Supplementary materials

A systematic approach to context-mapping to prepare for health interventions
– development and validation of the SETTING-tool in four countries

CONTENT

Appendix 1 Full methodology of the development of the SETTING-tool

Where applicable, this paper is reported following the STROBE statement for observational studies[1] and the COREQ guidelines for qualitative research (see below).[2] This methodology was developed between October 2015 and March 2016 within the FRESH AIR study (Free Respiratory Evaluation and Smoke-exposure reduction by primary Health cAre Integrated gRoups), an implementation science research project targeting CRD in diverse low-resource settings in Uganda, Kyrgyzstan, Vietnam, and Greece.[3] We first formed a multidisciplinary content expert panel, which consisted of professionals from implementation science, anthropology, health psychology, medicine and global health. Members were diverse in terms, gender and nationality (including professionals from each of the countries). Formation of the panel was facilitated by the network of the International Primary Care Respiratory Group (IPCRG).

Development of the methodology

We employed a multi-stage and multi-method approach similar to the development approach of the ImpRes tool, consisting of an iterative brainstorming- and consensus-building process to generate core concepts for the tool.[4] Through multiple online and face-to-face meetings, we outlined the context-mapping tool based on methodological principles considered state-of-the art in our fields (e.g. the principle that mixed-method designs generally provide better insights than qualitative or quantitative research alone). Concurrently, we pragmatically searched the literature in Pubmed and Google between October 2015 and March 2016 for additional evidence-based methodological concepts to map health beliefs and behaviours. We used (synonyms for) context, setting, beliefs, perceptions, attitudes, knowledge, awareness, or behaviour with no date restriction. To identify validated questionnaires regarding CRD, we repeated the search after adding asthma, COPD, lung, tobacco, smoking, or household air pollution. We repeated pragmatic searches for all components of the context-mapping methodology, ranging from how to engage stakeholders to how to randomly select participants for a survey in rural areas. The resulting options for each component of our

References:

1 von Elm E, Altman DG, Egger M, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *BMJ* 2007; **335**(7624): 806-8.
2 Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007; **19**(6): 349-57.
3 Cragg L, Williams S, Chavannes NH. FRESH AIR: an implementation research project funded through Horizon 2020 exploring the prevention, diagnosis and treatment of chronic respiratory diseases in low-resource settings. *NPJ Prim Care Respir Med* 2016; **26**: 16035.
4 Hull L, Goulding L, Khadjesari Z, et al. Designing high-quality implementation research: development, application, feasibility and preliminary evaluation of the implementation science research development (ImpRes) tool and guide. *Implement Sci* 2019; **14**(1): 80.

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methodology were discussed among the expert panel and local end-users (identified via the country-professionals). We then selected components (e.g. use a 'Rapid Assessment Process for qualitative data collection') based on expected feasibility, acceptability and effectiveness. Components were consolidated into a comprehensive step-by-step tool.

Evaluation of the methodology

Next, a research team (part of the content expert panel) sequentially validated the context-mapping tool prospectively in periods between April 2016 and January 2017. We purposively chose six highly diverse low-resource settings for validation: in Uganda, Kyrgyzstan (a highland and lowland setting), Vietnam, and Greece (a Roma camp and a rural Greek setting). Settings were selected for their diversity in among others geography, political- and health system, and living conditions (Appendix 2). All four countries were within the IPCRG's established primary care network to promote sustainable use of the research findings. Throughout the application of the tool, we qualitatively evaluated the feasibility and acceptability in formal and informal, face-to-face and digital meetings. Meetings occurred together with our end-users and other stakeholders, and within the expert panel only. Results were used to fine-tune the tool for the next setting. For example, after we noticed that more frequent communication with the FRESH AIR colleagues substantially enhanced uptake of our findings (i.e. colleagues used the findings to guide development of their implementation strategies), this became a more prominent concept in our tool.

The tool was considered 'feasible' if each step could be completed within reasonable effort, budget and time. The tool was regarded 'acceptable' if those using it or to whom it was applied considered it appropriate, based on the cognitive and emotional response (whether they were eager to work with the tool).[5] 'Fidelity' was considered to be high if all planned steps were adhered to as intended. Evaluations were structured by the modified Conceptual Framework for Implementation Fidelity.[6,7] This framework addresses adherence to complex health interventions, potential moderators, and the identification of 'essential components' for achieving the intended outcome (Appendix 7). We considered the tool to be 'the intervention' and a mapped context as 'intended outcome'. Effectiveness

References:

[5] Sekhon M, Cartwright M, Francis JJ. Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. *BMC Health Serv Res* 2017; **17**(1): 88.

[6] Carroll C, Patterson M, Wood S, Booth A, Rick J, Balain S. A conceptual framework for implementation fidelity. *Implement Sci* 2007; **2**: 40.

[7] Hasson H. Systematic evaluation of implementation fidelity of complex interventions in health and social care. *Implement Sci* 2010; **5**: 67.

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was assessed by the degree to which application of the tool resulted in context-driven adjustments in the implementation strategies of subsequent FRESH AIR lung health interventions. We discussed outcomes until consensus was reached.

Reflexivity

The content expert panel was multidisciplinary (see above) and included members from the Netherlands, Uganda, Kyrgyzstan, Vietnam, and Greece. Members represented both sexes, diverse ages, and ranged from students to professors. The diversity in the team stimulated collection of rich data through the different perspectives. As hierarchies within this diversity could be at play, we repetitively emphasised that every person's input was equally valuable.

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Reporting guidelines: STROBE CHECKLIST

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Page	If applicable, relevant section or text from manuscript
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1	A systematic approach to context-mapping to prepare for health interventions – development and validation of the SETTING-tool in four countries
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	3	See Abstract
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5,6	See Introduction
Objectives	3	State specific objectives, including any prespecified hypotheses	6	Therefore, we aimed to develop and validate a practical, systematic context-mapping tool for assessing local beliefs and behaviours.
Methods				
Study design	4	Present key elements of study design early in the paper	A1 2-4	See Appendix 1
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	A1 2-4	See Appendix 1
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	A1 2-4	See Appendix 1
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	A1 2-4	See Appendix 1
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe	A1 2-4	See Appendix 1

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		comparability of assessment methods if there is more than one group		
Bias	9	Describe any efforts to address potential sources of bias	A1 2-4	See Appendix 1, Reflexivity
Study size	10	Explain how the study size was arrived at	A1 2-4	See Appendix 1
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why		n.a.
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding		n.a.
		(*b*) Describe any methods used to examine subgroups and interactions		n.a.
		(*c*) Explain how missing data were addressed		n.a.
		(*d*) If applicable, describe analytical methods taking account of sampling strategy		7,8
		(*e*) Describe any sensitivity analyses		n.a.
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed		n.a. (for application of the tool, see p11)
		(b) Give reasons for non-participation at each stage		n.a.
		(c) Consider use of a flow diagram		n.a.
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential		See 'Reflexivity' and table E1

