstruction OR TX Chronic Airflow Obstructions OR TX ACOS OR TX Asthma-COPD overlap syndrome OR SU Chronic Bronchitis OR TX Chronic bronchitis OR TX Pulmonary emphysema OR TX emphysema OR TX emphysemas OR SU Asthma OR TX Asthma OR TX Asthmas OR TX Astma OR TX asthmatic OR ((TX chronic) AND (SU Cough OR TX cough OR TX coughs OR TX coughing OR TX Dyspnea OR TX Dyspnea OR TX Dyspneas OR TX Dyspnoea OR TX Dispnea OR TX Dyspnoe OR TX Breathlessness OR TX wheeze OR TX wheezing OR TX wheezer OR TX wheezers OR SU Hyperventilation OR TX Hyperventilation OR TX Hypoventilation OR SU Tachypnea OR TX Tachypnea OR TX Sputum OR TX sputum OR TX Sputums OR TX Phlegm OR (TX chest AND TX tightness) OR (TX chest AND TX pain) OR SU Chest Pain)) OR (TX nicotine AND TX cessation) OR <u>TX nicotine-free</u> OR <u>TX nicotine-dependance</u> OR TX tobacco OR TX tobacco-free OR TX tobacco-dependence OR TX smoke OR TX smoke-free OR TX smokeless OR TX smoker OR TX smokers OR TX smoking OR SU Smoking OR SU Tobacco Use Disorder OR SU Tobacco Use OR SU Smoking cessation OR SU Tobacco smoke pollution OR (TX Chest AND (TX physiotherapy OR TX physical therapy OR TX Exercise OR TX rehabilitation OR TX training)) OR SU Indoor Air Pollution OR ((TX air OR TX atmospheric OR TX atmosphere OR TX atmospheres) AND (TX pollution OR TX pollutions OR TX pollutant OR TX pollutants OR TX quality)) OR TX fume OR ((TX clean OR TX improved) AND (TX stove OR TX stoves OR TX cookstove OR TX cookstoves OR TX cooking stove OR TX cooking stoves OR TX cooking)))
<b>AND</b>	
Low- and middle-income countries	(TX Afghanistan OR TX Albania OR TX Algeria OR TX American Samoa OR TX Angola OR TX Argentina OR TX Armenia OR TX Azerbaijan OR TX Bangladesh OR TX Belarus OR TX Belize OR TX Benin OR TX Bhutan OR TX Bolivia OR TX Bosnia OR TX Botswana OR TX Brazil OR TX Bulgaria OR TX Burkina Faso OR TX Burundi OR TX Cabo Verde OR TX Cambodia OR TX Cameroon OR TX Cape Verde OR TX Central African Republic OR TX Chad OR TX China OR TX Colombia OR TX Comoros OR TX Congo OR TX Costa Rica OR TX Cote d'Ivoire OR TX Côte d'Ivoire OR TX Cote d'Ivoire OR TX Cote d'Ivoire OR TX Côte d'Ivoire OR TX Ivory Coast OR TX Cuba OR TX Democratic Republic of the Congo OR TX Djibouti OR TX Dominica OR TX Dominican Republic OR TX Ecuador OR TX Egypt OR TX El Salvador OR TX Equatorial Guinea OR TX Eritrea OR TX Ethiopia OR TX Fiji OR TX Gabon OR TX Gambia OR TX Gaza OR TX Georgia OR TX Ghana OR TX Grenada OR TX Grenadines OR TX Guatemala OR TX Guinea-Bissau OR TX Guinea OR TX Guyana OR TX Haiti OR TX Herzegovina OR TX Herzegowina OR TX Honduras OR TX India OR TX Indonesia OR TX Iran OR TX Iraq OR TX Ivory coast OR TX Jamaica OR TX Jordan OR TX Kazakhstan OR TX Kenya OR TX Kiribati OR TX Kosovo OR TX Kyrgyz republic OR TX Kyrgyzstan OR TX Kirghizia OR TX Lao OR TX Laos OR TX Lebanon OR TX Lesotho OR TX Liberia OR TX Libya OR TX Macedonia OR TX Madagascar OR TX Malawi OR TX Malaysia OR TX Maldives OR TX Mali OR TX Marshall Islands OR TX Mauritania OR TX Mauritius OR TX Mexico OR TX Micronesia OR TX Moldova OR TX Mongolia OR TX Montenegro OR TX Morocco OR TX Mozambique OR TX Myanmar OR TX Namibia OR TX Nepal OR TX Nicaragua OR TX Niger OR TX Nigeria OR TX North Korea OR TX North-Korea OR TX Pakistan OR TX Palau OR TX Palestine OR TX Panama OR TX Papua New Guinea OR TX Paraguay OR TX Peru OR TX Philippines OR TX

Romania OR TX Rwanda OR TX Saint Lucia OR TX St. Lucia OR TX Saint Vincent OR TX St. Vincent OR TX Samoa OR TX Sao Tome and Principe OR TX São Tomé and Príncipe OR TX Senegal OR TX Serbia OR TX Sierra Leone OR TX Solomon Islands OR TX Somalia OR TX South Africa OR TX South Sudan OR TX Sri Lanka OR TX Sudan OR TX Suriname OR TX Swaziland OR TX Syria OR TX Tajikistan OR TX Tanzania OR TX Thailand OR TX Timor-Leste OR TX Togo OR TX Tonga OR TX Tunisia OR TX Turkey OR TX Turkmenistan OR TX Tuvalu OR TX Uganda OR TX Ukraine OR TX Uzbekistan OR TX Vanuatu OR TX Venezuela OR TX Vietnam OR TX West Bank OR TX Yemen OR TX Zambia OR TX Zimbabwe OR TX Russia OR TX Central America OR TX Central-America OR TX Caribbean OR SU Latin America OR TX Latin America OR TX Latin-America OR TX South America OR TX South-America OR TX Africa OR TX North Africa OR TX North-Africa OR TX Sub-Sahara OR TX Subsahara OR TX Central Asia OR TX Southeastern Asia OR TX Southeast Asia OR TX South east Asia OR TX South-east Asia OR TX Western Asia OR TX Western Asia OR TX China OR TX Eastern Europe OR TX Balkan OR TX Afghan OR TX Afghani OR TX Albanian OR TX Algerian OR TX Samoan OR TX Angolan OR TX Argentinian OR TX Armenian OR TX Azerbaijani OR TX Bangladeshi OR TX Belarussian OR TX Belizean OR TX Beninese OR TX Bhutanese OR TX Bolivian OR TX Bosnian OR TX Botswana OR TX Botswanan OR TX Brazilian OR TX Bulgarian OR TX Burkinabe OR TX Burkinabé OR TX Burundian OR TX Cabo Verdean OR TX Cambodian OR TX Cameroonian OR TX Cape Verdean OR TX African OR TX Chadian OR TX Chinese OR TX Colombian OR TX Comoran OR TX Congolese OR TX Costa Rican OR TX Ivorian OR TX Cuban OR TX Djiboutian OR TX Dominican OR TX Ecuadorean OR TX Egyptian OR TX Salvadorean OR TX Equatorial Guinean OR TX Eritrean OR TX Ethiopian OR TX Fijian OR TX Gabonese OR TX Gambian OR TX Gazan OR TX Georgian OR TX Ghanian OR TX Grenadian OR TX Grenadine OR TX Guatemalan OR TX Guinean OR TX Guyanese OR TX Haitian OR TX Honduran OR TX Indian OR TX Indonesian OR TX Iranian OR TX Iraqi OR TX Jamaican OR TX Jordanian OR TX Kazakhstani OR TX Kazakh OR TX Kenyan OR TX I-Kiribati OR TX Kosovan OR TX Kyrgyzstani OR TX Kirghiz OR TX Kyrgyz OR TX Laotian OR TX Lebanese OR TX Basotho OR TX Liberian OR TX Libyan OR TX Macedonian OR TX Malagasy OR TX Malawian OR TX Malaysian OR TX Maldivian OR TX Malian OR TX Marshallese OR TX Mauritanian OR TX Mauritian OR TX Mexican OR TX Micronesian OR TX Moldovan OR TX Mongolian OR TX Montenegrin OR TX Moroccan OR TX Mozambican OR TX Burmese OR TX Namibian OR TX Nepalese OR TX Nicaraguan OR TX Nigerien OR TX Nigerian OR TX North Korean OR TX North-Korean OR TX Pakistani OR TX Palauan OR TX Palestinian OR TX Panamanian OR TX Papua New Guinean OR TX Paraguayan OR TX Peruvian OR TX Philippine OR TX Romanian OR TX Rwandan OR TX Saint Lucian OR TX St. Lucian OR TX Saint Vincentian OR TX St. Vincentian OR TX Samoan OR TX Sao Tomean OR TX São Tomean OR TX Senegalese OR TX Serbian OR TX Sierra Leonean OR TX Soloman Islander OR TX Somali OR TX South African OR TX Sri Lankan OR TX Sudanese OR TX Surinamese OR TX Swazi OR TX Syrian OR TX Tajikistani OR TX Tanzanian OR TX Thai OR TX Timorese OR TX Togolese OR TX Tongan OR TX Tunisian OR TX Turkish OR TX Turkmen OR TX Turkmenian OR TX Tuvaluan OR TX Ugandan OR TX Ukrainian OR TX Uzbekistani OR TX Ni-Vanuatu OR TX Venezuelan OR TX Vietnamese OR TX Yemeni OR TX Zambian OR TX Zimbabwean OR TX Russian OR TX Central American OR TX Central-American OR TX Caribbean OR TX Latin American OR TX Latin-American OR TX South American OR TX South-American OR TX African OR TX Sub-Saharan OR TX Subsaharan OR TX Central Asian OR TX Southeast Asian OR TX South east Asian OR TX South-east Asian OR TX Western Asian OR SU developing countries OR ((TX poor OR TX Low income OR TX lower income OR TX lower middle income OR TX upper middle income OR TX low and middle income OR TX low & middle income OR TX low and medium income OR TX middle income OR TX medium income OR TX low resource OR TX lower resource OR TX resource limited OR TX resource poor OR TX least developed OR TX less developed OR TX underdeveloped OR

	TX under developed OR TX developing OR TX limited resource OR TX third world OR TX second world OR <u>TX Low-income</u> OR TX lower-income OR TX <u>upper-middle income</u> OR TX upper-middle-income OR TX lower-middle-income OR TX lower-middle income OR TX low-and-middle income OR TX low-and-middle-income OR TX low-and-medium income OR TX low-and-medium-income OR TX middle-income OR TX medium-income OR TX low-resource OR TX lower-resource OR TX least-developed OR TX less-developed OR TX under-developed OR TX limited-resource OR TX resource-limited OR TX resource-poor OR TX third-world OR TX second-world) AND (TX continent OR TX continents OR TX country OR TX countries OR TX nation OR TX nations OR TX setting OR TX settings OR TX region OR TX regions OR TX area OR TX areas))
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**Table E2f. Search strategy as used in Emcare**

Emcare search results: 691	
<i>Construct</i>	<i>Terms used</i>
Implementation	("implementation".ti. OR "implementations".ti. OR "implement".ti. OR "implementing".ti. OR "implemented".ti. OR "implements".ti. OR "adherence".ti. OR "adhere".ti. OR "adhering".ti. OR "adhered".ti. OR "adheres".ti. OR "penetration".ti. OR "penetrations".ti. OR "penetrate".ti. OR "penetrating".ti. OR "penetrated".ti. OR "penetrates".ti. OR "adoption".ti. OR "adoptions".ti. OR "adopt".ti. OR "adopting".ti. OR "adopted".ti. OR "adopts".ti. OR "Information Dissemination"/ OR "dissemination".ti. OR "disseminations".ti. OR "disseminating".ti. OR "disseminated".ti. OR "disseminates".ti. OR "effectiveness research".ti. OR "diffusion".ti. OR "diffusions".ti. OR "diffuse".ti. OR "diffusing".ti. OR "diffused".ti. OR "diffuses".ti. OR "knowledge to action".ti. OR " <u>knowledge-to-action</u> ".ti. OR "knowledge transfer".ti. OR " <u>knowledge-transfer</u> ".ti. OR "knowledge translation".ti. OR "research to practice".ti. OR "research-to-practice".ti. OR "research utilization".ti. OR "research utilisation".ti. OR "scale up".ti. OR " <u>scale-up</u> ".ti. OR "scaling up".ti. OR " <u>scaling-up</u> ".ti. OR "technology transfer".ti. OR "translational research".ti. OR "Continuation".ti. OR "Continuing".ti. OR "Continued".ti. OR "Continues".ti. OR exp program evaluation/ OR ("Program".ti. OR "Programs".ti. OR "Programme".ti. OR "Programmes".ti. OR "Process".ti. OR "Processes".ti.) AND ("Appropriateness".ti. OR "Evaluation".ti. OR "Evaluations".ti. OR "Effectiveness".ti. OR "Efficacy".ti.))
<b>AND</b>	
Symptoms-, diseases-, or interventions related to chronic lung health	((("chronic".mp. OR "non-communicable".mp.) AND (exp"Lung"/ OR "Lung".mp. OR "Lungs".mp. OR "Airway".mp. OR "Airways".mp. OR "Breathing".mp. OR "Breath".mp. OR "Pulmonal".mp. OR "Pulmonary".mp. OR "Respiratory".mp. OR "Respiration".mp.)) OR exp obstructive airway disease/ OR "COPD".mp. OR "COAD".mp. OR "Chronic Airflow Obstruction".mp. OR "Chronic Airflow Obstructions".mp. OR "ACOS".mp. OR " <u>Asthma-COPD overlap syndrome</u> ".mp. OR "Chronic bronchitis".mp. OR "emphysema".mp. OR "emphysemas".mp. OR "Asthma".mp. OR "Asthmas".mp. OR "Astma".mp. OR "asthmatic".mp. OR (("chronic".mp.) AND (coughing/ OR "Cough"/ OR "cough".mp. OR "coughs".mp. OR "coughing".mp. OR "Dyspnea"/ OR "Dyspnea".mp. OR "Dyspneas".mp. OR "Dyspnoea".mp. OR "Dispnea".mp. OR "Dyspnoe".mp. OR "Breathlessness".mp. OR "wheeze".mp. OR "wheezing".mp. OR "wheezer".mp. OR "wheezers".mp. OR "Hyperventilation"/ OR "Hyperventilation".mp. OR "Hypoventilation".mp. OR "Tachypnea"/ OR "Tachypnea".mp. OR "Sputum"/ OR "sputum".mp. OR "Sputums".mp. OR "Phlegm".mp.)) OR ("chest".mp. AND "tightness".mp.) OR ("chest".mp. AND "pain".mp.) OR "Thorax Pain"/ OR ("nicotine".mp. AND "cessation".mp.) OR " <u>nicotine-free</u> ".mp. OR " <u>nicotine-dependence</u> ".mp. OR "tobacco".mp. OR " <u>tobacco-free</u> ".mp. OR " <u>tobacco-dependence</u> ".mp. OR "smoke".mp. OR "smoke"/ OR " <u>smoke-free</u> ".mp. OR " <u>smoke-dependence</u> ".mp. OR "smokeless".mp. OR "smoker".mp. OR "smokers".mp. OR "smoking".mp. OR exp "Smoking"/ OR " <u>tobacco dependence</u> ".mp. OR exp "Tobacco Use"/ OR "Smoking cessation"/ OR "Passive smoking"/ OR ("Chest".mp. AND ("physiotherapy".mp. OR "physical therapy".mp. OR "Exercise".mp. OR "rehabilitation".mp. OR

	"training".mp.)) OR "Air Pollution"/ OR "air pollutant"/ OR "Air Pollution control"/ OR "Air particle control"/ OR "Chimney"/ OR "Indoor air pollution "/ OR (("air".mp. OR "atmospheric".mp. OR "atmosphere".mp. OR "atmospheres".mp.) AND ("pollution".mp. OR "pollutions".mp. OR "pollutant".mp. OR "pollutants".mp. OR "quality".mp.)) OR "fume".mp. OR (("clean".mp. OR "improved".mp.) AND ("stove".mp. OR "stoves".mp. OR "cookstove".mp. OR "cookstoves".mp. OR "cooking stove".mp. OR "cooking".mp.))
<b>AND</b>	
Low- and middle-income countries	("Afghanistan".mp. OR "Albania".mp. OR "Algeria".mp. OR "American Samoa".mp. OR "Angola".mp. OR "Argentina ".mp. OR "Armenia".mp. OR "Azerbaijan".mp. OR "Bangladesh".mp. OR "Belarus".mp. OR "Belize".mp. OR "Benin".mp. OR "Bhutan".mp. OR "Bolivia".mp. OR "Bosnia".mp. OR "Botswana".mp. OR "Brazil".mp. OR "Bulgaria".mp. OR "Burkina Faso".mp. OR "Burundi".mp. OR "Cabo Verde".mp. OR "Cambodia".mp. OR "Cameroon".mp. OR "Cape Verde".mp. OR "Central African Republic".mp. OR "Chad".mp. OR "China".mp. OR "Colombia".mp. OR "Comoros".mp. OR "Congo".mp. OR "Costa Rica".mp. OR "Cote d'Ivoire".mp. OR "Côte d'Ivoire".mp. OR "Cote d'Ivoire".mp. OR "Cote d'Ivoire".mp. OR "Côte d'Ivoire".mp. OR "Ivory Coast".mp. OR "Cuba".mp. OR "Democratic Republic of the Congo".mp. OR "Djibouti".mp. OR "Dominica".mp. OR "Dominican Republic".mp. OR "Ecuador".mp. OR "Egypt".mp. OR "El Salvador".mp. OR "Equatorial Guinea".mp. OR "Eritrea".mp. OR "Ethiopia".mp. OR "Fiji".mp. OR "Gabon".mp. OR "Gambia".mp. OR "Gaza".mp. OR "Georgia".mp. OR "Ghana".mp. OR "Grenada".mp. OR "Grenadines".mp. OR "Guatemala".mp. OR "Guinea-Bissau".mp. OR "Guinea".mp. OR "Guyana".mp. OR "Haiti".mp. OR "Herzegovina".mp. OR "Herzegovina".mp. OR "Honduras".mp. OR "India".mp. OR "Indonesia".mp. OR "Iran".mp. OR "Iraq".mp. OR "Jamaica".mp. OR "Jordan".mp. OR "Kazakhstan".mp. OR "Kenya".mp. OR "Kiribati".mp. OR "Kosovo".mp. OR "Kyrgyz republic".mp. OR "Kyrgyzstan".mp. OR "Kirghizia".mp. OR "Lao".mp. OR "Laos".mp. OR "Lebanon".mp. OR "Lesotho".mp. OR "Liberia".mp. OR "Libya".mp. OR "Macedonia".mp. OR "Madagascar".mp. OR "Malawi".mp. OR "Malaysia".mp. OR "Maldives".mp. OR "Mali".mp. OR "Marshall Islands".mp. OR "Mauritania".mp. OR "Mauritius".mp. OR "Mexico".mp. OR "Micronesia".mp. OR "Moldova".mp. OR "Mongolia".mp. OR "Montenegro".mp. OR "Morocco".mp. OR "Mozambique".mp. OR "Myanmar".mp. OR "Namibia".mp. OR "Nepal".mp. OR "Nicaragua".mp. OR "Niger".mp. OR "Nigeria".mp. OR "North Korea".mp. OR "North-Korea".mp. OR "Pakistan".mp. OR "Palau".mp. OR "Palestine".mp. OR "Panama".mp. OR "Papua New Guinea".mp. OR "Paraguay".mp. OR "Peru".mp. OR "Philippines".mp. OR "Romania".mp. OR "Rwanda".mp. OR "Saint Lucia".mp. OR "St. Lucia".mp. OR "Saint Vincent".mp. OR "St. Vincent".mp. OR "Sao Tomé and Principe".mp. OR "Sao Tome and Principe".mp. OR "São Tomé and Principe".mp. OR "Senegal".mp. OR "Serbia".mp. OR "Sierra Leone".mp. OR "Solomon Islands".mp. OR "Somalia".mp. OR "South Africa".mp. OR "South Sudan".mp. OR "Sri Lanka".mp. OR "Sudan".mp. OR "Suriname".mp. OR "Swaziland".mp. OR "Syria".mp. OR "Tajikistan".mp. OR "Tadzhikistan".mp. OR "Tanzania".mp. OR "Thailand".mp. OR "Timor-Leste".mp. OR "Togo".mp. OR "Tonga".mp. OR "Tunisia".mp. OR "Turkey".mp. OR "Turkmenistan".mp. OR "Tuvalu".mp. OR "Uganda".mp. OR "Ukraine".mp. OR "Uzbekistan".mp. OR "Vanuatu".mp. OR "Venezuela".mp. OR "Vietnam".mp. OR "West Bank ".mp. OR "Yemen".mp. OR "Zambia".mp. OR "Zimbabwe".mp. OR "Russia".mp. OR "South and Central America"/ OR "Central America"/ OR "South America"/ OR "Caribbean"/ OR "Central America".mp. OR "Central-America".mp. OR "Caribbean".mp. OR "Latin America".mp. OR "Latin-America".mp. OR "South America".mp. OR "South-America".mp. OR "Africa"/ OR "Africa".mp. OR "North Africa".mp. OR "North-Africa".mp. OR "Sub-Sahara".mp. OR "Subsahara".mp. OR "South Asia"/ OR "Central Asia".mp. OR "Southeast Asia"/ OR "Southeast Asia".mp. OR "South east Asia".mp. OR "South-east Asia".mp. OR "Western Asia".mp. OR "China"/ OR "North Korea"/ OR "Eastern Europe"/ OR "Balkan".mp. OR "Afghan".mp. OR "Afghani".mp. OR "Albanian".mp. OR "Algerian".mp. OR "Samoan".mp. OR "Angolan".mp. OR "Argentinian".mp. OR

"Armenian".mp. OR "Azerbaijani".mp. OR "Bangladeshi".mp. OR "Belarussian".mp. OR "Belizean".mp. OR "Beninese".mp. OR "Bhutanese".mp. OR "Bolivian".mp. OR "Bosnian".mp. OR "Motswana".mp. OR "Botswanan".mp. OR "Brazilian".mp. OR "Bulgarian".mp. OR "Burkinabe".mp. OR "Burkinabé".mp. OR "Burundian".mp. OR "Cabo Verdean".mp. OR "Cambodian".mp. OR "Cameroonian".mp. OR "Cape Verdean".mp. OR "African".mp. OR "Chadian".mp. OR "Chinese".mp. OR "Colombian".mp. OR "Comoran".mp. OR "Congolese".mp. OR "Costa Rican".mp. OR "Ivorian".mp. OR "Cuban".mp. OR "Djiboutian".mp. OR "Dominican".mp. OR "Ecuadorean".mp. OR "Egyptian".mp. OR "Salvadorean".mp. OR "Equatorial Guinean".mp. OR "Eritrean".mp. OR "Ethiopian".mp. OR "Fijian".mp. OR "Gabonese".mp. OR "Gambian".mp. OR "Gazan".mp. OR "Georgian".mp. OR "Ghanian".mp. OR "Grenadian".mp. OR "Grenadine".mp. OR "Guatemalan".mp. OR "Guinean".mp. OR "Guyanese".mp. OR "Haitian".mp. OR "Honduran".mp. OR "Indian".mp. OR "Indonesian".mp. OR "Iranian".mp. OR "Iraqi".mp. OR "Jamaican".mp. OR "Jordanian".mp. OR "Kazakhstani".mp. OR "Kazakh".mp. OR "Kenyan".mp. OR "I-Kiribati".mp. OR "Kosovan".mp. OR "Kyrgyzstani".mp. OR "Kirghiz".mp. OR "Kyrgyz".mp. OR "Laotian".mp. OR "Lebanese".mp. OR "Basotho".mp. OR "Liberian".mp. OR "Libyan".mp. OR "Macedonian".mp. OR "Malagasy".mp. OR "Malawian".mp. OR "Malaysian".mp. OR "Maldivian".mp. OR "Malian".mp. OR "Marshallese".mp. OR "Mauritanian".mp. OR "Mauritian".mp. OR "Mexican".mp. OR "Micronesian".mp. OR "Moldovan".mp. OR "Mongolian".mp. OR "Montenegrin".mp. OR "Moroccan".mp. OR "Mozambican".mp. OR "Burmese".mp. OR "Namibian".mp. OR "Nepalese".mp. OR "Nicaraguan".mp. OR "Nigerien".mp. OR "Nigerian".mp. OR "North Korean".mp. OR "North-Korean".mp. OR "Pakistani".mp. OR "Palauan".mp. OR "Palestinian".mp. OR "Panamanian".mp. OR "Papua New Guinean".mp. OR "Paraguayan".mp. OR "Peruvian".mp. OR "Philippine".mp. OR "Romanian".mp. OR "Rwandan".mp. OR "Saint Lucian".mp. OR "St. Lucian".mp. OR "Saint Vincentian".mp. OR "St. Vincentian".mp. OR "Samoa".mp. OR "Sao Tomean".mp. OR "São Tomean".mp. OR "Senegalese".mp. OR "Serbian".mp. OR "Sierra Leonean".mp. OR "Soloman Islander".mp. OR "Somali".mp. OR "South African".mp. OR "Sri Lankan".mp. OR "Sudanese".mp. OR "Surinamese".mp. OR "Swazi".mp. OR "Syrian".mp. OR "Tajikistani".mp. OR "Tanzanian".mp. OR "Thai".mp. OR "Timorese".mp. OR "Togolese".mp. OR "Tongan".mp. OR "Tunisian".mp. OR "Turkish".mp. OR "Turkmen".mp. OR "Turkmenian".mp. OR "Tuvaluan".mp. OR "Ugandan".mp. OR "Ukrainian".mp. OR "Uzbekistani".mp. OR "Uzbek".mp. OR "Ni-Vanuatu".mp. OR "Venezuelan".mp. OR "Vietnamese".mp. OR "Yemeni".mp. OR "Zambian".mp. OR "Zimbabwean".mp. OR "Russian".mp. OR "Central American".mp. OR "Central American".mp. OR "Caribbean".mp. OR "Latin American".mp. OR "Latin-American".mp. OR "South American".mp. OR "South-American".mp. OR "African".mp. OR "Sub-Saharan".mp. OR "Subsaharan".mp. OR "Central Asian".mp. OR "Southeast Asian".mp. OR "South east Asian".mp. OR "South-east Asia".mp. OR "Western Asian".mp. OR "developing countries"/ OR ("poor".mp. OR "Low income".mp. OR "lower income".mp. OR "lower middle income".mp. OR "upper middle income".mp. OR "low and middle income".mp. OR "low & middle income".mp. OR "low and medium income".mp. OR "middle income".mp. OR "medium income".mp. OR "low resource".mp. OR "lower resource".mp. OR "least developed".mp. OR "less developed".mp. OR "underdeveloped".mp. OR "under developed".mp. OR "developing".mp. OR "limited resource".mp. OR "resource limited".mp. OR "resource poor".mp. OR "third world".mp. OR "second world".mp. OR "Low-income".mp. OR "lower-income".mp. OR "lower-middle-income".mp. OR "lower-middle income".mp. OR "upper-middle income".mp. OR "upper-middle-income".mp. OR "low-and-middle income".mp. OR "low-and-middle-income".mp. OR "low-and-medium income".mp. OR "low-and-medium-income".mp. OR "middle-income".mp. OR "medium-income" OR "low-resource".mp. OR "lower-resource".mp. OR "least-developed".mp. OR "less-developed".mp. OR "under-developed".mp. OR "limited-resource".mp. OR "resource-limited".mp. OR "resource-poor".mp. OR "third-world".mp. OR "second-world".mp.) AND ("continent".mp. OR

	"continents".mp. OR "country".mp. OR "countries".mp. OR "nation".mp. OR "nations".mp. OR "setting".mp. OR "settings".mp. OR "region".mp. OR "regions".mp. OR "area".mp. OR "areas".mp.))
<b>NOT</b>	
	("Animal"/ NOT "Human"/)

**Table E2g. Search strategy as used in Web of Science**

Web of Science search results: 1366	
<i>Construct</i>	<i>Terms used</i>
Implementation	( <b>TI</b> =("implementation" OR "implementations" OR "implement" OR "implementing" OR "implemented" OR "implements" OR "adherence" OR "adhere" OR "adhering" OR "adhered" OR "adheres" OR "penetration" OR "penetrations" OR "penetrate" OR "penetrating" OR "penetrated" OR "penetrates" OR "adoption" OR "adoptions" OR "adopt" OR "adopting" OR "adopted" OR "adopts" OR "dissemination" OR "disseminations" OR "disseminating" OR "disseminated" OR "disseminates" OR "effectiveness research" OR "diffusion" OR "diffusions" OR "diffuse" OR "diffusing" OR "diffused" OR "diffuses" OR "knowledge to action" OR " <u>knowledge-to-action</u> " OR "knowledge transfer" OR " <u>knowledge-transfer</u> " OR "knowledge translation" OR "research to practice" OR "research-to-practice" OR "research utilization" OR "research utilisation" OR "scale up" OR " <u>scale-up</u> " OR "scaling up" OR " <u>scaling-up</u> " OR "technology transfer" OR "translational research" OR "Continuation" OR "Continuing" OR "Continued" OR "Continues" OR ("Program" OR "Programs" OR "Programme" OR "Programmes" OR "Process" OR "Processes") AND ("Appropriateness" OR "Evaluation" OR "Evaluations" OR "Effectiveness" OR "Efficacy"))))
<b>AND</b>	
Symptoms-, diseases-, or interventions related to chronic lung health	( <b>TS</b> =(((("chronic" OR "non-communicable") AND ("Lung" OR "Lungs" OR "Airway" OR "Airways" OR "Breathing" OR "Breath" OR "Pulmonal" OR "Pulmonary" OR "Respiratory" OR "Respiration"))) OR "COPD" OR "COAD" OR ("chronic" AND ("Airflow Obstruction" OR "Airflow Obstructions")) OR "ACOS" OR " <u>Asthma-COPD overlap syndrome</u> " OR "chronic bronchitis" OR "emphysema" OR "emphysemas" OR "Asthma" OR "Asthmas" OR "Astma" OR "asthmatic" OR (("chronic") AND ("cough" OR "coughs" OR "coughing" OR "Dyspnea" OR "Dyspneas" OR "Dyspnoea" OR "Dispnea" OR "Dyspnoe" OR "Breathlessness" OR "wheeze" OR "wheezing" OR "wheezer" OR "wheezers" OR "Hyperventilation" OR "Hypoventilation" OR "Tachypnea" OR "sputum" OR "Sputums" OR "Phlegm" OR ("chest" AND "tightness") OR ("chest" AND "pain")))) OR ("nicotine" AND "cessation") OR "nicotine-free" OR "nicotine-dependence" OR "tobacco" OR " <u>tobacco-free</u> " OR " <u>tobacco-dependence</u> " OR "smoke" OR "smoke-free" OR "smokeless" OR "smoker" OR "smokers" OR "smoking" OR ("Chest" AND ("physiotherapy" OR "physical therapy" OR "Exercise" OR "rehabilitation" OR "training")) OR (("air" OR "atmospheric" OR "atmosphere" OR "atmospheres") AND ("pollution" OR "pollutions" OR "pollutant" OR "pollutants" OR "quality")) OR "fume" OR ("clean" OR "improved") AND ("stove" OR "stoves" OR "cookstove" OR "cookstoves" OR "cooking stove" OR "cooking stoves" OR "cooking"))))
<b>AND</b>	
Low- and middle-income countries	(( <b>TS</b> =("Afghanistan" OR "Albania" OR "Algeria" OR "American Samoa" OR "Angola" OR "Argentina" OR "Armenia" OR "Azerbaijan" OR "Bangladesh" OR "Belarus" OR "Belize" OR "Benin" OR "Bhutan" OR "Bolivia" OR "Bosnia" OR "Botswana" OR "Brazil" OR "Bulgaria" OR "Burkina Faso" OR "Burundi" OR "Cabo Verde" OR "Cambodia" OR "Cameroon" OR "Cape Verde" OR "Central African Republic" OR "Chad" OR "China" OR "Colombia" OR "Comoros" OR "Congo" OR "Costa Rica" OR "Cote d'Ivoire" OR "Côte d'Ivoire" OR "Cote d'Ivoire" OR "Cote d'ivore" OR "Côte d'Ivoire" OR "Ivory Coast" OR "Cuba" OR "Democratic Republic of the Congo" OR "Djibouti" OR "Dominica" OR "Dominican Republic" OR "Ecuador" OR "Egypt" OR "El Salvador" OR "Equatorial Guinea" OR "Eritrea" OR "Ethiopia" OR "Fiji" OR "Gabon" OR "Gambia" OR "Gaza" OR "Georgia" OR "Ghana" OR "Grenada" OR "Grenadines"