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confounders

		(b) Indicate number of participants with missing data for each variable of interest	n.a.
Outcome data	15*	Report numbers of outcome events or summary measures	n.a.
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	n.a.
		(*b*) Report category boundaries when continuous variables were categorized	n.a.
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n.a.
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n.a.
Discussion			
Key results	18	Summarize key results with reference to study objectives	12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	12,13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-14
Generalizability	21	Discuss the generalizability (external validity) of the study results	12-14

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Other information

| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | 15 |

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Reporting guidelines: COREQ CHECKLIST

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	n.a.
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	A1p4
Occupation	3	What was their occupation at the time of the study?	A1p4
Gender	4	Was the researcher male or female?	A1p4
Experience and training	5	What experience or training did the researcher have?	A1p4
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	A1p2,3
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	A1p2,3
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	n.a.
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	A4,A6,A7
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	A1
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	A1
Sample size	12	How many participants were in the study?	A1
Non-participation	13	How many people refused to participate or dropped out? Reasons?	A1,A2
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	A1
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	A1
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	A1
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	n.a.
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	n.a.
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	n.a.
Field notes	20	Were field notes made during and/or after the inter view or focus group?	n.a.
Duration	21	What was the duration of the inter views or focus group?	n.a.
Data saturation	22	Was data saturation discussed?	n.a.
Transcripts returned	23	Were transcripts returned to participants for comment and/or	n.a.

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Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	n.a.
Description of the coding tree	25	Did authors provide a description of the coding tree?	n.a.
Derivation of themes	26	Were themes identified in advance or derived from the data?	n.a.
Software	27	What software, if applicable, was used to manage the data?	n.a.
Participant checking	28	Did participants provide feedback on the findings?	n.a.
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	n.a.
Data and findings consistent	30	Was there consistency between the data presented and the findings?	n.a.
Clarity of major themes	31	Were major themes clearly presented in the findings?	n.a.
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	n.a.

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.

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Appendix 2. Context of settings known prior to the study

Uganda

Uganda is a low-income country with almost 50% of the country <15 years old. Life expectancy at birth is 63 years. Around 21% of the people live below the poverty line. The Jinja district was selected in Eastern Uganda. It has a tropical climate. 79.1% of all people live in rural areas. Around 38% of the households depend on subsistence farming, and other leading economic activities are fishing and trading. 81% of the population is literate. Around 42% of the people is Protestant, 26% Muslim, and 23% Catholic. Multiple languages are spoken in Jinja, of which Lusoga is most common, followed by Swahili. The prevalence of smoking daily is 11.5% for males 1.8% for females.

The tuberculosis prevalence is 159:100 000. Data on chronic respiratory disease are limited, but one study in a rural Ugandan district found a COPD prevalence of 16.2%, strongly related to biomass fuel use. Health expenditures are 7.2% of GDP; physician density is 12 per 100,000 but in Jinja this is much lower. Public health service delivery in Jinja is financed by the government and donor funds. Daily challenges are inadequate funding, poor infrastructure, limited essential equipment, limited staff, and absenteeism. Health is grassroot structured, with village health teams (non-medical background) in the communities, health centre (HC) II run by nurses and midwives, HC III led by a senior clinical officer which should have a lab and HC IV as a referral centre, with emergency surgery and inpatients facilities. Next are regional referral centre with specialists and national specialist/teaching hospitals.

References:

1. The World Bank. The World Bank in Uganda – Overview. 2019. Available from: https://www.worldbank.org/en/country/vietnam/overview (accessed 30-12-2019)
2. Author unknown. Uganda's healthcare system explained. The Guardian 2009. Available from: https://www.theguardian.com/katine/2009/apr/01/uganda-healthcare-system-explained (accessed 04-09-2016)
3. UBOS: Uganda Bureau of Statistics: Statistical Abstract. Available from: http://www.ubos.org/onlinefiles/uploads/ubos/2009_HLG_%20Abstract_printed/jinja%20district%202009%20statistical%20abstract%20FINAL1.pdf (accessed 04-09-2016)
4. Kalibala S, Elson L. Situation analysis of vulnerable children in Uganda - Final Report. New York: Population Council; 2010: 2.
5. Jinja District Local Government. Higher Local Government, Statistical Abstract. In: Republic of Uganda; 2009.
6. van Gemert FA, Kirenga B, Chavannes NH, Kamya M, Luzige S, Musinguzi P, et al. Prevalence of chronic obstructive pulmonary disease and associated risk factors in Uganda (FRESH AIR Uganda): a prospective cross-sectional observational study. Lancet Global Health. 2015 (3) e44-51

Vietnam

Vietnam is a communist lower-middle income country. It is densely populated and the population is rapidly growing. Around 34% of all people live in urban areas. Since Vietnam shifted from a centrally planned to a market economy, people living below the poverty line declined from 70% to below 6% since 1986. Life expectancy is 76 years, with 70% of the population being <35 years old. Most (85.7%) of the people are Kinh (Viet), and speak Vietnamese. Over 70% of the people engaging in farming or farm-related work. Literacy is around 94.5%.

Polite behaviour is highly valued in Vietnam, especially showing respect towards elders. In general, women are expected to avoid tobacco and alcohol. Among youth, 1.2 (female) to 3.6% (male) smoke

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tobacco. Among adults, this is 1.2 (female) to 38.7% (male). Vietnam is ranked 12th among tuberculosis high-burden countries, with a prevalence of 89:100,000. COPD is ranked the third cause of death with a prevalence of 6.7%, of whom 25-45% never smoked. Around 4-5.7% of the people are estimated to have asthma. Vietnam adopted the target of universal health coverage in 2010, and has a grassroots system of village health committees (non-medical background), health stations for primary care, then larger health centres, district hospitals and larger referral hospitals in larger cities. Health expenditures are 7.1% of GDP, and physician density 1.19:1000 people. Biomedicine and traditional medicine are both popular.

The Ben Luc and Can Giuoc district, in the Long An province west of Ho Chi Minh City, were selected as study settings. Long An is located in the Mekong River Delta, and has a tropical climate with a rainy and a dry season.

References:

1. The World Bank. The World Bank in Vietnam – Overview. 2019. Available from: https://www.worldbank.org/en/country/vietnam/overview (accessed 30-12-2019)
2. Central Intelligence Agency. The World Factbook - Central Asia: Vietnam. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/vm.html (accessed 03-02-2017)
3. World Health Organization. Countries - Vietnam. Available from: http://www.who.int/countries/vnm/en/. (accessed 03-02-2017)
4. Binh Hoa N, Ngoc Sy D, Nhung NV, Tiemersma EW, Borgdorff MW, Cobelens FGJ et al. National survey of tuberculosis prevalence in Viet Nam. *Bull World Health Organization 2010*; 88:273-280. doi: 10.2471/BLT.09.067801
5. Nguyen Viet N, Yunus F, Nguyen Thi Phuong A, Dao Bich V, Damayanti T, Wiyono WH, et al. The prevalence and patient characteristics of chronic obstructive pulmonary disease in non-smokers in Vietnam and Indonesia: An observational survey, Respirology, 2015. 20, 602–611 doi: 10.1111/resp.12507
6. Lam HT, Ronmark E, Tường NV, Ekerljung L, Chuch NTK, et al. Increase in asthma and a high prevalence of bronchitis: Results from a population study among adults in urban and rural Vietnam. 2010, Respiratory Medicine 2011; 105: 177-185.

Greece

Although officially a high-income country, Greece has severely suffered from the austerity following 2008. In 2013, around 27.5% of the people were unemployed. In 2016 the poverty rate was 14.4%. Greek life expectancy is 81 years old. Literacy is 97.7%. Around 77% of the people live in rural areas. The vast majority of Greek are Greek Orthodox.

Daily tobacco smoking prevalence among the youth is 19.3 (male) and 13.3% (female), and for adults 49.7 (male) and 23.9%, the highest in Europe. Prevalence of chronic respiratory disease is high and there is evidence this has deteriorated since the austerity.

The Greek healthcare system is strongly hospital centred; there is no referral system to specialists. 2.2% of all physicians are pulmonologist vs. 3.6% general practitioner, mostly in rural areas. Rural and semi-urban areas have ambulatory centres, which can be a mix of public and private services. 70% of hospital beds are in the public sector. Although formerly free of charge, at 2011 admission fees for state hospitals were introduced, co-payments for medication were increased. Meanwhile, reduced household income and employment rates led to reductions in insurance healthcare coverage. The

economic conditions deteriorated the already limited hospitals and workforce. Lack of appropriate equipment and medical supplies let to the closure of health services. Physician density is 6.2:1000. For the 'traditional' Greek setting, the Heraklion district in Crete was selected. Transportation in rural areas is not well organized and many people do not possess a car, limiting access to healthcare.

References

1. World Health Organization. Barriers and facilitating factors in access to health services in Greece. 2015. Available from: http://www.euro.who.int/__data/assets/pdf_file/0006/287997/Barriers-and-facilitating-factors-in-access-to-health-services-in-Greece-rev1.pdf?ua=1. (accessed 04-09-2016)
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3. Index Mundi. Greek Literacy. 2019. Available from: https://www.indexmundi.com/greece/literacy.html (accessed 30-12-2019)
4. Kentikelenis A, Karanikolos M, Papanicolas I, Basu S, McKee M, Stuckler D. Health effects of financial crisis: Omens of a Greek tragedy. Lancet. 2011;378:1457-1458.

Roma

The other selected setting is a Roma camp in Heraklion municipality, with 600 inhabitants the largest concentration of Roma in Crete. Almost half of these are children. The primary communication language is Greek, with 65% of the Roma population using only Greek, while 35% communicates in both Romani and Greek. It is estimated that the majority lives below the poverty line. Unemployment rates are high, and only 2 inhabitants work as official employees. The majority of those working do so in the peddler trade, often illegally. Twenty of the 140 houses are brick-built, the rest are improvised constructions. There is a water supply, but no sewage or garbage system in the camp and electricity is only available when the costly generator is in use. Cooking occurs on gas and heating by wooden stoves.

Traditionally, women are housewives. Of Roma 13-19 years old, marriage or cohabitation rate is 70%. Among the 283 Roma minors, 145 attended school. Most older Roma are illiterate. On average, Roma start smoking at age 13. The prevalence among adults is 83%.

The Roma population is served by the Support Center for Roma and Minority Groups. Other primary care or hospital facilities are not withing walking distance. Care is not continuous by medical personnel, and in order to provide services various voluntary organizations help out.

Reference

1. Census and reports from the Support Center for Roma and Minority Groups. 2016.

Kyrgyzstan

Highland and lowland setting

Kyrgyzstan is a lower-middle income country in central-Asia. Formerly it was part of the Soviet Union, now it is officially a democratic parliamentary republic. 70.9% of the population is Kyrgyz, 14.3% Uzbek, 7.7% Russian. The main religion is Islam (75%), followed by Russian Orthodox (20%). 35.7% of the population lives in urban areas. Life expectancy is 71 years old; almost half the population is <24 years old. 25.4% of the population lives below the poverty line. 99.5% of the population is literate.

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The economy is dominated by extraction of minerals, agriculture and reliance on remittances from citizens working abroad.

Smoking prevalence for Kyrgyz men is around 40% (very low for women), and almost the entire rural population uses solid fuels for cooking and heating, especially in the highlands. Kyrgyzstan has the highest respiratory mortality of the European Respiratory Society 'White Book'. We selected its lowest region, Chui (~750 m above sea level), as a lowland setting. Its neighbouring region, one of its highest regions, was selected as highland setting (~2050 m above sea level): Naryn. Since we conducted this study, data of another of our studies has demonstrated that COPD prevalence in rural Chui and Naryn was 10.4% and 36.7% respectively. Nationally, TB prevalence is 196:100,000.

In Kyrgyzstan, 6.5% of GDP is spent on health. Physician density is 1.97:1000, but lower in both Naryn and Chui. Healthcare is organized from Village Health Committees in communities, to family group practices and family medicine centres, and a limited number of general practice centres in primary care. In small villages and remote areas, primary health services are provided by trained nurses in feldsher-midwifery posts (FAPs). Furthermore, there are referral hospitals. Health costs are formally covered, but salaries for healthcare staff remain low and informal co-payments contribute substantially to healthcare spending. Private expenditures account for around 50% of total health expenditure, followed by state funding (around 30%). Since the significant decline in health workers since the 1990s, there is a shortage of personnel, particularly in remote areas. Low salaries for health impact motivation and quality of care and many workers migrate to other countries.

References:

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3. Central Intelligency Agency. The World Factbook. Central Asia: Kyrgyzstan. Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/kg.html (Accessed 06-10-2016)
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5. World Health Organization. Country Cooperation Strategy at a glance. Available from: http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_kgz_en.pdf (Accessed 06-10-2016)
6. Ibraimova A, Akkazieva B, Ibraimov A, Manzhieva E, Rechel B. Health Systems in Transition. Vol. 13 No. 3 2011. Kyrgyzstan. Health system review. Available from: http://www.euro.who.int/__data/assets/pdf_file/0017/142613/e95045.pdf (Accessed 06-10-2016)
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Definition of 'rural'

We employed the following definition: 'An area with a population density of < 250 inhabitants/km^2 or a total population <2500, and in the absence of particular reasons to classify the area differently, such as a highly sophisticated infrastructure. In Vietnam, the population density was overall much higher and villages <10.000 inhabitants were considered rural.