OR "Guatemala" OR "Guinea-Bissau" OR "Guinea" OR "Guyana" OR "Haiti" OR "Herzegovina" OR "Herzegovina" OR "Honduras" OR "India" OR "Indonesia" OR "Iran" OR "Iraq" OR "Ivory coast" OR "Jamaica" OR "Jordan" OR "Kazakhstan" OR "Kenya" OR "Kiribati" OR "Kosovo" OR "Kyrgyz republic" OR "Kyrgyzstan" OR "Kirghizia" OR "Lao" OR "Laos" OR "Lebanon" OR "Lesotho" OR "Liberia" OR "Libya" OR "Macedonia" OR "Madagascar" OR "Malawi" OR "Malaysia" OR "Maldives" OR "Mali" OR "Marshall Islands" OR "Mauritania" OR "Mauritius" OR "Mexico" OR "Micronesia" OR "Moldova" OR "Mongolia" OR "Montenegro" OR "Morocco" OR "Mozambique" OR "Myanmar" OR "Namibia" OR "Nepal" OR "Nicaragua" OR "Niger" OR "Nigeria" OR "North Korea" OR "North-Korea" OR "Pakistan" OR "Palau" OR "Palestine" OR "Panama" OR "Papua New Guinea" OR "Paraguay" OR "Peru" OR "Philippines" OR "Romania" OR "Rwanda" OR "Saint Lucia" OR "St. Lucia" OR "Saint Vincent" OR "St. Vincent" OR "Samoa" OR "Sao Tome and Principe" OR "São Tomé and Principe" OR "Senegal" OR "Serbia" OR "Sierra Leone" OR "Solomon Islands" OR "Somalia" OR "South Africa" OR "South Sudan" OR "Sri Lanka" OR "Sudan" OR "Suriname" OR "Swaziland" OR "Syria" OR "Tajikistan" OR "Tanzania" OR "Thailand" OR "Timor-Leste" OR "Togo" OR "Tonga" OR "Tunisia" OR "Turkey" OR "Turkmenistan" OR "Tuvalu" OR "Uganda" OR "Ukraine" OR "Uzbekistan" OR "Vanuatu" OR "Venezuela" OR "Vietnam" OR "West Bank " OR "Yemen" OR "Zambia" OR "Zimbabwe" OR "Russia" OR "Balkan" OR "Afghan" OR "Afghani" OR "Albanian" OR "Algerian" OR "Samoan" OR "Angolan" OR "Argentinian" OR "Armenian" OR "Azerbaijani" OR "Bangladeshi" OR "Belarussian" OR "Belizean" OR "Beninese" OR "Bhutanese" OR "Bolivian" OR "Bosnian" OR "Botswana" OR "Botswanan" OR "Brazilian" OR "Bulgarian" OR "Burkinabe" OR "Burkinabé" OR "Burundian" OR "Cabo Verdean" OR "Cambodian" OR "Cameroonian" OR "Cape Verdean" OR "African" OR "Chadian" OR "Chinese" OR "Colombian" OR "Comoran" OR "Congolese" OR "Costa Rican" OR "Ivorian" OR "Cuban" OR "Djiboutian" OR "Dominican" OR "Ecuadorean" OR "Egyptian" OR "Salvadorean" OR "Equatorial Guinean" OR "Eritrean" OR "Ethiopian" OR "Fijian" OR "Gabonese" OR "Gambian" OR "Gazan" OR "Georgian" OR "Ghanian" OR "Grenadian" OR "Grenadine" OR "Guatemalan" OR "Guinean" OR "Guyanese" OR "Haitian" OR "Honduran" OR "Indian" OR "Indonesian" OR "Iranian" OR "Iraqi" OR "Jamaican" OR "Jordanian" OR "Kazakhstani" OR "Kazakh" OR "Kenyan" OR "I-Kiribati" OR "Kosovan" OR "Kyrgyzstani" OR "Kirghiz" OR "Kyrgyz" OR "Laotian" OR "Lebanese" OR "Basotho" OR "Liberian" OR "Libyan" OR "Macedonian" OR "Malagasy" OR "Malawian" OR "Malaysian" OR "Maldivian" OR "Malian" OR "Marshallese" OR "Mauritanian" OR "Mauritian" OR "Mexican" OR "Micronesian" OR "Moldovan" OR "Mongolian" OR "Montenegrin" OR "Moroccan" OR "Mozambican" OR "Burmese" OR "Namibian" OR "Nepalese" OR "Nicaraguan" OR "Nigerien" OR "Nigerian" OR "North Korean" OR "North-Korean" OR "Pakistani" OR "Palauan" OR "Palestinian" OR "Panamanian" OR "Papua New Guinean" OR "Paraguayan" OR "Peruvian" OR "Philippine" OR "Romanian" OR "Rwandan" OR "Saint Lucian" OR "St. Lucian" OR "Saint Vincentian" OR "St. Vincentian" OR "Samoan" OR "Sao Tomean" OR "São Tomean" OR "Senegalese" OR "Serbian" OR "Sierra Leonean" OR "Soloman Islander" OR "Somali" OR "South African" OR "Sri Lankan" OR "Sudanese" OR "Surinamese" OR "Swazi" OR "Syrian" OR "Tajikistani" OR "Tanzanian" OR "Thai" OR "Timorese" OR "Togolese" OR "Tongan" OR "Tunisian" OR "Turkish" OR "Turkmen" OR "Turkmenian" OR "Tuvaluan" OR "Ugandan" OR "Ukrainian" OR "Uzbekistani" OR "Ni-Vanuatu" OR "Venezuelan" OR "Vietnamese" OR "Yemeni" OR "Zambian" OR "Zimbabwean" OR "Russian" OR "Central American" OR "Central-American" OR "Caribbean" OR "Latin American" OR "Latin-American" OR "South American" OR "South-American" OR "African" OR "Sub-Saharan" OR "Subsaharan" OR "Central Asian" OR "Southeast Asian" OR "South east Asian" OR "South-east Asian" OR "Western Asian" OR ("poor" OR "Low income" OR "lower income" OR "lower middle income" OR "low and medium income" OR "middle income" OR "upper middle income" OR "medium income" OR "low resource" OR "lower resource" OR "least developed" OR "less developed" OR "underdeveloped" OR "under developed" OR "developing" OR

	"limited resource" OR "resource limited" OR "resource poor" OR "third world" OR "second world" OR "Low-income" OR "lower-income" OR "lower-middle-income" OR "lower-middle income" OR "low-and-middle income" OR "low-and-middle-income" OR "low and middle income" OR "low & middle income" OR "low-and-medium-income" OR "low-and-medium income" OR "upper-middle-income" OR "upper-middle income" OR "middle-income" OR "medium-income" OR "low-resource" OR "lower-resource" OR "least-developed" OR "less-developed" OR "under-developed" OR "limited-resource" OR "resource-limited" OR "resource-poor" OR "third-world" OR "second-world") AND ("continent" OR "continents" OR "country" OR "countries" OR "nation" OR "nations" OR "setting" OR "settings" OR "region" OR "regions" OR "area" OR "areas"))))
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**Table E2h. Search strategy as used in CINAHL**

CINAHL search results: 655	
<i>Construct</i>	<i>Terms used</i>
Implementation	(SU system implementation OR SU program implementation OR TI implementations OR TI implement OR TI implementing OR TI implemented OR TI implements OR TI adhere OR TI adhering OR TI adhered OR TI adheres OR TI penetrations OR TI penetrate OR TI penetrating OR TI penetrated OR TI penetrates OR TI adoptions OR TI adopt OR TI adopting OR TI adopted OR TI adopts OR TI dissemination OR TI disseminations OR TI disseminating OR TI disseminated OR TI disseminates OR SU Diffusion of Innovation OR TI diffusion OR TI diffusions OR TI diffuse OR TI diffusing OR TI diffused OR TI diffuses OR SU <u>Nursing Practice, Research-Based</u> OR SU <u>Medical Practice, Research-Based</u> OR SU <u>Professional Practice, Research-Based</u> OR TI Continuation OR TI Continuing OR TI Continued OR TI Continues OR ((TI Program OR TI Programs OR TI Programme OR TI Programmes OR TI Process OR TI Processes) AND (TI Appropriateness OR TI Evaluation OR TI Evaluations OR TI Effectiveness OR TI Efficacy)))
<b>AND</b>	
Symptoms-, diseases-, or interventions related to chronic lung health	((((TX chronic OR TX non-communicable) AND (SU Lung OR TX Lung OR TX Lungs OR TX Airway OR TX Airways OR TX Breathing OR TX Breath OR TX Pulmonal OR TX Pulmonary OR TX Respiratory OR TX Respiration)) OR SU Pulmonary Disease, Chronic Obstructive OR SU Lung Diseases, Obstructive OR TX COPD OR TX COAD OR TX Chronic Airflow Obstruction OR TX Chronic Airflow Obstructions OR TX ACOS OR <u>TX Asthma-COPD overlap syndrome</u> OR SU Bronchitis, Chronic OR TX Chronic bronchitis OR TX Pulmonary emphysema OR TX emphysema OR TX emphysemas OR SU Asthma OR TX Asthma OR TX Asthmas OR TX Astma OR TX asthmatic OR ((TX chronic) AND (SU Cough OR TX cough OR TX coughs OR TX coughing OR SU Dyspnea OR TX Dyspnea OR TX Dyspnea OR TX Dyspneas OR TX Dyspnoea OR TX Dispnea OR TX Dyspnoe OR TX Breathlessness OR TX wheeze OR TX wheezing OR TX wheezer OR TX wheezers OR SU Hyperventilation OR TX Hyperventilation OR TX Hypoventilation OR SU Tachypnea OR TX Tachypnea OR SU Sputum OR TX Sputum OR TX sputum OR TX Sputums OR TX Phlegm OR (TX chest AND TX tightness) OR (TX chest AND TX pain) OR SU Chest Pain)) OR (TX nicotine AND TX cessation) OR <u>TX nicotine-free</u> OR <u>TX nicotine-dependance</u> OR TX tobacco OR TX tobacco-free OR TX tobacco-dependence OR TX smoke OR <u>TX smoke-free</u> OR TX smokeless OR TX smoker OR TX smokers OR TX smoking OR SU Smoking OR SU Smoking cessation OR SU Smoking Cessation Programs OR SU Tobacco Use Cessation Products OR (TX Chest AND (TX physiotherapy OR TX physical therapy OR TX Exercise OR TX rehabilitation OR TX training)) OR SU Air Pollution, Indoor OR ((TX air OR TX atmospheric OR TX atmosphere OR TX atmospheres) AND (TX pollution OR TX pollutions OR TX pollutant OR TX pollutants OR TX quality)) OR TX fume OR ((TX clean OR TX improved) AND (TX stove OR TX stoves OR TX cookstove OR TX cookstoves OR TX cooking stove OR TX cooking stoves OR TX cooking)))
<b>AND</b>	