To our knowledge, no established definition of 'rural' exists, possibly because it is context-specific. Therefore, we considered definitions used in scientific papers and policy reports of several institutes internationally (United Kingdom, Canada, United States, and the Netherlands) and combined those to make a suitable distinction between rural and urban in our countries.[1-5]

References:

1. Bibby PB, Paul. Urban and Rural Area Definitions for Policy Purposes in England and Wales: Methodology (v1.0): Government Statistical Service, 2013.
2. Ricketts TC, Johnson-Webb KD, Taylor P. Definitions of Rural: A Handbook for Health Policy Makers and Researchers: Federal Office of Rural Health Policy, USA, 1998.
3. Hewitt M. Defining "Rural" Areas: Impact on Health Care Policy and Research: Health Program Office of Technology Assessment Congress of the United States Washington, D.C., 1989.
4. Easterbrook M, Godwin M, Wilson R, et al. Rural background and clinical rural rotations during medical training: effect on practice location. *Canadian Medical Association Journal* 1999; **160**(8): 1159-63.
5. Terluin IJ, Slangen LHG, van Leeuwen ES, Oskam AJ, Gaaff A. De plattelandseconomie in Nederland: een verkenning van definities, indicatoren, instituties en beleid. The Hague: LEI; 2005.

Appendix 3. Additional information on study design and conduct

Table E1. Members of the stakeholder engagement groups

Uganda	Kyrgyzstan	Vietnam	Greece
Workers at the Ministry of Health	District health managers	Directors of district health services	Administrative authorities
Provincial health authorities	Government representatives	A director of a local health centre	Networks of health professionals
District health authorities	Village leaders	Directors of a health education centre	Academics
Workers at the Makerere University	Community members	Local health workers	Community members
Community members	Health workers	Academics	Patient groups (not respiratory, no such groups exist)
Patient groups	A national musician		

The stakeholder engagement groups covered both settings in Kyrgyzstan and Greece. Stakeholders varied in age, sex, education level and the degree of local involvement in the community.

- **Training for research team members**

Objective of training: To optimise the research process by familiarising with 1) FRESH AIR; 2) Lung disease and risk factors; 3) Why context mapping; 4) Qualitative research; 5) expectations of the data collection and further process.

Content:

- It's team work!
- Different roles as researcher
- What will a Rapid Assessment Process (RAP) research day look like
- Field methods: Interviews, Observations, Focus Groups, Document Analysis, Survey (theory + practice)
- Field notes + reflective notes
- How to work with a translator
- Use of voice recorders
- Ethics

Other: contextualising the vignette. Piloting the research materials.

- **In- and exclusion criteria for participation in the RAP and survey:**

Inclusion

1) Healthcare professional (HP): any worker treating chronic respiratory disease (CRD) within the community boundaries, e.g. medical doctors, trained nurses

2) Community members (CM): ≥ 18 years of age

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3) Key informants (KI): any relevant stakeholder with either a specific expertise, in-depth knowledge or overall overview on beliefs and behaviours in the community, e.g. community leader, religious leader, teacher, pharmacist, traditional healer. (RAP only)

Exclusion
Potential informants with physical or mental disabilities that made it impossible for them to participate.

- **Information on the data collection for the RAP**

Planning and structure
We broadly followed the guidelines for RAP described by Beebe.[1] The research team preferably stayed near the study settings to avoid long travel time. Before the fieldwork started, all research tasks were divided and the work schedule (See Work Schedule) was discussed. We split into several smaller groups, each involved in different field activities with different informants throughout the day. At the end of each day, we held a systematic preliminary evaluation with the entire team to bring all findings together. An intensive short meeting at the end of the afternoon, after data collection and before dinner, appeared most effective and allowed for timely adaptations.

Our RAP lasted around five days per setting; previous experience with the technique prescribed that it should last a minimum of four days. More than five consecutive days of more than five hours of interviewing per day was experienced ineffective.

A data matrix (see data analysis) helped structure the input of the debriefing sessions and helped decide in which areas data saturation had occurred and which data were still lacking. Unexpected emerging themes or informants were also identified. All results were triangulated, and discrepancies were discussed. The research materials (e.g. topic lists) and Work Schedule were then adjusted accordingly. Alongside a logbook was kept listing all decisions made during the team meetings, as well as all steps agreed upon in the research process, serving as a memory guide and helpful during data analysis.

Work Schedule - Planning of Rapid Assessment Process field activities (case of Vietnam)
Informants:
HP   = healthcare professional
CM   = community member
KI   = key informant

Activities:

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O   = observation (for HP these are respiratory-related consultations, for CM these are smoking, cooking and heating related behaviours)

I   = interview

FG   = focus-group

S   = survey (a pilot version of the questionnaire was administered)

Day 1, Monday = village 1

	Both	Group EB	Group CP
07:00	start		
08:30		HP1-O	KI1-I
10:00		HP1-I	CM-FG1
12:30	lunch		
13:30		KI2-I	CM-FG2
15:00		CM-S&O	CM-S&O
16:00	debriefing		
17:00	drive home		

HP1=   Medical doctor. Do observation before interview so that HP is not directed in his/her behaviour by the topics discussed.

KI1-I = -Leader village women's committee (or someone from the committee else who would know more about the beliefs perceptions & behaviour regarding respiratory symptoms.)
          -Alternative: leader farmers committee (idem dito)

KI2-I = -Drug dispenser
          -Alternative (e.g. if there is no drug dispenser): Monk

FG1 =   mixed group: gender and age

FG2 =   Young boys group (18-25 years old)

Day 2, Tuesday = village 1

	Both	Group CP	Group EB
07:00	start		
08:30		HP2-O	CM-FG3
10:00		HP2-I	KI3-I
12:30	lunch		
13:30		KI4-I	CM-S&O
15:00		CM-S&O	CM-S&O
16:00	debriefing		
17:00	drive home		

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HP2 =   Traditional doctor

KI3-I =   village health team volunteer

Alternative: village health centre leader

KI4-I =   monk

Alternative: leader farmers committee (depending on Monday)

Alternative II: priest

FG3 =   Older women group (>60 years old)

Day 3, Wednesday = village 2

	Both	Group CP	Group EB	Group 3
07:00	start			
08:30		HP3-O	CM-FG4	
10:00		HP3-I	KI5-I	KI-6
12:30	lunch			
13:30		KI7-I	CM-FG5	KI-8
15:00		CM-S&O	CM-S&O	
16:00	debriefing			
17:00	drive home			

KI5-I =   -Leader farmers committee (or someone else from the committee who would know more about the beliefs perceptions & behaviour regarding respiratory symptoms.

-Alternative: leader village women's committee (idem dito)

KI6-I=   Teacher

KI7-I=   -Village leader (in case KI2 was not a village leader already)

-Alternative: drug dispenser

KI-8=   -Health volunteer

-alternative: director health station

FG4 =   Men group (30-50 years)

FG5 =   Young girls group (18-25 years old)

Day 4, Thursday = village 3

	Both	Group EB	Group CP	Group 3
07:00	start			
08:30		HP4-O	HP5-O	KI9
10:00		HP4-I	HP5-I	

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12:30	lunch		
13:30		KI10-I	CM-FG7
15:00		CM-S&O	CM-S&O
16:00	debriefing		
17:00	drive home		

HP-4 = doctor, any type (not traditional)

HP-5 = traditional doctor

KI9-I = -monk (village health volunteer)

KI10-I= -drug dispenser (village health volunteer)

FG6 = Older men group (>60 years)

FG7 = Women group (30-50 years)

Day 5, Friday = village 2

PLEASE NOTE: We need another location because immunization programme is taking place in health centre

	Both	Group CP	Group EB	Group 3
07:00	start			
08:30		KI11-I	CM-FG8	CM-S&O
10:00		KI12-I	KI13-I	
12:30	lunch			
13:30		KI14-I	CM-FG9	
15:00	debriefing			
17:00	drive home			

KI11-I =Farmers committee (village leader)

KI12-I = Women's committee (teacher)

KI13-I =? (? = to be specified later)

KI14-I = ?

FG8 = ?

FG9 = ?

Day 6, Monday = university

Debriefing and analysis day (all day)

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Description of each field method

Throughout the field activities, we considered appropriate locations; during interviews and focus groups we wanted informants to feel they could speak freely, so generally these were held in a private place: at home for community members, or in a private consultation room with HPs. We ensured that preferably no other person was present in the room, but in some cases, this was not feasible considering cultural politeness. We noted this down in our field notes so we would be aware of it during the analyses.

After some small talk (participants were unknown to all but the community researchers) we introduced the study aim, explaining we would like to learn from the participants expertise on the topic of breathing and breathing problems in the community. Where possible, we introduced ourselves as 'researchers' and avoided to mention some positions often perceived high in hierarchy, such as professors or medical doctors. The non-local origin of the Dutch researchers was mostly obvious; therefore, we conducted some activities without their presence and compared answers.

After consent was given, interviews and focus groups were audio-recorded, and anonymity in the recordings was ensured. They were held in the local language, unless the informant would be fluent in English. Interpreters translated each question and response literally. (Although involving professional translators in the team could have increased accuracy, considering the additional costs and expected benefit, we decided not to involve professional translators.) All research team members interviewed and/or facilitated focus groups. Most had experience, and those who conducted these for the first time were supervised by more experienced researchers. The vast majority of interviews and focus groups lasted around 60 minutes.

When using the vignette, we read the story and then usually probed the informant 'Are there people like this living your community?' and 'What, according to you, is the cause of the situation?', etc. Each topic list was tailored to the informant.

Throughout the RAP, each researcher kept fieldnotes in a personal field note booklet. Such notes included descriptions about the setting, atmosphere, relevant non-verbal information, etc. These served to facilitate interpretations during the analysis-phase.

- *Interviews*

Semi-structured interviews with the healthcare professionals enabled in-depth exploration of the topics; interviewees often speak more freely in smaller settings, for example because they experience less limitations due to hierarchy. Interviews also provide an opportunity for acquiring insights from key stakeholders that have an in-depth view or an overview of the situation due to their position (e.g. a church leader or community leader). We did not carry out repeat-interviews.

- *Focus groups*

Through focus groups perspectives of multiple informants were explored, and discussion among the informants provided valuable information. Informants were generally of the same level in hierarchy to enable them to speak freely (e.g. only community members excluding community leaders). We held

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focus groups with only men, only women, and mixed groups, as well as younger, middle-aged, older and mixed-groups. This also helped to explore potential gender- or age-related differences in perceptions. Key questions provided a lead for the discussion, and these were tailored to the local reality and the flow of the dialogues. When the discussion showed that more in-depth exploration with an informant about a certain topic would be desirable, a subsequent in-depth interview was scheduled.

- *Observations*

The observations were direct, non-participatory, and structured. Observations revealed insights that could be hard to detect otherwise because of self-serving bias. (Potential differences between *observed* behaviour and *verbally stated* behaviour of healthcare professionals during consultations could be detected.)

- *Document analysis*

Relevant available documents were collected and used to triangulate other data sources. In this way e.g. a guideline regarding chronic respiratory symptoms could be compared to the stated behaviour of a healthcare professional, which could in turn be compared to an observed behaviour during a consultation. Selection of document depended on availability, and included materials like teaching curricula, policy documents, local guidelines, and relevant advertisements. Translators translated relevant paragraphs of documents in verbatim. A paragraph was considered relevant when it mentions anything related to the definition, cause, prevention, diagnostics, treatment, follow-up and prognosis of lung disease (when feasible, e.g. no books were translated).

- *Questionnaires*

The questionnaires developed for the survey were also pilot-tested during the rapid assessment. The input did not only serve to improve the design of the questionnaire itself, but the answers served as input for the qualitative analysis.

- **Information on sampling for the survey**

CM sampling followed a three-stage design, based on the Expanded Program of Immunization (EPI) method.[2,3] Please note, this design is originally intended for a vaccination programme and based upon the assumption that every one in seven households has a child between 1-2 years old. However, we did not encounter a more suitable strategy in literature and decided to adopt this methodology anyway. During the first stage of sampling, 30 standard geographic units were randomly selected in each setting, proportionally to their population size. We excluded villages where previous FRESH AIR activities had been performed to prevent bias. In Uganda, the district governors stated that information on villages in the municipality and their inhabitants was strictly confidential, so we enrolled to their paid randomization service performed by the Ugandan Bureau Of Statistics. Second, using a simple random approach, seven households were chosen from each geographic unit. We used a random number generator (by atmospheric noise) [4] to select ten (Greece) or seven (Kyrgyzstan, Vietnam)

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numbers. In case of a double number (this occurred once in the Kyrgyz lowland setting ang twice in the Greek setting), the process was repeated. Third, if more than one person was found eligible for inclusion per household, lots were drawn to determine which person was invited to participate. In case none of the residents in the household were present or if they did not want to participate, the neighbouring house was approached. In this way we enhance an equal distribution between informants of more remote areas and more densely populated areas.