Low- and middle-income countries	<p>(TX Afghanistan OR TX Albania OR TX Algeria OR TX American Samoa OR TX Angola OR TX Argentina OR TX Armenia OR TX Azerbaijan OR TX Bangladesh OR TX Belarus OR TX Belize OR TX Benin OR TX Bhutan OR TX Bolivia OR TX Bosnia OR TX Botswana OR TX Brazil OR TX Bulgaria OR TX Burkina Faso OR TX Burundi OR TX Cabo Verde OR TX Cambodia OR TX Cameroon OR TX Cape Verde OR TX Central African Republic OR TX Chad OR TX China OR TX Colombia OR TX Comoros OR TX Congo OR TX Costa Rica OR TX Cote d'Ivoire OR TX Côte d'Ivoire OR TX Cote d'Ivoire OR TX Cote d'ivore OR TX Côte d'Ivoire OR TX Ivory Coast OR TX Cuba OR TX Democratic Republic of the Congo OR TX Djibouti OR TX Dominica OR TX Dominican Republic OR TX Ecuador OR TX Egypt OR TX El Salvador OR TX Equatorial Guinea OR TX Eritrea OR TX Ethiopia OR TX Fiji OR TX Gabon OR TX Gambia OR TX Gaza OR TX Georgia OR TX Ghana OR TX Grenada OR TX Grenadines OR TX Guatemala OR TX Guinea-Bissau OR TX Guinea OR TX Guyana OR TX Haiti OR TX Herzegovina OR TX Herzegovina OR TX Honduras OR TX India OR TX Indonesia OR TX Iran OR TX Iraq OR TX Ivory coast OR TX Jamaica OR TX Jordan OR TX Kazakhstan OR TX Kenya OR TX Kiribati OR TX Kosovo OR TX Kyrgyz republic OR TX Kyrgyzstan OR TX Kirghizia OR TX Lao OR TX Laos OR TX Lebanon OR TX Lesotho OR TX Liberia OR TX Libya OR TX Macedonia OR TX Madagascar OR TX Malawi OR TX Malaysia OR TX Maldives OR TX Mali OR TX Marshall Islands OR TX Mauritania OR TX Mauritius OR TX Mexico OR TX Micronesia OR TX Moldova OR TX Mongolia OR TX Montenegro OR TX Morocco OR TX Mozambique OR TX Myanmar OR TX Namibia OR TX Nepal OR TX Nicaragua OR TX Niger OR TX Nigeria OR TX North Korea OR TX North-Korea OR TX Pakistan OR TX Palau OR TX Palestine OR TX Panama OR TX Papua New Guinea OR TX Paraguay OR TX Peru OR TX Philippines OR TX Romania OR TX Rwanda OR TX Saint Lucia OR TX St. Lucia OR TX Saint Vincent OR TX St. Vincent OR TX Samoa OR TX Sao Tome and Principe OR TX São Tomé and Príncipe OR TX Senegal OR TX Serbia OR TX Sierra Leone OR TX Solomon Islands OR TX Somalia OR TX South Africa OR TX South Sudan OR TX Sri Lanka OR TX Sudan OR TX Suriname OR TX Swaziland OR TX Syria OR TX Tajikistan OR TX Tanzania OR TX Thailand OR TX Timor-Leste OR TX Togo OR TX Tonga OR TX Tunisia OR TX Turkey OR TX Turkmenistan OR TX Tuvalu OR TX Uganda OR TX Ukraine OR TX Uzbekistan OR TX Vanuatu OR TX Venezuela OR TX Vietnam OR TX West Bank OR TX Yemen OR TX Zambia OR TX Zimbabwe OR TX Russia OR SU Central America OR TX Central America OR TX Central-America OR TX Caribbean OR SU Latin America OR TX Latin America OR TX Latin-America OR SU South America TX South America OR TX South-America OR TX Africa OR SU Africa, Northern OR TX North Africa OR TX North-Africa OR TX Sub-Sahara OR TX Subsahara OR SU Asia, Central OR TX Central Asia OR SU Asia, Southeastern OR TX Southeastern Asia OR TX Southeast Asia OR TX South east Asia OR TX Southeast Asia OR TX Western Asia OR SU Asia, Western OR TX Western Asia OR TX China OR SU Europe, Eastern OR TX Eastern Europe OR TX Balkan OR TX Afghan OR TX Afghani OR TX Albanian OR TX Algerian OR TX Samoan OR TX Angolan OR TX Argentinian OR TX Armenian OR TX Azerbaijani OR TX Bangladeshi OR TX Belarussian OR TX Belizean OR TX Beninese OR TX Bhutanese OR TX Bolivian OR TX Bosnian OR TX Mlotswana OR TX Botswanan OR TX Brazilian OR TX Bulgarian OR TX Burkinabe OR TX Burkinabé OR TX Burundian OR TX Cabo Verdean OR TX Cambodian OR TX Cameroon OR TX Cape Verdean OR TX African OR TX Chadian OR TX Chinese OR TX Colombian OR TX Comoran OR TX Congolese OR TX Costa Rican OR TX Ivorian OR TX Cuban OR TX Djiboutian OR TX Dominican OR TX Ecuadorean OR TX Egyptian OR TX Salvadorean OR TX Equatorial Guinean OR TX Eritrean OR TX Ethiopian OR TX Fijian OR TX Gabonese OR TX Gambian OR TX Gazan OR TX Georgian OR TX Ghanian OR TX Grenadian OR TX Grenadine OR TX Guatemalan OR TX Guinean OR TX Guyanese OR TX Haitian OR TX Honduran OR TX Indian OR TX Indonesian OR TX Iranian OR TX Iraqi OR TX Jamaican OR TX Jordanian OR TX Kazakhstani OR TX Kazakh OR TX Kenyan OR TX I-Kiribati OR TX Kosovan OR TX Kyrgyzstani OR TX Kirghiz OR TX Kyrgyz OR</p>
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TX Laotian OR TX Lebanese OR TX Basotho OR TX Liberian OR TX Libyan OR  
 TX Macedonian OR TX Malagasy OR TX Malawian OR TX Malaysian OR TX  
 Maldivian OR TX Malian OR TX Marshallese OR TX Mauritanian OR TX  
 Mauritian OR TX Mexican OR TX Micronesian OR TX Moldovan OR TX  
 Mongolian OR TX Montenegrin OR TX Moroccan OR TX Mozambican OR TX  
 Burmese OR TX Namibian OR TX Nepalese OR TX Nicaraguan OR TX Nigerian  
 OR TX Nigerian OR TX North Korean OR TX North-Korean OR TX Pakistani OR  
 TX Palauan OR TX Palestinian OR TX Panamanian OR TX Papua New Guinean  
 OR TX Paraguayan OR TX Peruvian OR TX Philippine OR TX Romanian OR TX  
 Rwandan OR TX Saint Lucian OR TX St. Lucian OR TX Saint Vincentian OR TX  
 St. Vincentian OR TX Samoan OR TX Sao Tomean OR TX São Tomean OR TX  
 Senegalese OR TX Serbian OR TX Sierra Leonean OR TX Solomon Islander OR  
 TX Somali OR TX South African OR TX Sri Lankan OR TX Sudanese OR TX  
 Surinamese OR TX Swazi OR TX Syrian OR TX Tajikistani OR TX Tanzanian  
 OR TX Thai OR TX Timorese OR TX Togolese OR TX Tongan OR TX Tunisian  
 OR TX Turkish OR TX Turkmen OR TX Turkmenian OR TX Tuvaluan OR TX  
 Ugandan OR TX Ukrainian OR TX Uzbekistani OR TX Ni-Vanuatu OR TX  
 Venezuelan OR TX Vietnamese OR TX Yemeni OR TX Zambian OR TX  
 Zimbabwean OR TX Russian OR TX Central American OR TX Central-American  
 OR TX Caribbean OR TX Latin American OR TX Latin-American OR TX South  
 American OR TX South-American OR TX African OR TX Sub-Saharan OR TX  
 Subsaharan OR TX Central Asian OR TX Southeast Asian OR TX South east  
 Asian OR TX South-east Asian OR TX Western Asian OR SU Developing  
 countries OR ((TX poor OR TX Low income OR TX lower income OR TX lower  
 middle income OR TX upper middle income OR TX low and middle income OR  
 TX low & middle income OR TX low and medium income OR TX middle income  
 OR TX medium income OR TX low resource OR TX lower resource OR TX  
 resource limited OR TX resource poor OR TX least developed OR TX less  
 developed OR TX underdeveloped OR TX under developed OR TX developing  
 OR TX limited resource OR TX third world OR TX second world OR TX Low-  
income OR TX lower-income OR TX upper-middle income OR TX upper-middle-  
income OR TX lower-middle-income OR TX lower-middle income OR TX low-  
and-middle income OR TX low-and-middle-income OR TX low-and-medium  
income OR TX low-and-medium-income OR TX middle-income OR TX medium-  
income OR TX low-resource OR TX lower-resource OR TX least-developed OR  
TX less-developed OR TX under-developed OR TX limited-resource OR TX  
resource-limited OR TX resource-poor OR TX third-world OR TX second-world)  
 AND (TX continent OR TX continents OR TX country OR TX countries OR TX  
 nation OR TX nations OR TX setting OR TX settings OR TX region OR TX  
 regions OR TX area OR TX areas))

## Appendix 2 Critical appraisal tool and operationalisation

For a comprehensive critical appraisal, the authors of the Meta-QAT<sup>1</sup> recommend to combine their tool with the Critical Appraisal Skills Programme (CASP) Tool<sup>2</sup>. Using the two tools sequentially would distort a logical appraisal flow, and some items of the two tools overlap. Therefore, we integrated the individual items of the CASP into the Meta-QAT tool for a more user-friendly structure, and omitted overlapping items to avoid giving those extra weight. The example below includes the Meta-QAT tool including the items of the CASP for Qualitative Studies.

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### Meta-QAT (CASP) TOOL

#### 1. ASSESSMENT OF RELEVANCY

Does the study address a topic(s) relevant to the issue under investigation?

SIGNALLING - you may consider the following questions to help you answer the bolded question.

- a) Was the justification for the study clearly stated? (For example, does it address a gap in the existing literature?)
- b) Do the results of the study apply to the issue under consideration?
- c) How similar or different is the study population or setting to yours? Is a difference likely to matter for the issue at hand?
- d) Is the research design appropriate for the methodology you are considering? (For example, if you are considering a systematic review, you will be reviewing only certain types of publications.)

Written answer:

Optional: yes no unclear n/a

Overall comments on relevancy?

#### 2. ASSESSMENT OF RELIABILITY

Reliability refers to the elements required so that one could reproduce the research. The main elements being assessed are the transparency of the research and the reporting quality.

A) Is the study presented clearly?

SIGNALLING - you may consider the following questions to help you answer the bolded question.

- a) Is the rationale for study clearly stated, and does the study focus on a clearly defined issue?
- b) Is the conduct of the study clearly described and easy to follow? Can you identify the research design?
- c) Are the findings presented and discussed within the appropriate context?
- d) Is there a conflict of interest statement?
- e) Can the study be reproduced with the information provided?

Written answer:

Optional: yes no unclear n/a

B) Are the research methodology and results clearly described?

SIGNALLING - you may consider the following questions to help you answer the bolded question.

- a) Does the methodology describe the population studied, the intervention given, and the outcomes?
- b) Are all sources of information clearly identified?
- c) Are inclusion and exclusion criteria defined?
- d) Are the statistical and/or analytical methods described?
- e) If applicable, are the results reported in data tables consistent with those described in the results section?
- f) Could the methods be reproduced based on the information provided?

Written answer:

Optional: yes no unclear n/a

g) **CASP 1. Was there a clear statement of the aims of the research?**

HINT: Consider • what was the goal of the research • why it was thought important • its relevance  
Yes Can't Tell No

**Comments:**

h) **CASP 9. Is there a clear statement of findings?**

HINT: Consider whether • If the findings are explicit • If there is adequate discussion of the evidence both for and against the researcher's arguments • If the researcher has discussed the credibility of their findings (e.g. triangulation, respondent validation, more than one analyst) • If the findings are discussed in relation to the original research question. • Measurement of exposure/outcome or important confounders/predictors?

Yes Can't Tell No

**Comments:**

Overall comments on reliability?

### 3. ASSESSMENT OF VALIDITY

This section refers to the likelihood and magnitude of error or bias in the study

A) Is the study methodology appropriate for the scope of research?

SIGNALLING - you may consider the following questions to help you answer the bolded question.

- a) Is the research question congruent with the study design?
- b) Does the methodology match the theory or the conceptual model?
- c) Are appropriate controls considered if applicable?
- d) Are the statistical/analytic methods appropriate for the design and/or the question?
- e) Are important theoretical factors accounted for in the analysis?

Written answer:

Optional: yes no unclear n/a

B) Are the authors' conclusions explicit and transparent?

SIGNALLING - you may consider the following questions to help you answer the bolded question.

- a) Are the results conclusive?
- b) Are the authors' conclusions clearly derived from the results (transparent)?
- c) Are potential discrepancies discussed?
- d) Was chance addressed?

Written answer:

Optional: yes no unclear n/a

C) Can I be confident about the findings?

SIGNALLING - you may consider the following questions to help you answer the bolded question.

- a) Are there any major methodological flaws that limit the validity of the findings? (these may have been identified in a) or b))
- b) Are the study's results similar to those of the existing body of literature? If not, are the reasons for the difference clearly explained?

Written answer:

Optional: yes no unclear n/a

## **CASP Section A: Are the results valid?**

### **c) CASP 2. Is a qualitative methodology appropriate?**

HINT: Consider • If the research seeks to interpret or illuminate the actions and/or subjective experiences of research participants • Is qualitative research the right methodology for addressing the research goal

Yes Can't Tell No

#### **Comments:**

### **d) CASP 3. Was the research design appropriate to address the aims of the research?**

HINT: Consider • if the researcher has justified the research design (e.g. have they discussed how they decided which method to use)

Yes Can't Tell No

#### **Comments:**

### **e) CASP 4. Was the recruitment strategy appropriate to the aims of the research?**

HINT: Consider • If the researcher has explained how the participants were selected • If they explained why the participants they selected were the most appropriate to provide access to the type of knowledge sought by the study • If there are any discussions around recruitment (e.g. why some people chose not to take part) • Were there sources of bias in the inclusion/exclusion criteria for the study population?

Yes Can't Tell No

#### **Comments:**

### **f) CASP 5. Was the data collected in a way that addressed the research issue?**

HINT: Consider • If the setting for the data collection was justified • If it is clear how data were collected (e.g. focus group, semi-structured interview etc.) • If the researcher has justified the methods chosen • If the researcher has made the methods explicit (e.g. for interview method, is there an indication of how interviews are conducted, or did they use a topic guide) • If methods were modified during the study. If so, has the researcher explained how and why • If the form of data is clear (e.g. tape recordings, video material, notes etc.) • If the researcher has discussed saturation of data

Yes Can't Tell No

#### **Comments:**

### **g) CASP 6. Has the relationship between researcher and participants been adequately considered?**

HINT: Consider • If the researcher critically examined their own role, potential bias and influence during (a) formulation of the research questions (b) data collection, including sample recruitment and choice of location • How the researcher responded to events during the study and whether they considered the implications of any changes in the research design

Yes Can't Tell No

#### **Comments:**

## **CASP Section B: What are the results?**

### **h) CASP 7. Have ethical issues been taken into consideration?**

HINT: Consider • If there are sufficient details of how the research was explained to participants for the reader to assess whether ethical standards were maintained • If the researcher has discussed issues raised by the study (e.g. issues around informed consent or confidentiality or how they have handled the effects of the study on the participants during and after the study) • If approval has been sought from the ethics committee

Yes Can't Tell No

**Comments:**

i) **CASP 8. Was the data analysis sufficiently rigorous?**

HINT: Consider • If there is an in-depth description of the analysis process • If thematic analysis is used. If so, is it clear how the categories/themes were derived from the data • Whether the researcher explains how the data presented were selected from the original sample to demonstrate the analysis process • If sufficient data are presented to support the findings • To what extent contradictory data are taken into account • Whether the researcher critically examined their own role, potential bias and influence during analysis and selection of data for presentation  
Yes Can't Tell No

**Comments:**

Overall comments on validity?

**4. ASSESSMENT OF APPLICABILITY**

How can the results be applied within the scope public health?

SIGNALLING - you may consider the following questions to help you answer the bolded question.

- a) Can the study results be interpreted and analyzed within the context of public health?
- b) Are there other important public health outcomes to be considered that were not included?
- c) Can the results be applied to public health practice, based on the validity of the article and its relevance?
- d) Are harms and benefits discussed?
- e) Were the relevant stakeholders considered?

Written answer:

Optional: yes no unclear n/a

**CASP Section C: Will the results help locally?**

f) **CASP 10. How valuable is the research?**

HINT: Consider • If the researcher discusses the contribution the study makes to existing knowledge or understanding (e.g. do they consider the findings in relation to current practice or policy, or relevant research based literature • If they identify new areas where research is necessary • If the researchers have discussed whether or how the findings can be transferred to other populations or considered other ways the research may be used

**Comments:**

Overall comments on applicability?

**Overall comments on study:**

### Operationalisation of the tool:

- Appraisal of the studies only reflect the data applicable to our research question. For example, if we only used the qualitative data focusing on implementation within a randomized controlled trial on effectiveness, the appraisal regards the relevance, reporting quality, validity and applicability of the qualitative data only.
- Appraisal was based upon quality, regardless of how quality compared to the quality of other articles. (E.g. if the analysis was poorly reported in an article yet better than in other articles, the article still received a low score.)
- When a low score for one item impacted the score of other items, scores were repetitively rated low. However, this was taken into consideration when the overarching item was scored. Therefore, it could be that a high overall rating was given while the individual items were lower; this was then explained at the 'overall comments'.
- 'Unclear'
  - If the information provided was insufficient to rate the item (information was missing or unclear), the item was considered 'unclear'.
  - Overarching items were only considered 'unclear' when significant items were missing; we valued description of the data analysis in qualitative research relatively high.
  - As the appraisal of '2 Reliability' assessed reporting quality, it meant that missing or unclear information could not be rated as unclear, but would be rated as 'No' (a low reporting quality). This also applied to 3.B 'Are the authors' decisions explicit and transparent', 3.C.g (considerations of the role of the researcher) and 3.C.h (ethical issues).
  - Discussion of harms (for public health context application): if this was not mentioned at all (e.g. costs, time, etc.) then we marked it as unclear.

### Overarching rating (rating of item 1, 2, 3, and 4):

- CASP QUALITATIVE: when giving an overall score per element, it was noted that CASP 1 & 9 belong to item 2 (Reliability), CASP 2-8 to item 3 (Validity), and CASP 10 to item 4 (Applicability)
- CASP QUANTITATIVE (COHORT): CASP 1 belonged to item 2, CASP 2-6 to item 3, CASP 7 was an overall comment, CASP 8 & 9 belonged to item 3, CASP 10 to item 4, CASP 11 to item 3, and CASP 12 to item 4.