After using the three-stage sampling approach for inviting CMs for participation, we invited all eligible HPs from the nearest health facilities in Uganda and Kyrgyzstan. In Vietnam, HPs were recruited pragmatically during a district health meeting. In Greece, with many HPs, we were able to randomized general practitioners (GPs) at the individual level.

References:

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3.   Bostoen K, Chalabi Z. Optimization of household survey sampling without sample frames. *Int J Epidemiol* 2006; **35**(3): 751-5.
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Appendix 4. Theoretical framework

A theoretical framework should guide the specific content to be explored to fulfil the study's aim, and methodological orientation.[1,2] The theoretic framework we used in this study was composed from the Health Belief Model (HBM),[3,4] the Theory of Explanatory Models of Illness (EM)[5] and the Theory of Planned Behaviour (TPB).[6]

The Health Belief Model by Hochbaum intends to explain and predict health behaviour by focusing on beliefs of individuals.[3] The model consists of several key concepts: the individuals' sociodemographic characteristics, the individuals' perceptions of susceptibility to disease, the perceived illness severity and the perceived benefits and barriers of performing certain behaviour. Rosenstock[4] added the aspect of self-efficacy to the model; the perceived capability of performing the behaviour. The HBM implies that these factors, combined with certain internal and external cues to action (e.g. 'pain' or 'the illness of a friend') lead to certain health behaviour.
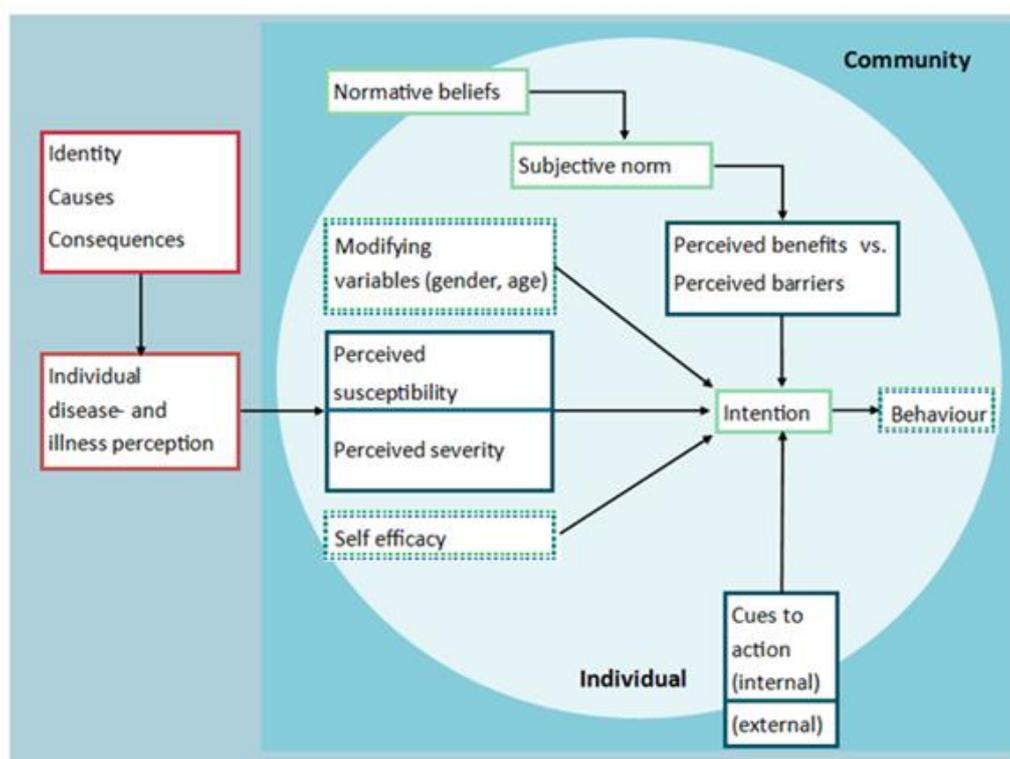

Figure 1. The Theoretical Framework: The Beliefs and Behaviour theoretic framework used a combination of the Theory of Explanatory Models,[5] the Theory of Planned Behaviour[6] and the Health Beliefs Model[4]

To help explain relations between the different factors, and explore individual's relation with the sociocultural context we added components of *the Theory of Planned Behaviour* (TPB) to this framework.[6] The first is 'normative beliefs', meaning an individual's perception of social normative pressures. The second is 'subjective norm' which is an individual's perception about the judgement of

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significant others (parents, friends, teachers) towards certain behaviour. Also, the TBD includes the component of 'intention', which precedes performing the behaviour.

Kleinmans' *Theory of Explanatory Models of Illness* (EM) provides a useful addition to this research framework, as it addresses individuals' emotions.[5] It focusses on the beliefs one holds about one's symptoms (illness), the personal and social meaning one attaches to these symptoms, one's expectations about what will happen to him/her, what the care providers will do, and one's own therapeutic goals. This theory therefore helps to elucidate how perspectives can differ across cultures and backgrounds, e.g. between patients and doctors.

Reflection on the framework

As we consolidated three validated frameworks, the overall resulting framework had not been validated before we used it in our study. We experienced the framework in the six different settings in four different countries as effective and comprehensive. However, a more pragmatic framework may be more user-friendly.

References

1. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007; **19**(6): 349-57.
2. Hamilton AB, Finley EP. Qualitative methods in implementation research: An introduction. *Psychiatry Res* 2019; **280**: 112516.
3. Hochbaum GM. Public participation in medical screening programs: A sociopsychological study. Washington, DC:: (Public Health Service, PHS Publication 572). , 1958.
4. Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the Health Belief Model. *Health Educ Q* 1988; **15**(2): 175-83.
5. Kleinman A. Patients and healers in the context of culture: an exploration of the borderland between anthropology, medicine, and psychiatry. Berkeley: University of California Press; 1980.
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Appendix 5 Research Materials

Please note, the full versions of the research materials are provided in a separate file: Supplementary file 2.

The versions provided are in dual language (English-Russian). However, each country had its own translated version: English (Uganda), Vietnamese, Russian and Kyrgyz (Kyrgyzstan), and Greek.

Community member:
1. Topic list focus group
2. Household observation form
3. Questionnaire

Healthcare professional:
4. Topic list interview
5. Respiratory consultation observation form
6. Questionnaire

Topic lists for key informants varied as they were tailored to the specific informant.

Topic lists and observation forms were not pilot tested in the field, but iteratively improved after application. This way, we ensured all data from the field were used in the analyses. Please note, topic lists for key informants were tailored to the specific informant, and therefore they were all different. The vignette in the topic lists was tailored to each setting (e.g. a neutral and common name for the person in the vignette was chosen). Also, we alternated age and sex to see if this would influence the perceptions of the participants.