An illustration of the operationalisation is presented in Table E1. The full document covers >100 pages and is therefore not included. These data can be shared upon request.

### References

- 1 Rosella, L. *et al.* The development and validation of a meta-tool for quality appraisal of public health evidence: Meta Quality Appraisal Tool (MetaQAT). *Public Health* **136**, 57-65, (2016).
- 2 Critical Appraisal Skills Programme. *CASP (Qualitative and Cohort) Checklist.*, <<https://casp-uk.net/casp-tools-checklists/>> (2019).

**Table E1. Illustration of the operationalisation Critical appraisal results**

Study: Aghi (2016)			
Item	DV	EB	Consensus
<b>1</b>	a + b + c + d + , although RCT was not really necessary (also not “wrong” though)	a + b + c / men only d + Qualitative part of the study (focus groups) within this RCT are relevant	a + b + c / men only d + Qualitative part of the study (focus groups) within this RCT are relevant, RCT would not have been necessary for the part of the results we are interested in
<b>Yes/no/..</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Overall</b>	Relevant study, both in terms of tobacco-focus and setting. Justification clearly stated. Although it could have been less devious, research design is appropriate.	Justification study clearly stated, results apply to our issue, study population is similar to ours although only accounts men, qualitative study conducted within RCT is okay for our aim.	Justification study clearly stated, results apply to our issue in terms or topic and setting, study population is similar to ours although only accounts men, qualitative study conducted within RCT is okay for our aim.
<b>2a</b>	a + b / everything is described in the end, but not very easy to follow c / “ “ d + e +	a - No focus of paper can be identified other than the tobacco cessation intervention b / Vaguely described, difficult to follow. The RCT part of the design is not really described, and the qualitative part lacks any structure. c / Not well structured, but appropriate context in terms of setting. d + qualitative & quantitative e + very detailed	a - No focus of paper can be identified other than the tobacco cessation intervention (what is the aim?!) b / Difficult to follow, description unclear, lack of structure, although in the end the information is all present in the paper. c / Lack of structure, but appropriate context in terms of setting d + e + very detailed
<b>Yes/no/..</b>	<b>Yes</b>	<b>No</b>	<b>No</b>
<b>b</b>	a + b + c / d + e n.a. f + g - (aims do not correspond to the rest of the paper. methods and results are fine, but do not match the aim?) h -	a / outcomes are vague. (Unclear why methodological considerations + detailed description of the process are reported in the results section - it seems to be another aim?) Also, measuring the process outcomes do not relate to the stated aims? b + sources of information that apply to our research question are identified c + d + Described but not explicitly mentioned which results are based on which type of data e - Table not relevant to aim as stated in methods	a / Population and interventions clear, outcome unclear b - Described but not explicitly mentioned which results are based on which type of data/sources c + d + e / Table not relevant to aim as stated in methods but relevant to purpose stated in the introduction f + g - Purpose (abstract & introduction) is not congruent with stated aim (methods) and results h - Results that are not process descriptions (and interpreted by me as

		and not in line with text f + g - Purpose (abstract & introduction) is not congruent with stated aim (methods) and results h - Results that are not process descriptions (and interpreted by me as methods) are explicit. Findings not in relation to initial research aims	methods) are explicit. Findings not in relation to initial research aims
<b>Yes/no/..</b>	<b>Partly</b>	<b>No</b>	<b>No</b>
<b>Overall</b>	Reliable study, although confusing due to lack of structure. Study aim does not match the methods and results? Rationale and conduct extensively described though.	Focus of study unclear, reporting unstructured and difficult to follow, detailed description of process, aims and outcomes unclear, findings not congruent with aims.	Detailed description of process which seems reliable, however, focus of study unclear, reporting unstructured and difficult to follow, aims and outcomes unclear, findings not congruent with aims.
<b>2 total</b>	<b>Partly</b>	<b>No</b>	<b>No</b>
<b>3a</b>	a - b + c n.a. d / (yes for the design, no for the question) e +	a + Part of the reported design is congruent with part of the study b + c n.a. d unclear which methods have been used for which results e +	a - b + c n.a. d unclear which methods have been used for which results e +
<b>Yes/no/..</b>	<b>Partly</b>	<b>Partly</b>	<b>Partly</b>
<b>b</b>	a / b + c / d n.a.	a - They do not seem so answer research question b + c - d +	a - They do not seem so answer research question b + c - d +
<b>Yes/no/..</b>	<b>Partly</b>	<b>No</b>	<b>No</b>
<b>c</b>	a - (incongruity between research aim and findings) b + c + d - e + f + g + h - i +	a + b + c + d / Not specified, seems not to have been considered, but it does match the aim we are interested in e / f + g / No data saturation discussed, no explicit description of methods (e.g. topic guide, how interviews were conducted) h / IRB approved, no details on explanation of study to participants or informed consent i / data present to support the findings are limited, described how themes	a - (incongruity between research aim and findings) b + c + d - e / f + g / No data saturation discussed, no explicit description of methods (e.g. topic guide, how interviews were conducted) h - IRB approved, no details on explanation of study to participants or informed consent i / data present to support the findings are limited, described how themes were derived, but it is not clear whether this analysis applies to the results or to

		were derived, but it is not clear whether this analysis applies to the results or to other parts of the results, own role not considered, contradictory data not taken into account	other parts of the results, own role not considered, contradictory data not taken into account
<b>Yes/no/..</b>	<b>Partly</b>	<b>Partly</b>	<b>No</b>
<b>Overall</b>	Overall valid in terms of methods and results, but obviously a mismatch between the aim and the rest of the paper. → Hard to assess the validity of the paper as a whole.	Unclear which part of the 'methods' has been used for which part of the results, some details on validity are lacking	Seems to be valid in terms of methods and results although unclear which part of the methods apply to which results section. Mismatch between aims/purpose and the rest of the paper make it difficult to assess the validity of the paper as a whole. Some details on validity lacking.
<b>3 total</b>	<b>Partly</b>	<b>Partly/no?</b>	<b>No</b>
<b>4</b>	a + b + c / d / (harms were not discussed) e + f /	a + b + c - validity unsure d + (discussed that costs were not measured, time not discussed) e + f / Results not clear enough for changing current policies	a + b + c - d / e + f /
<b>Yes/no/..</b>	<b>Yes/Partly</b>	<b>Partly</b>	<b>Partly</b>
<b>Overall</b>	Applicable to public health practice, but not without first putting it in the right context / clarifying what it is that they are addressing.	Relevant topic and findings for public health, yet present poorly and therefore validity unclear and difficult to apply results to practice	Applicable to public health practice, but not without first putting it in the right context / clarifying what it is that they are addressing.
<b>OVERALL</b>	Relevant, reliable and valid study in terms of the methods and the results, however, not everything is clear as a logical structure is lacking and the aim does not correspond to the rest of the paper. Clarification would help to see the added value of this research, which is definitely there.	Relevant although only applies to men, reliability hampered by unstructured and unclear reporting, validity therefore difficult to assess, results therefore hard to apply to public health	Relevant although only applies to men, reliability hampered by unstructured and unclear reporting, validity therefore difficult to assess, results therefore hard to apply to public health. Clarification would help to see the added value of this research, which is definitely there.

**Appendix 3 Consolidated Framework for Implementation Research (CFIR) Codebook with inductively added codes and tailoring (in green) and operationalisation of the codes**

<b>Tailoring of the CFIR Codebook</b>	
<b>III E 3. Access to Knowledge &amp; Information</b>	<p>(...)</p> <p><u>Inclusion Criteria:</u> Include statements related to implementation leaders' and users' access to knowledge and information regarding use of the program, i.e., training on the mechanics of the program. <b>This regards knowledge as well as skills.</b></p> <p>(...)</p>
<b>V B 1. Opinion Leaders</b>	<p>(...)</p> <p><u>Exclusion Criteria:</u> Exclude statements related to individuals that influence the adoption of an interventions by end-users simply by being a role model (teacher, doctor, etc.), e.g. smoking doctors negatively influencing successful uptake of a smoking cessation program. Code as <u>Role Model</u>.</p>
<b>V B 7. Role model</b>	<p><u>Definition:</u> Individuals that influence the adoption of an intervention by end-users simply by being a role model (doctor, teacher, etc.), e.g. smoking doctors negatively influence successful uptake of a smoking cessation program.</p> <p><u>Inclusion Criteria:</u></p> <p><u>Exclusion Criteria:</u> Exclude statements regarding role models within an organization, and their influence on delivering the intervention and code as <u>Opinion Leaders</u></p>
<b>VI. Additional Codes</b>	
A. Language	<p><u>Definition:</u> The extent to which language (differences) – including dialects – affect(s) effectiveness of the implementation process.</p> <p><u>Inclusion Criteria:</u></p> <p><u>Exclusion Criteria:</u></p>
B. Timing	<p><u>Definition:</u> The degree to which the timing of the intervention influences the implementation process.</p> <p><u>Inclusion Criteria:</u></p> <p><u>Exclusion Criteria:</u></p>
C. Coordination/organization	<p><u>Definition:</u> (Lack of) coordination and organization, and the degree to which this influences the implementation of the intervention.</p> <p><u>Inclusion Criteria:</u></p> <p><u>Exclusion Criteria:</u></p>
D. Alignment	<p><u>Definition:</u> The congruence between those receiving and/or delivering the intervention (being on 'the same page'), and its consequences for the implementation process.</p>

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Inclusion Criteria:

Exclusion Criteria:

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E. Group cohesion

Definition: The extent to which the social relations between the group receiving and delivering the intervention determines the receptiveness to the implementation, and/or the extent to which the social relations within the group receiving the intervention determines receptiveness to the implementation.

Inclusion Criteria:

Exclusion Criteria: Exclude statements related to the social cohesion of individuals within the delivering organization only, and code as Networks and Communications. Code statements related to the relation between the delivering organization and other external organizations (not receiving the intervention) as Cosmopolitanism.

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### **General Coding Rules:**

In case several factors were mentioned within the same passage and these factors would not be adequately covered by a single code, we decided to double code.

### **General Rating Rules:**

We planned to report separately on barriers and on facilitators, but refrained from this as we noticed studies commonly reported reversed barriers as facilitators intermittently within the same paper and vice versa. Also, initially we planned to weigh factors but refrained from this, as we experienced that author's writing styles strongly determined such weight in the qualitative studies (majority of our included studies). For example, some authors mentioned all their factors as 'key', or 'essential', while others never used such words.

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## Appendix 4 Critical appraisal of the included studies

Author	Appraisal				Description <i>Funding source and role</i>
	Rv	R	V	A	
Aghi, 2016* <sup>1</sup>					Relevant although only applicable to men, reliability hampered by unstructured and unclear reporting, validity therefore difficult to assess, hence results not well applicable to public health domain. Study has a high potential of adding value, yet clarification is needed. <i>Funding: the National Cancer Institute [grant number K05 CA108663], [grant number R01 CA120958]. Role not specified.</i>
Aldinger (IUHPE – Promotion & Education, 2008* <sup>2</sup>					Study's focus is much broader than tobacco/lungs and some high-resource settings were included, analysis could have been described into more detail and more critical comparison with other literature would have strengthened the study. Yet the provided methodology seems rigorous. Factors are clear and applicable <i>Funding: Not reported.</i>
Aldinger (Health Education Research, 2008* <sup>2</sup>					Study's focus is much broader than tobacco/lungs, some high-resource settings were included and there is no focus on implementation factors. Methodology & findings: descriptions are clear although there is a lack of details on analysis, lack of balanced presentation of successful results, lack of reflexivity of role researcher. Medium transparency/conclusiveness of results. Mentioned factors are clear and applicable to public health. <i>Funding: World Health Organization to Health Education Institute of Centers for Disease Control in Zhejiang Province [HQ/05/121651], S.-H.Y.[HQ/04/893602] and Education Development Center [HQ/05/120607] and [HQ/05/12011]. Role not specified.</i>
Asfar, 2016					Highly relevant, yet essential information missing in reporting, therefore unclear validity hampering application of data to public health settings. <i>Funding: NIH Grant [R01DA035160]. Role not specified.</i>
Assanangkornchai, 2014					Medium relevancy given that results for tobacco smoking/other misuse behaviour cannot be distinguished. Reliability seems very high although a crucial element - data analysis - is not reported. Validity high (but analysis missing), applicability high. Seems a very useful study taking into account analysis and methodological details are missing. <i>Funding: the Integrated Community Management for Substance Abuse Programme of the Thai Health Promotion Foundation [54-02-003]. Role of the funding source: No involvement in the study design; collection, analysis or interpretation of data; writing of the manuscript or decision to submit the paper for publication.</i>
Bheekie, 2006					High relevancy, high reliability although details on analysis are missing, sufficient validity although, Medium applicability for public health, as only benefits are discussed. <i>Funding: the International Development Research Centre, Canada. Role not specified.</i>

Bteddini, 2017  Partly relevant study as half of the inclusions were derived from a private setting. Other than that, the study is focused on a clearly defined issue, the rationale is clearly stated and the methodology well described. Very applicable to public health practice.

*Funding: Qatar National Research Fund (a member of Qatar Foundation) [09628-3-160]. The statements made are solely the responsibility of the authors. Funder had no involvement in the study design; the collection, analysis and interpretation of data; the writing of the report; and in the decision to submit the article for publication.*

Castaldelli-Maia, 2017  Relevant study, reliability limited by missing information, consequently hampering validity although those elements described are highly valid. Applicable to public health, although cautious with action steps based on this information as validity could be compromised.

*Funding: Pfizer Independent Grant for Learning and Change managed by Global Bridges (Healthcare Alliance for Tobacco Dependence Treatment) hosted at Mayo Clinic. ABC Center for Mental Health Studies has been awarded with this grant to support free smoking cessation treatment training in addiction/mental health care units in Brazil [IGLC 13513957]. Role not further specified.*

Chatterjee, 2017  High relevancy, medium reliability, validity compromised by missing data analysis and lack of other reporting (ethics, potential harms). Conclusions are clear. High applicability.

*Funding: Salaam Mumbai Foundation. Role not specified.*

Cruvinel, 2013  Limited relevance because it regards also alcohol and other drugs, highly reliable, high validity although confidence intervals are lacking and no control group, applicable to public health after some clarifications.

*Funding: Pro-Office of Research (PROPESQ/Emerging Groups Call UFJF) Foundation. Role not specified.*

Elsay, 2016  High relevance, reliability and validity and valuable to public health.

*Funding: not reported.*

Goenka, 2010\*<sup>3</sup>  Moderately relevant because half of the schools were private, reliable (although unclear reporting of which methods were used for which outcomes, yet procedures well described), validity would benefit from more extensive reporting, applicable to a certain extent due to validity

*Funding: Fogarty International Center [R01TW05952-01]. Role not specified.*

Groth-Marnat, 1996  Highly relevant, reliability and thereby validity hampered by missing information, applicability moderate due to missing information.

*Funding: not reported.*

Ishaak, 2014  Results are partly applicable (also regarding alcohol and other drugs), reliability seems good yet hampered by lack of details in descriptions, validity likewise, and should be considered in the broader context before wide scale application of results.

*Funding: not reported.*

Khan, 2019  Highly relevant, reliable, and valid study applicable to public health settings.

*Funding: the COMDIS-HSD, a research consortium funded by UK aid from the UK government. Role: the views expressed do not necessarily reflect the UK government's official policies.*

- Malan, 2015     Partly relevant study due to broader focus than tobacco and besides public, also inclusion of private sector. Other than that, highly reliable, valid and applicable to public health.  
*Funding: the Chronic Disease Initiative for Africa via the Division of Family Medicine and Primary Care, Stellenbosch University; the Cancer Association of South Africa contributed funding to the project as part of CDIA's programme of work. Role not specified.*
- Marsiglia, 2014     Partly relevant (also focus on other substances but tobacco), not reliable due to missing information on the qualitative results, thereby hampering validity and hence not ready to be applied to public health.  
*Funding: the Global Health Initiative of the Southwest Interdisciplinary Research Center, funded by Arizona State University. Data analysis and manuscript development were supported by the National Institute on Minority Health and Health Disparities of the National Institutes of Health [P20MD002316-05]. Role: The content of this article is solely the responsibility of the authors and does not necessarily represent the official views of the funders.*
- Mash, 2010     Relevant study. Reliability (and therefore validity) limited due to lacking descriptions on the analysis. The results seem to reflect regular evaluation meetings, but more details would have been welcome. Other than that, extended descriptions of the outcomes (and the factors associated).  
*Funding: International Diabetes Federation and Chronic Disease Initiative in Africa. Role not specified.*
- McAlister, 2000     Relevant, reliability hampered by missing information on methods, particularly analysis. Although feasibility is an outcome, only the quantitative methods have been described. This hampers validity and hence the applicability in public health.  
*Funding: not reported.*
- Medeiros, 2016     Relevant study, although the focus is not solely on tobacco use but also on other drugs. The methods (including analysis) and results are described very well (and are appropriate), so highly reliable and valid results. Applicable to public health practice as well.  
*Funding: the Brazilian Ministry of Health through the United Nations Office for Drugs and Crime, Technical Cooperation Agreement [PRODOC BRA/K47]. Role not specified.*
- Mehanni, 2019     High relevance, missing information in reporting hampering validity and therefore applicability to public health.  
*Funding: the Office of the Director, National Institutes of Health under an Early Independence Award, [DP5OD019894]. The Eunice Kennedy Shriver National Institute of Child Health and Human Development and the National Institute of Dental and Craniofacial Research provided support for this award. The funders played no role in research design, data collection, data analysis, manuscript write-up or decision to publish. Any opinions, findings, conclusions or recommendations expressed in this article are those of the authors alone and do not necessarily reflect the views of the funder.*
- Melson, 2017     High relevance, reliability, validity and applicability. Some elements missing (ethical clearance, conflict of interest statement, data saturation, etc.).  
*Funding: the Ministry of Health, Malaysia and from Sabah Health Promotion Unit, Sabah Noncommunicable Disease Unit and Sabah State Health Department. Role not specified.*
- Nagler, 2012\*<sup>1</sup>     Although largely about intervention development, still a fairly relevant study. High reliability and validity, although more details on validity would increase the validity even more. Possible harms, stakeholders and other important public health outcomes need to be taken into consideration before application to public health practice.  
*Funding: National Institutes of Health [5R01 CA120958-02] [5 K05 CA108663-05] and [2 R25 CA057713-06]. Role not specified.*

- Nichter, 2010     Partly relevant study, missing information on analysis (and conduct) hamper validity and therefore applicability.  
*Funding: the Fogarty International Center of the National Institutes of Health [R01TW005969] and [R01TW007944]. The cosponsors of Project Quit Tobacco International are The University of Arizona Schools of Anthropology and Medicine, the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram, India, and the Department of Public Health, School of Medicine and Centre for Bioethics Gadjah Mada University, Jogjakarta, Indonesia. Role not specified.*
- Ossip, 2016     Highly relevant study, missing information on analysis hampers validity and therefore applicability.  
*Funding: the National Cancer Institute and Fogarty International Center at the US National Institutes of Health [R01CA132950] and [R01TW05945]; [1R25TW009697], [HHSN261200800569P]; [D43TWO1282]. Role not specified.*
- Pawar, 2015\*<sup>1</sup>     Relevant although focus of study is not on factors. Reliability therefore low as focus of methods was on other issue, validity hampered by missing information and hence applicability to practice in public health is limited.  
*Funding: the National Cancer Institute at the National Institutes of Health [5R01 CA120958], [5K05 A108663]. Role not specified.*
- Pereira, 2016     Partly relevant study, scope is wider than tobacco only (alcohol, drugs). No specific intervention inherent to study, rather other existing interventions on initiative of school are studied. Reliable. Moderate validity due to unclear descriptions. Partly applicable to public health, but further detailed data and considerations of possible stakeholders, harms and other factors is required.  
*Funding: Conselho Nacional de Desenvolvimento Científico e Tecnológico [472991/2012-4] and Coordenação de Aperfeiçoamento Pessoal de Nível Superior (study scholarship granted to APDP). Role not specified.*
- Perry, 2008\*<sup>3</sup>     Partly relevant (also private school included), not reliable due to missing information on data collection and analysis, hence low validity and moderate applicability.  
*Funding: the Fogarty International Center [R01TW05952-01]. Role not specified.*
- Persai, 2015     Partly relevant although also concerns law enforcement (beyond our scope), reliable, valid and applicable, although harms, benefits and stakeholders could be considered.  
*Funding: The study is part of a project funded by Bill and Melinda Gates Foundation. Role not specified.*
- Portes, 2014     Relevant although scope is wider than local interventions only, reliable although conflict of interest statement missing, precise outcome measure not stated and procedure could be more detailed. Valid and applicable.  
*Funding: not reported.*
- Prasodjo, 2015     Relevant, partly reliable (not transparent how analysis was done and more details on data collection procedures needed), partly valid, therefore partly applicable.  
*Funding: not reported.*
- Rosati, 2012     Partly relevant as tobacco was addressed along with drugs, alcohol and sexual behaviour, partly reliable as data analysis was not reported, partly valid due to missing information on many elements (especially motivation without incentives and costs of incentives should be considered) and partly applicable, could have been put in broader public health context.  
*Funding: the National Institutes of Health, National Institute of Alcoholism and Alcohol Abuse [AA015672]. Its contents are solely the responsibility of the*

authors and do not necessarily represent the official views of the National Institutes of Health.

Sodhi, 2014     Partly relevant as chronic lung diseases were considered in a broad range of other diseases, partly reliable and valid due to lacking details regarding data analysis. Applicable to public health, helpful study.  
*Funding: the Global Health Research Initiative, a research funding partnership composed of the Canadian Institutes of Health Research, Foreign Affairs, Trade and Development Canada, and the International Development Research Centre. The International Development Research Centre, Ottawa, Canada, and with the financial support of the Government of Canada provided through Foreign Affairs, Trade and Development Canada. Role not specified.*

Vitavasiri, 2010     Relevant study, but reliability, validity and applicability firmly limited due to lacking information.  
*Funding: not reported.*

Wang, 2008     Very relevant, reliable, valid and applicable study.  
*Funding: Fogarty International of the National Institute of Health in the United States [R01-HL-73699]. Role not specified.*

Xiao, 2013     Partly relevant (focus is not on qualitative factors and possibly private 'first class' hospitals are included), reliability low due to focus on quantitative data (no factors), therefore unclear validity and moderate applicability to public health.  
*Funding: the International Union Against Tuberculosis and Lung Disease (promoting smoke-free healthcare and supporting the Ministry of Health decision for smoke-free healthcare facilities; project number CHINA-OC-400). Role not specified.*

Ziedonis, 2012     Relevant, reliability suffers from missing information on many elements, therefore validity limited and partly applicable.  
*Funding: the University of Massachusetts Medical School Global Initiatives Program grant. Role not specified.*

Rv = relevance, R = reliability, V = validity, A = applicability to a wider public health context.  High  Medium  Low  Unclear score in appraisal.

\*Articles from the same study. Funding source: the funding source is provided as reported by the articles' authors. If no explicit disclosure was provided on the role of the funding source, this was noted as 'Role not specified'.

## Appendix 5 From data to factors (CFIR) and confidence in their importance (GRADE-CERQual)

CFIR = Consolidated Framework for Implementation Research

GRADE-CERQual = Grading of Recommendations Assessment, Development and Evaluation-Confidence in the Evidence from Reviews of Qualitative research

**Table 1. Example of data extracted on data extraction sheet**

Author	Year	Journal	Study design	Setting	Population	Intervention (disease targeted)	Outcomes
Ziedonis	2012	Journal of Dual Diagnosis	Qualitative	China, central district, hospital-based mental health center	Hospital personnel and patients	Smoke-free hospitals	Effectiveness and implementation factors

Researcher initials	Factor (facilitators)	Factor (barriers)
EB	<ul style="list-style-type: none"> <li>Strong leadership and support of the majority of staff and faculty (female nurses and physicians) who did not smoke</li> <li>Collaborative trust was established with ongoing work together and accomplishing goals and objectives.</li> </ul>	<ul style="list-style-type: none"> <li>Difference in cultural values, determining goal, process and communication styles</li> <li>The language barrier limited some independence of interaction for some of the team and did affect communication at times. It was important to have bilingual and bicultural staff in both sites.</li> </ul>
DV	<ul style="list-style-type: none"> <li>Support from China's national level leadership as well as the local level general hospital center health care system and hospital-based mental health center leaders, including the CEO and vice-president</li> <li>Strong leadership</li> </ul>	<ul style="list-style-type: none"> <li>Language and culture barriers (between staff)</li> </ul>
Consensus	<ul style="list-style-type: none"> <li>Strong leadership and support of the majority of staff and faculty (female nurses and physicians who did not smoke)</li> </ul>	<ul style="list-style-type: none"> <li>Difference in communication style (both in terms of language and cultural values)</li> </ul>

- Importance of having bilingual and bicultural staff at location.
  - Support from China's national level leadership as well as the local level general hospital center health care system and hospital-based mental health center leaders, including the CEO and vice-president
- The language barrier limited some independence of interaction for some of the team and did affect communication at times.

**Table 2. Example of CFIR coding (Ziedonis et al.)**

<b>Factor</b>	<b>EB</b>	<b>DV</b>	<b>Consensus</b>
Strong leadership	IV5 Characteristics of individual: other personal attributes	IIIE1 Inner setting - Readiness for implementation - Leadership engagement	IIIE1 Inner setting - Readiness for implementation - Leadership engagement
Support of the majority of staff and faculty	IIID Implementation climate	IIID6 Inner setting - Implementation climate - Learning climate VB1 Process - Engaging - Opinion leaders	IIID6 Inner setting - Implementation climate - Learning climate VB1 Process - Engaging - Opinion leaders
The language barrier limited some independence of interaction for some of the team and did affect communication at times. It was important to have bilingual and bicultural staff in both sites.	Outer setting - ? (new code?)	ID Innovation characteristics - Adaptability IIIB Inner setting - Networks & communications IIIE3 Inner setting - Readiness for implementation - Access to knowledge & information	ID Innovation characteristics - Adaptability IIIB Inner setting - Networks & communications VIA (new): language
Difference in communication style (both in terms of language and cultural values)	IIIC Culture	ID Innovation characteristics - Adaptability IIIB Inner setting - Networks & Communications IIIC Culture	ID Innovation characteristics - Adaptability IIIB Inner setting - Networks & Communications IIIC Culture
Support from China's national level	IIB Outer setting-Cosmopolitanism	IIB Outer setting - Cosmopolitanism	IIB Outer setting - Cosmopolitanism

leadership as well as the local level general hospital center health care system and hospital-based mental health center leaders, including the CEO and vice-president

VB Process - Engaging  
(national/local level leadership)

VB Process - Engaging  
(national/local leaders)

**Table 3. Example of assigning confidence using GRADE-CERQUAL (Ziedonis et al.)**

<b>Researcher initials</b>	<b>Methodological limitations</b> (based on validity & reliability in critical appraisal)	<b>Relevance</b> (based on relevance in critical appraisal)	<b>Adequacy</b> (based on richness of data in article)
EB	Substantial	No or very minor concerns	No or very minor concerns
DV	Substantial	No or very minor concerns	No or very minor concerns
Consensus	Substantial	No or very minor concerns	No or very minor concerns

**Table 4. GRADE-CERQUAL of the factors**

Factor (coded using the Consolidated Framework for Implementation Research)	Studies reporting the factor	Confidence in the factor			
		Assessment of methodological limitations	Assessment of relevance	Assessment of adequacy (richness of data)	Overall confidence in factor
<b>I Innovation characteristics, total</b>					<b>227</b>
IA Innovation characteristics – Innovation source	Chatterjee, Groth 2x, Mehanni, Melson, Nichter	No: 1 Minor: Mod: 1 Sub: 4	No: 6 Minor: Mod: Sub:	No: 1 Minor: 1 Mod: 4 Sub:	49
IB Innovation characteristics – Evidence strength and quality	Castaldelli	No: Minor: Mod: Sub: 1	No: 1 Minor: Mod: Sub:	No: Minor: Mod: Sub: 1	6
IC Innovation characteristics – Relative advantage	Assanankorchai, Castaldelli	No: Minor: Mod: 1 Sub: 1	No: 1 Minor: 1 Mod: Sub:	No: Minor: Mod: Sub: 2	12
ID Innovation characteristics – Adaptability	Assanankorchai, Bheekie, Bteddini 2x, Groth, Mehanni, Nichter, Perry, Ziedonis 2x	No: 2 Minor: 1 Mod: 1 Sub: 6	No: 5 Minor: 2 Mod: 3 Sub:	No: 3 Minor: 2 Mod: 3 Sub: 2	77
IE Innovation characteristics – Trialability	Ossip	No: Minor: Mod: Sub: 1	No: 1 Minor: Mod: Sub:	No: 1 Minor: Mod: Sub:	9
IF Innovation characteristics – Complexity	Assanankorchai	No: Minor: Mod: 1 Sub:	No: Minor: 1 Mod: Sub:	No: Minor: Mod: Sub: 1	6
IG Innovation characteristics – Design quality and packaging	Bheekie, Nichter, Castaldelli	No: Minor: 1 Mod: Sub: 2	No: 2 Minor: 1 Mod: Sub:	No: 1 Minor: Mod: 1 Sub: 1	23
IH Innovation characteristics – cost	Bteddini, Pereira, Persai, Prasodjo 2x, Vitavasiri	No: 2	No: 3	No: 1	45