For the vignette in the survey, we could not alter age nor sex. Therefore, we described a person in the population group where COPD was most prevalent in rural Uganda: a woman aged 35 (due to its relation with biomass fuel use). The age in the vignette in the other countries was adjusted according to the country's life expectancy.

Appendix 6. Qualitative analyses; application of the Framework Method

The Framework Method guided the analysis of our qualitative data. In this method, data are structured by a matrix consisting of rows (cases), columns (codes) and 'cells' (summarised data). This structure enables data to be systematically reduced by case and by code. It allows for both data comparison across cases and within individual cases. The broad and systematic structure is particularly suitable in this FRESH AIR research where multiple data sources were used (interviews, observations, etc.). The format also suits large datasets with a holistic approach because the overall pictures as well as its details will be shown. We conducted the stages of the Framework Method as detailed below.

1. Transcription: Field-researchers, hence familiar with the theoretical perspectives of the study, transcribed in verbatim. Where English translations were used, only the original (local) language was transcribed and then translated to English.

2. Familiarisation with the interview: Audio-recordings in English or containing English translations were listened to, and all translated transcripts and contextual/reflective notes were read. Analytical notes or thoughts were noted in the margins.

3. Coding: Coding was mainly deductive based on our pre-composed Beliefs and Behaviour theoretic framework, although we also coded inductively (open for generating new codes) to explore the unexpected. Two researchers independently coded the first few transcripts and after discussion one researcher coded the transcript, and another researcher checked the transcripts. We used Atlas.ti version 7.5.15.

4. Developing a working analytical framework: after the first few transcripts were coded, the labels were compared, codes were grouped into clearly defined categories (by a tree diagram).

5. Applying the analytical framework: subsequent transcripts were indexed using the categories and codes.

6. Charting data into the framework matrix: Two researchers chartered the data, and consistency was ensured by comparing the summary styles. References to interesting or illustrative quotations were added.

7. Interpreting the data: emerging themes were discussed with other members of the research team. We used the interactive data platform SharePoint (2016, Microsoft Office) for securely sharing audiofiles and text documents. Gradually, ideas about characteristics of and differences between the data were developed. Relations, connections and causality were further explored and interpreted and conclusions are drawn.

8. Member checks: 2-3 participants per informant group (e.g. community members, healthcare professionals) were planned to be performed throughout the rapid assessment process, verifying preliminary results of the study. Due to rurality of the settings we did not do this after all.

We kept an analysis-logbook which detailed coding definitions, decisions made, and how the researchers perceived and examined the data. Logbooks served to improve transparency and reproducibility.

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Appendix 7 The SETTING-tool: feasibility and acceptability

Elements of fidelity	Uganda	Kyrgyz highlands	Kyrgyz lowlands	Vietnam	Greece, Roma	Greece, rural
Adherence (was methodology implemented as designed)						
Content	All steps conducted.	All steps conducted.	All steps conducted.	All steps conducted.	Only short RAP, no survey.	All steps conducted.
Coverage	Targeted sample sizes reached.	Targeted sample sizes reached.	Targeted sample sizes reached.	Targeted sample sizes reached.	No full data saturation or survey.	Targeted sample sizes reached.
Frequency/duration	RAP preparation and training 4 days (Uganda was the first setting) + data collection 5 days. Survey in 2 weeks.	Introduction external members to stakeholders 1 day, RAP data collection 5 days, debriefing 1 day. Survey in 1 month.	Introduction external members to stakeholders 1 day, RAP data collection 5 days, debriefing 1 day. Survey in 1.5 month.	Introduction external members to stakeholders 1 day, RAP data collection 5 days, debriefing 1 day. Survey in 1 month.	RAP data collection 2 days, debriefing 1 day.	RAP data collection 5 days, debriefing 1 day. Survey in 2.5 months.
	The verbatim transcription process in the in-depth analysis was time-consuming; it took about 4-6 months to complete.					
Moderators (factors which have influenced the degree of fidelity)						
Methodology complexity	Simplicity and understandability of the tool were enhanced by co-designing it with end-users and local stakeholders.					
Facilitation strategy	An intensive one-day training was delivered before application of the methodology, and each researcher had a research manual with key instructions. Researchers with ample experience led the team, enabling adequate application of the methodology. Feedback on field-activity techniques was regularly given during the daily RAP debriefings and throughout data collection for the survey.					
	Two team members missed the initial training and received a catch-up half a day training instead.	For logistical reasons, one member from the lowlands was replaced. The new member received a catch-up half a day training instead.		The local members intended to add two research interns to the team halfway the RAP. As continuity in the RAP is vital for its iterative nature, the interns received only observatory or logistical tasks.	For logistical reasons, the researcher from the Roma community did not participate in the training and received a rapid pre-briefing instead.	
	Co-creation of the study design and materials with local stakeholders enhanced the methodology to be a context-sensitive.					
Quality of the delivery	The quality of the delivery was enhanced by numerous measures, e.g. a careful translation process of research materials (translation, back-translation, comparison and adjustments), piloting questionnaires to improve their understandability, continuous reflection on the methods (for the RAP at least daily during the debriefings), continuous feedback from stakeholders, a structured analysis process, use of the secure online data sharing platforms Sharepoint (qualitative data) and REDCap (survey). A strong sense of teamwork made field-researchers highly committed and dedicated to strive for excellence. All steps were completed within budget.					
	Transportation delays due to heavy	Research experience was initially relatively modest. Meanwhile, organisational skills			Teaming up with the local support	