		Minor: Mod: 1 Sub: 3	Minor: 1 Mod: 2 Sub:	Minor: 1 Mod: 2 Sub: 2	
<b>II Outer setting, total</b>					<b>476</b>
IIA – Outer setting – Needs & resources of those served by the organisation	Aldinger (Changes in attitudes), Castaldelli 2x, Chatterjee 2x, Elsey 3x, Groth, Khan, Malan 2x, Marsiglia 2x, Mash, Medeiros, Melson, Mehanni, Nagler 2x, Nichter, Ossip, Perry 2x, Prasodjo 3x	No: 10 Minor: Mod: 3 Sub: 14	No: 17 Minor: 3 Mod: 6 Sub: 1	No: 9 Minor: 5 Mod: 8 Sub: 5	222
IIB Outer setting – cosmopolitanism	Chatterjee 2x, Elsey, Mash 2x, McAlister 2x Medeiros, Mehanni, Melson, Ossip, Pawar, Perry, Persai, Portes 3x, Ziedonis	No: 7 Minor: Mod: 2 Sub: 9	No: 14 Minor: 2 Mod: 2 Sub:	No: 9 Minor: 2 Mod: 3 Sub: 4	159
IID Outer setting – external policy & incentives	Aldinger (Strategies for...), Assanankorchai, Chatterjee, Groth, Khan, Mehanni 2x, Ossip 3x, Persai	No: 2 Minor: 1 Mod: 2 Sub: 6	No: 8 Minor: 2 Mod: 1 Sub:	No: 6 Minor: 1 Mod: 3 Sub: 1	95
<b>III Inner setting, total</b>					<b>1705</b>
IIIA Inner setting – structural characteristics	Mehanni, Pawar, Portes 2x, Vitavasiri	No: 2 Minor: Mod: Sub: 3	No: 4 Minor: Mod: 1 Sub:	No: 3 Minor: Mod: Sub: 2	43
IIIB Inner setting – Networks and communications	Elsey, Malan, Marsiglia, McAlister, Medeiros, Nagler 3x, Ossip, Perry 2x, Persai, Portes, Rosati 2x, Sodhi 2x, Vitavasiri, Ziedonis 2x	No: 8 Minor: Mod: 4 Sub: 8	No: 7 Minor: 5 Mod: 8 Sub:	No: 8 Minor: 7 Mod: 2 Sub: 3	167
IIIC Inner setting – Culture	Bteddini, Malan, Pawar, Persai, Portes 2x, Wang, Ziedonis	No: 6 Minor: Mod: Sub: 2	No: 4 Minor: 1 Mod: 3 Sub:	No: 6 Minor: 1 Mod: Sub: 1	79
<b>IIID Inner setting - implementation climate, total</b>					<b>775</b>
IIID Inner setting – Implementation climate (unspecified)	Bteddini 3x, Groth, McAlister, Medeiros 2x, Nichter, Pawar 2x, Pereira 2x, Prasodjo, Vitavasiri	No: 5 Minor: Mod: 2 Sub: 7	No: 5 Minor: 2 Mod: 7 Sub:	No: 2 Minor: 3 Mod: 4 Sub: 5	101

IIID1 Inner setting – Implementation climate – Tension for change	Assanankorchai, Bteddini, Castaldelli 2x, Chatterjee, Nagler, Perry, Persai, Wang, Xiao	No: 4 Minor: Mod: 3 Sub: 3	No: 3 Minor: 5 Mod: 2 Sub:	No: 2 Minor: 3 Mod: Sub: 5	78
IIID2 - Inner setting - Implementation climate – Compatibility	Aldinger (changes in attitudes), Assanankorchai, Bheekie, Bteddini 3x, Castaldelli, Chatterjee 2x, Elsey 4x, Groth, Khan, Malan 5x, Marsiglia 3x, Mash 4x, Medeiros 2x, Mehanni 3x, Melson, Nagler 2x, Ossip, Pawar 2x, Perry 2x, Prasodjo, Rosati 3x, Xiao, Wang 3x	No: 21 Minor: 1 Mod: 7 Sub: 19	No: 22 Minor: 7 Mod: 19	No: 18 Minor: 11 Mod: 8 Sub: 11	399
IIID3 Inner setting – Implementation climate – relative priority	Assanankorchai, Bteddini, Medeiros, Pereira 2x, Perry, Persai, Portes, Wang	No: 5 Minor: Mod: 3 Sub: 1	No: 2 Minor: 3 Mod: 4 Sub:	No: 4 Minor: 1 Mod: Sub: 4	75
IIID4 Inner setting – Implementation climate – organizational incentives & rewards	Chatterjee 2x, McAlister, Sodhi, Vitavasiri 2x	No: Minor: Mod: 3 Sub: 3	No: 5 Minor: Mod: 1 Sub:	No: Minor: 3 Mod: 1 Sub: 2	44
IIID5 Inner setting – Implementation climate – Goals & feedback	Goenka, Mash, Mehanni, Perry, Vitavasiri	No: Minor: 1 Mod: Sub: 4	No: 3 Minor: Mod: 2 Sub:	No: Minor: Mod: 2 Sub: 3	30
IIID6 Inner setting – Implementation climate – Learning climate	Bheekie 3x, Ossip, Ziedonis	No: Minor: 3 Mod: Sub: 2	No: 2 Minor: 3 Mod: Sub:	No: 5 Minor: Mod: Sub:	48
<b>IIIE Inner setting - Readiness for implementation, total</b>					<b>641</b>
IIIE Inner setting – Readiness for implementation (unspecified)	Elsey	No: 1 Minor: Mod: Sub:	No: 1 Minor: Mod: Sub:	No: 1 Minor: Mod: Sub:	12
IIIE1 Inner setting - Readiness for implementation – Leadership engagement	Assanankorchai, Bteddini, Chatterjee, Mash, Mehanni, Nagler, Wang 2x, Xiao, Ziedonis	No: 4 Minor: Mod: 2 Sub: 4	No: 6 Minor: 3 Mod: 1 Sub:	No: 3 Minor: 3 Mod: 1 Sub: 3	85
IIIE2 Inner setting - Readiness for	Aldinger (strategies for), Assanankorchai 3x,	No: 11	No: 18	No: 10	282

implementation - Available resources	Bteddini 2x, Chatterjee, Goenka, Ishaak, Khan, Malan 3x, Marsiglia, Mash 2x, McAlister 3x, Medeiros 2x, Mehanni 3x, Nichter 2x, Pereira 2x, Perry 2x, Persai, Portes 2x, Prasodjo 2x, Vitavasiri, Xiao	Minor: 2 Mod: 7 Sub: 17	Minor: 6 Mod: 13 Sub:	Minor: 2 Mod: 14 Sub: 11	
III E3 Inner setting – Readiness for implementation – Access to knowledge & information	Aldinger (strategies for...), Aldinger (changers in attitudes), Assanankorchai, Bheekie, Castaldelli, Chatterjee, Cruvinel, Elsey, Goenka 2x, Khan, Malan, Mash, Medeiros 2x, Mehanni, Nagler, Pawar, Perry, Persai 2x, Rosati, Sodhi 3x, Vitavasiri 2x, Xiao	No: 9 Minor: 4 Mod: 7 Sub: 8	No: 8 Minor: 9 Mod: 10 Sub: 1	No: 10 Minor: 8 Mod: 2 Sub: 8	262
<b>IV Characteristics of individuals, total</b>				<b>198</b>	
IV1 Characteristics of individuals – Knowledge & beliefs about the innovation	Aldinger (strategies for...), Assanankorchai, Bteddini, Castaldelli 3x, Chatterjee, Mehanni 2x, Nagler, Nichter, Prasodjo 2x, Rosati, Vitavasiri 2x, Wang, Xiao	No: 3 Minor: 1 Mod: 3 Sub: 11	No: 12 Minor: 3 Mod: 3 Sub:	No: 2 Minor: 4 Mod: 5 Sub: 7	132
IV2 Characteristics of individuals – Self-efficacy	Bheekie, Malan, Assanankorchai, Persai	No: 2 Minor: 1 Mod: 1 Sub:	No: Minor: 3 Mod: 1 Sub:	No: 4 Minor: Mod: Sub:	40
IV4 Characteristics of individuals – individual identification with organisation	Malan 2x	No: 2 Minor: Mod: Sub:	No: Minor: Mod: 2 Sub:	No: 2 Minor: Mod: Sub:	20
IV5 Characteristics of individuals – personal attributes	Castaldelli	No: Minor: Mod: Sub: 1	No: 1 Minor: Mod: Sub:	No: Minor: Mod: Sub: 1	6
<b>V Process, total</b>				<b>751</b>	
VA Process – Planning	Assanankorchai, Mash, Pawar, Perry, Rosati	No: Minor: Mod: 2 Sub: 3	No: 1 Minor: 1 Mod: 3 Sub:	No: Minor: 1 Mod: Sub: 4	27
<b>VB Process – Engaging, total</b>				<b>606</b>	

VB Process – Engaging (unspecified)	Aldinger (strategies for...) 2x, Assanankorchai 2x, Castaldelli, Chatterjee 3x, Cruvinel, Elsey 4x, Groth 2x, Malan, Mash 3x, Medeiros 2x, Nagler, Nichter, Ossip 4x, Pawar 4x, Perry 2x, Persai 2x, Rosati 2x, Sodhi, Wang 2x, Ziedonis	No: 13 Minor: 2 Mod: 8 Sub: 18	No: 21 Minor: 8 Mod: 12 Sub:	No: 18 Minor: 8 Mod: 3 Sub: 12	338
VB1 Process – Engaging – Opinion Leaders	Sodhi, Ziedonis	No: Minor: Mod: 1 Sub: 1	No: 1 Minor: Mod: 1 Sub:	No: 1 Minor: 1 Mod: Sub:	16
VB2 Process – Engaging – Formally appointed internal implementation leaders	Assanankorchai, Mehanni, Portes 2x	No: 2 Minor: Mod: 1 Sub: 1	No: 3 Minor: 1 Mod: Sub:	No: 2 Minor: Mod: 1 Sub: 1	37
VB3 Process – Engaging – Champions	Mehanni	No: Minor: Mod: Sub: 1	No: 1 Minor: Mod: Sub:	No: Minor: Mod: 1 Sub:	7
VB4 Process – Engaging – External change agents	Chatterjee, Elsey, Mash 2x	No: 1 Minor: Mod: 1 Sub: 2	No: 4 Minor: Mod: Sub:	No: 1 Minor: 1 Mod: Sub: 2	33
VB5 Process – Engaging – Key stakeholders	Cruvinel	No: 1 Minor: Mod: Sub:	No: Minor: 1 Mod: Sub:	No: 1 Minor: Mod: Sub:	11
VB6 Process - Engaging - Innovation participants	Aldinger (strategies for...) 3x, Chatterjee, Nagler, Pereira, Portes 2x, Prasodjo, Rosati	No: 3 Minor: 3 Mod: 3 Sub: 1	No: 4 Minor: 1 Mod: 5 Sub:	No: 5 Minor: 3 Mod: 1 Sub: 1	89
VB7 Process – Engaging – Role model	Asfar, Bheekie, Chatterjee, Groth, Ossip, Vitavasiri, Wang, Xiao	No: 1 Minor: 1 Mod: 1 Sub: 5	No: 6 Minor: 2 Mod: Sub:	No: 4 Minor: 1 Mod: 1 Sub: 2	67
VC Process – Executing	Assanankorchai, Malan, Mash, Vitavasiri	No: 1 Minor: Mod: 1 Sub: 2	No: 2 Minor: 1 Mod: 1 Sub:	No: 1 Minor: Mod: Sub: 3	28

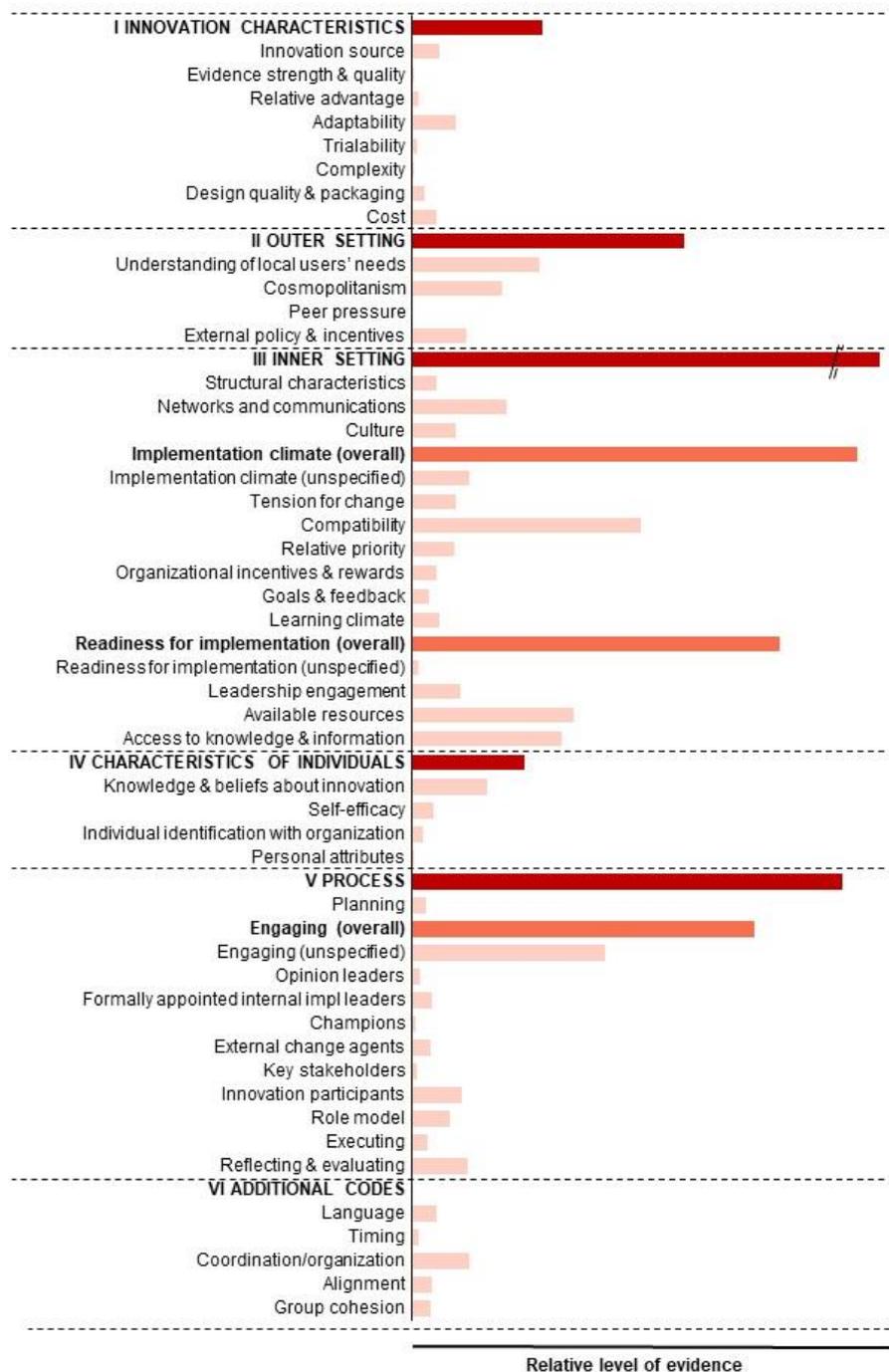
VD Process – Reflecting & Evaluating	Assanankorchai, Chatterjee, Groth, Mash, Medeiros, Nagler, Pawar, Perry, Persai, Rosati, Vitavasiri, Wang, Xiao	No: 4 Minor: Mod: 3 Sub: 6	No: 5 Minor: 5 Mod: 3 Sub:	No: 3 Minor: 3 Mod: 1 Sub: 6	98
<b>VI Additional (inductive codes)</b>					
VIA Language	Bteddini, Malan, Mehanni, Perry, Vitavasiri, Ziedonis	No: 2 Minor: Mod: Sub: 4	No: 3 Minor: Mod: 3 Sub:	No: 2 Minor: 1 Mod: 1 Sub: 2	45
VIB Timing	Melson	No: 1 Minor: Mod: Sub:	No: 1 Minor: Mod: Sub:	No: 1 Minor: Mod: Sub:	12
VIC Coordination/organisation	Assanankorchai 4x, Bheekie, Chatterjee, Mash, McAlister, Mehanni, Nagler, Pawar, Persai, Portes	No: 3 Minor: 1 Mod: 5 Sub: 4	No: 5 Minor: 7 Mod: 1 Sub:	No: 3 Minor: 2 Mod: 2 Sub: 6	100
VID Alignment	Bheekie, Malan, Mash, Medeiros	No: 2 Minor: 1 Mod: Sub: 1	No: 1 Minor: 2 Mod: 1 Sub:	No: 3 Minor: Mod: Sub: 1	37
VIE Group cohesion	Cruvinel, Groth, 2x, Ossip	No: 1 Minor: Mod: Sub: 3	No: 3 Minor: 1 Mod: Sub:	No: 2 Minor: Mod: 2 Sub:	34

*GRADE-CERQual = Grading of Recommendations Assessment, Development and Evaluation-Confidence in the Evidence from Reviews of Qualitative research; No = no to very minor concerns, Minor = minor concerns, Mod = moderate concerns, Sub = substantial concerns.*

## Appendix 6. Full overview of the implementation factors

For successful implementation of interventions targeting chronic respiratory disease in low- and middle-income countries

Recommended use: This document provides a full overview of implementation factors and their level of evidence (Figure E1). In addition, definitions of the factors and illustrations of how they occurred in the included studies are provided (Table E1). Implementors can use this full overview complementary to the FRESH AIR Implementation Tool; we recommend to address these factors in the design of the implementation strategies of the interventions, and to monitor them throughout the entire implementation process. The level of evidence in the importance of the factors may assist in deciding on how much time/resources to dedicate to the factor. Lastly, a dynamic overview is provided of the factors for which level of evidence was highest (Figure E2).