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	rain shortened one RAP-debriefing session. Two community researchers were not consistently present throughout the RAP, possibly the local norms and their hierarchical position allowed them to choose more freely what to commit their time to.	were strong and dedication to learn was very high. A strong learning curve was visible.			centre enabled to gain trust from the Roma and access the camp. However, as we relied on their collaboration, we could not access the camp for sufficient time to collect all data.	
Participant responsiveness	Team members: highly motivated in each setting; very dedicated to learn from the training and perform the intensive RAP. Stakeholder engagement group members: stakeholders informally reported and demonstrated to feel ownership and provided continuous feedback in our co-creation process. Study participants: emotional and cognitive response to the study activities and materials was positive, also see recruitment.				
Recruitment	Tailored recruitment methods enabled high recruitment rates and very few refusals (one group of four elderly women declined the invitation to participate in the Kyrgyz lowlands, and provided the reason they did not want to wait for us, younger researchers, to complete preparations for the focus group. Also, we stopped one interview with a Vietnamese woman who had verbally given consent, but appeared to feel very uncomfortable with us carrying a voice recorder). Due to the high participation rate, we refreshed the informed-consent procedure to ensure the voluntary aspect of participation was sufficiently emphasized; participation rates remained equally high afterwards. This could be explained by the non-invasive nature of the research, the friendly, rural cultures, the involvement of community researchers which facilitated building trust, the rapport built by the researchers and possibly the small compensations for participations (a bar of soap in Uganda, a small reimbursement in Vietnam, and Dutch biscuits and travel reimbursement in Greece and Kyrgyzstan).				
	RAP: CM: 6 FG, 6 Q, 6 O; HP: 8 I, 7 Q, 11 O; KI: 1 FG, 7 I; *Total*: 42 CMs, 15 HPs, 11 KIs Survey: 207 CMs, 41 HPs	RAP: CM: 3 FG, 2 I, 18 Q, 13 O; HP: 1 FG, 4 I, 3 Q, 3 O; KI: 4 I; *Total*: 28 CMs, 10 HPs, 4 KIs Survey: 210 CMs, 42 HPs	RAP: CM: 8 FG, 12 Q, 11 O; HP: 4 I, 1 Q, 2 O; KI: 2 FG, 2 I; *Total*: 45 CMs, 5 HPs, 11 KIs Survey: 210 CMs, 40 HPs	RAP: CM: 7 FG, 4 I, 11 Q, 12 O; HP: 1 FG, 8 I, 1 Q, 1 O; KI: 9 I; *Total*: 52 CMs, 13 HPs, 9 KIs Survey: 210 CMs, 40 HPs	RAP: CM: 5 FG, 2 I, 3 Q, 4 O; HP: 3 I, 1 O; KI: 4 I; *Total*: 15 CMs, 3 HPs, 4 KIs Survey: /	RAP: CM: 10 FG, 5 I, 12 Q, 15 O; HP: 3 I, 1 Q, 4 O; KI: 10 I; *Total*: 59 CMs, 4 HPs, 10 KIs Survey: 200 CMs, 41 HPs
Context	See appendix 2				

SETTING-tool = Setting Exploration Treasure Trail for Informing implementatioN strateGies-tool, evaluated by the *modified Conceptual Framework for Implementation Fidelity*. The tool was considered 'feasible' if each step could be completed within reasonable effort, budget and time. It was regarded 'acceptable' if those using it or to whom it was applied considered it appropriate, based on their cognitive and emotional response (whether they were eager to work with the tool).[7], RAP = rapid assessment process. CM = community member, HP = healthcare professional, KI = key informant, FG = focus group, Q = questionnaire, O = observation, I = interview.

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Appendix 8 Budget for Horizon 2020 FRESH AIR WORK PACKAGE 3

Participant	Country	A Direct personnel costs	B Other direct costs	C Direct costs of sub-contracting	D Direct costs of providing financial support to third parties	E Costs of in kind contributions not used on the beneficaries premises	F Indirect costs (=0.25*(A+B-E))	G Special unit costs covering direct and indirect costs	H Total estimated eligible costs (A+B+C+D+F+G)	I Reimbursement rate	J Max. grant (H*I)	K Requested grant
Leiden University Medical Centre	Netherlands	138200	13800	0	0	0	38000	0	190000	1	190000	190000
International Primary Care Respiratory Group	UK	0	0	0	0	0	0	0	0	0	0	0
Makerere University College of Health Sciences	Uganda	11000	0	0	0	0	2750	0	13750	1	13750	13750
Ministry of Health Kyrgyz Republic	Kyrgyz Republic	14000	0	0	0	0	3500	0	17500	1	17500	17500
University of Medicine & Pharmacy Ho Chi Minh City	Vietnam	9000	0	0	0	0	2250	0	11250	1	11250	11250
University of Crete	Greece	17000	0	0	0	0	4250	0	21250	1	21250	21250
ARTEG	Netherlands	0	0	0	0	0	0	0	0	1	0	0
European Lung Foundation	UK	0	0	0	0	0	0	0	0	1	0	0
University of Washington	USA	0	0	0	0	0	0	0	0	1	0	0
National Centre for Smoking Cessation and Training	UK	0	0	0	0	0	0	0	0	1	0	0
University of Groningen	Netherlands	0	0	0	0	0	0	0	0	1	0	0
University of Copenhagen	Denmark	0	0	0	0	0	0	0	0	1	0	0
European COPD Coalition	Belgium	14700	0	0	0	0	3675	0	18375	0	18375	18375
University of Plymouth	UK	0	0	0	0	0	0	0	0	1	0	0
TOTAL		203900	13800	0	0	0	54425	0	272125	1	272125	272125

All numbers are in euros. This is the budget for WP 3, which included 5 objectives. 1) Secondary data collection to estimate the burden of chronic lung disease and its risk factors, 2) Exploring local health beliefs and behaviours, 3) a systematic review on factors that are key to successful implementation, 4) developing a knowledge base platform and 5) dissemination of the knowledge. Roughly, 75% of the budgets in Uganda, Vietnam, Kyrgyzstan and Greece was dedicated to objective 2.

Appendix 9. Additional Lessons Learnt:

STEP	Lessons learnt
1	→ Close alignment of the needs of research and practice requires extensive iterative communication with all stakeholders throughout the study process. → Insights from local team members were important for the identification of knowledgeable and influential representatives for the stakeholder engagement groups.
2	→ The Rapid Assessment Process proved a time-efficient and effective method. → The use of multiple methods resulted in richer data with higher validity. As an illustration: a rural nurse shared during an interview that she used a spirometer [a relatively sophisticated device] during respiratory consultations. However, observations of the consultations revealed that the device she meant to describe was a [basic] peak flow meter instead. → Finding an evidence-based randomisation method for low-resource, rural areas was challenging (Appendix 3).
3	→ Teaming up researchers with local stakeholders for the development of the research materials increased the materials' relevance and validity: the researchers promoted the use of theoretical frameworks and validated questionnaires, whereas the local stakeholders promoted a fit with the context. → Piloting the questionnaires resulted in substantial improvements in the content validity and understandability.
4	→ The RAP debriefing sessions were highly valued; discussing the daily findings from multiple perspectives substantially deepened our understanding. → Team members in low-resource settings tend to have multiple concomitant commitments, likely to result in a high member turn-over. However, to benefit from trainings and to allow for rapid, iterative data collection, a stable team is required. Emphasising the importance of a stable team to our local colleagues paid off. It resulted in a well-trained team and a strong team spirit.
5	→ Pragmatic analyses, mostly based upon our RAP debriefings, were essential for timely informing the implementation strategies of the FRESH AIR interventions. The time-consuming transcription and translation of qualitative data served the more in-depth analyses, which informed stakeholders and a scientific audience in a later stage.
6	→ Although we were aware of the importance of continuous communication with our stakeholders, we cannot emphasise enough how important frequent contact is for stakeholder engagement. Particularly, contact with our foreseen end-users facilitated use of the study's findings. In hindsight, we wished we would have done it even more.