**Figure E1. Full overview of implementation factors per domain, and the relative level of evidence for the factors (indicated by the size of the bar).**



**Table E1. Full overview of implementation factors**

<b>Confidence*</b>	<b>Domain / (subdomain / ) factor</b>	<b>Definition</b>	<b>Examples of facilitators based on included papers</b>
<b>I. Innovation Characteristics</b>			
●	A. Innovation Source	Stakeholders' perception of whether the innovation is developed by themselves or externally.	Have a participatory approach, ensure local ownership, let go of some of own techniques and agendas and allow an indigenous culture to develop their own program
●	B. Evidence Strength & Quality	Stakeholders' perceptions of how convincing the evidence is that the innovation will have the desired outcomes.	Resistance to the use of medication in addiction treatment (barrier)
●	C. Relative Advantage	Stakeholders' perception of the advantage of implementing the innovation versus an alternative solution.	Resistance to change, the belief medication is required for smoking cessation rather than behavioural support only (barriers)
●●	D. Adaptability	Can the innovation be adapted, tailored, refined, or reinvented to meet local needs?	Lack of confidence amongst healthcare workers to adapt the intervention for low-literate patients (barrier), able to adapt interventions to embed them into local ceremonies
●	E. Trialability	Can the innovation be tested on a small scale in the organization, and can the implementation be made undone if desired?	Begin with higher motivated people and ripple outwards
●	F. Complexity	Perceived difficulty of the innovation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.	Straight forward procedures
●	G. Design Quality & Packaging	Perceived excellence in how the innovation is bundled, presented, and assembled.	Nurse centered rather than disease centered, name of the intervention had negative connotation (barrier)
●	H. Cost	Costs of the innovation and costs associated with implementing the innovation including investment, supply, and opportunity costs.	Costly transportation for the deliverers to the participants, costly overtime payments (barriers)
<b>II. Outer Setting</b>			
●●●●●	A. Needs & Resources of Those Served	Extent to which needs of those served by organization (e.g. patients), as well as barriers and facilitators to meet	Providing clinicians the opportunity to explore their own feelings on treating tobacco

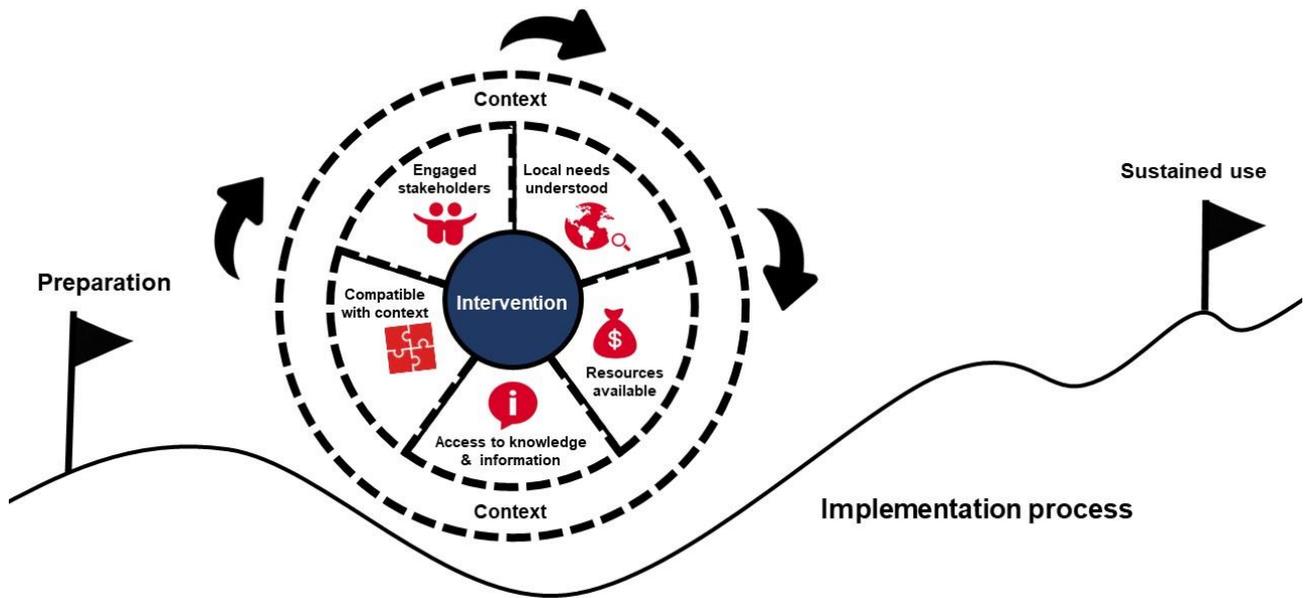
	by the Organization	those needs, are accurately known and prioritized.	dependence, providing alternative income-generating options for vendors who sell tobacco
●●●●	B. Cosmopolitanism	Degree to which organization is networked with other external organizations.	Well established existing structures, lobbying
/	C. Peer Pressure	Stimulated competitive pressure to implement an innovation, e.g. because other key competing organizations have already implemented it.	/
●●	D. External Policy & Incentives	External strategies to spread innovations, including policy and regulations, external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmark reporting.	Lacking police and legal intervention mechanisms (barrier), positive attention by media coverage
<b>III. Inner Setting</b>			
●	A. Structural Characteristics	Social architecture, age, maturity, and size of an organization.	Dependence on external staff high turn-over of staff (barriers)
●●●●	B. Networks & Communications	Nature and quality of webs of social networks, and the nature and quality of formal and informal communications within an organization.	The ongoing strengthening of relationships between the teachers (deliverers) and the staff (trainers)
●●	C. Culture	Norms, values, and basic assumptions of a given organization.	Corruption, parents' doubts about child's behavior and the developmental appropriateness of the intervention (barriers)
●●●	D. Implementation Climate (unspecified)	Capacity for change, extent to which individuals are receptive to the innovation and to which use of the innovation will be rewarded, supported, and expected within their organization.	General low support of the intervention policy, political unrest making it difficult to reach the school (barriers), high expectancy of success
●●	1. Tension for Change	Degree to which stakeholders perceive the current situation as intolerable or needing change.	Concerns of deliverers for duplicate efforts (barrier)
●●●●●	2. Compatibility	Fit between meaning and values attached to the innovation and how those align with individuals' own norms, values, and perceived risks and needs. Fit of the innovation with existing workflows and systems.	Wider social acceptance of waterpipe smoking, not able to fit content in traditional class schedule of 50 minutes (barriers)
●●	3. Relative Priority	Individuals' shared perception of the importance of the implementation within the organization.	Low priority for intervention as health workers saw it as addition to workload, fear of undermining curriculum (barriers)

●	4. Organizational Incentives & Rewards	Extrinsic incentives such as goal-sharing, awards, performance reviews, promotions, and raises in salary, and less tangible incentives.	Sanctions, linking delivery with continuing professional development accreditation
●	5. Goals & Feedback	Degree to which goals are clearly communicated, acted upon, and fed back to staff, and alignment of that feedback with goals.	Spend ample time in developing and agreeing on a conceptual model of modifiable factors to guide the intervention.
●	6. Learning Climate	A climate in which: 1. Leaders express their own weakness and need for team members' assistance and input; 2. Team members feel that they are essential, valued, and knowledgeable partners in the change process; 3. Individuals feel psychologically safe to try new methods; and 4. There is sufficient time and space for reflective thinking and evaluation.	Support of the majority of staff and faculty, appreciation of/respect for personal opinions, qualities and values of participants (nurses) and personal growth
●	E. Readiness for implementation (unspecified)	Tangible and immediate indicators of organizational commitment to its decision to implement an innovation.	Policy enforcement by hospital managers without experiencing the orientation phase and without consultation with all staff members (barrier)
●●	1. Leadership Engagement	Commitment, involvement, and accountability of leaders and managers with the implementation of the innovation.	Lacking of priority amongst hospital presidents; not good for hospital image or profit (barrier)
●●●●●	2. Available Resources	The level of resources organizational dedicated for implementation and on-going operations including physical space and time.	Sufficient funding, facilities, personnel, teaching, publicity, time, alternative smoking room
●●●●●	3. Access to Knowledge & Information	Ease of access to understandable information and knowledge about the innovation and how to incorporate it into work tasks.	Training, skills, professional training/technical support, qualified staff to consult
<b>IV. Characteristics of Individuals</b>			
●●●	1. Knowledge & Beliefs about the Innovation	Individuals' attitudes toward the innovation, familiarity with facts, truths, and principles related to the innovation.	Prejudice against psychiatric disorders, resistance against cognitive behavioural therapy , norms (barriers)
●	2. Self-efficacy	Individual belief in their own capabilities to achieve implementation goals.	Training increased confidence to deliver counseling
/	3. Individual Stage of Change	The phase an individual is in, as (s)he progresses toward skilled, enthusiastic, and sustained use of the innovation.	/

●	4. Individual Identification with Organization	A broad construct related to how individuals perceive the organization, and their relationship and degree of commitment with that organization.	Malalignment of personal and organizational values; lack of support for future training for others was lacking (barrier)
●	5. Other Personal Attributes	A broad construct to include other personal traits.	Extraordinary commitment of the program deliverers, include training professionals open to additional behavioural approaches
<b>V. Process</b>			
●	A. Planning	Degree to which a scheme or method of behaviour and tasks for implementing an innovation are developed in advance, and the quality of those schemes or methods.	The use of the quality improvement cycle encouraged an ongoing process of observation-reflection-planning action
●●●●●	B. Engaging (unspecified)	Attracting and involving appropriate individuals in the implementation and use of the innovation through a combined strategy of social marketing, education, role modeling, training, etc.	Engagement by showing opportunities, by publicity and propaganda, by good selection of staff, governmental support, ongoing relationships, trust & commitment with community
●	1. Opinion Leaders	Individuals in an organization that have formal or informal influence on the attitudes and beliefs of their colleagues with respect to implementing the innovation.	Support of the majority of staff and faculty, support of peers or mentors
●	2. Formally Appointed Internal Implementation Leaders	Individuals from within the organization who have been formally appointed with responsibility for implementing an innovation as coordinator, project manager, team leader, etc.	Lack of appointed person responsible (barrier), presence of coaches
●	3. Champions	Individuals who dedicate themselves to supporting, marketing, and 'driving through' an implementation, overcoming indifference or resistance that the innovation may provoke in an organization.	Quality Improvement champion had essential roles in brainstorming, generating content, communicating and directing changes, and garnering local consensus.
●	4. External Change Agents	Individuals who are affiliated with an outside entity who formally influence or facilitate innovation decisions in a desirable direction.	Involvement of village governing councils / motivated and committed local leadership
●	5. Key Stakeholders	Individuals from within the organization that are directly impacted by the innovation.	Support from influential hospital leaders and clinical staff who are asked to divert sparse resources into a practice
●●	6. Innovation Participants	Individuals served by the organization that participate in the innovation.	Quality of relation due to communication, participatory teaching strategies, cooperation and participation, ownership,

			commitment
●●	7. Role model	Individuals that influence the adoption of an intervention by end-users simply by being a role model.	Smoking doctors negatively influence successful uptake of a smoking cessation program (barrier)
●	C. Executing	Carrying out or accomplishing the implementation according to plan.	Poor continuity of care (barrier)
●●	D. Reflecting & Evaluating	Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience.	Supervision, monitoring
<b>VI. Additional Codes</b>			
●	A. Language	Extent to which language and/or dialect differences affect the implementation process.	Language barriers; it was important to have bilingual and bicultural staff in both sites.
●	B. Timing	Degree to which the timing of the intervention influences the implementation process.	Planning of participant recruitment during the weekend rather than in the school week
●●	C. Coordination/organization	(Lack of) coordination and organization, and degree to which this influences the implementation of the intervention.	Leader appointed, role distribution and communication
●	D. Alignment	The congruence between those receiving and/or delivering the intervention and its consequences for the implementation process.	Clearly defined roles & responsibilities
●	E. Group cohesion	The extent to which the social relations between the group receiving and delivering the intervention determines the receptiveness to the implementation, and/or the extent to which the social relations within the group receiving the intervention determines receptiveness to the implementation.	Social reinforcers and strong communal group cohesion

\*Confidence in importance of factor: / no confidence ● some confidence, ●● moderate confidence, ●●● moderate-high confidence, ●●●● high confidence, ●●●●● very high confidence in the importance of the factor



**Figure E2. The rocky road to implementation success.** To accomplish sustained use of an intervention targeting chronic respiratory disease in low- and middle-income countries, these five interrelated, critical factors should be adequately addressed from the preparation phase onwards.

Appendix 7

**FRESH AIR Implementation Tool** version 1.0 Jan 2020

Purpose: To enhance implementation success, thereby improving intervention outcomes, ultimately improving health outcomes

Intended users: Implementors of interventions targeting chronic respiratory disease in low- and middle-income countries

Recommended use: Factors should be considered and addressed by evidence-based implementation strategies. Throughout the entire implementation process (from the preparation and design phase until the phase of sustained use of the intervention), factors should be monitored to improve implementation strategies accordingly. The factors below were identified with the highest level of evidence. A full overview of influential factors during the implementation process and their level of evidence are detailed in Appendix 6.

Key factor	Description	How to address factor* (possible approaches)
 <b>Engage influential stakeholders</b>	Identify the influential stakeholders (e.g. decision makers, community members) and develop an engagement strategy.	Create a sense of ownership for stakeholders using a community-based, <sup>1</sup> participatory approach. <sup>2,3</sup> Invest in establishing trust. <sup>4</sup>
 <b>Understand local users' needs</b>	Explore and accurately prioritise the needs of intended users; understand barriers & facilitators to meet the needs.	Explore local context and needs by a team including local members through a rapid appraisal. <sup>5</sup> See also possible approaches for how to address 'Engage influential stakeholders'.
 <b>Secure necessary resources</b>	Secure sufficient resources for the implementation process and ongoing operations.	If unfeasible, address the lack of resources by adjusting the intervention and/or delivery strategy accordingly. <sup>6</sup> (Ideally, this should go in parallel with investing in strengthening the health system. <sup>7</sup> )
<b>Facilitate access to knowledge &amp; information</b>	Enable easy access to digestible knowledge & information about the intervention and how to use it.	Organize educational meetings, conduct outreach, facilitate audit and feedback moments. <sup>8</sup>
 <b>Ensure compatibility</b>	Ensure compatibility between the local (cultural and logistical) context and the intervention + delivery strategy.	Embed intervention in the existing (political, health) infrastructure by co-developing delivery strategy with local users. <sup>9,10</sup> See Understanding local users' needs', 'Engaging influential stakeholders'.

Address and monitor factors throughout entire implementation process – from planning phase to sustained use



\*These suggestions are based on the literature specific interventions targeting chronic respiratory disease in low-and middle-income countries, and on additional, general implementation literature.

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