

## **Appendix S1: Instructions for clinicians undertaking clinical reviews**

Participants had completed a screening questionnaire and undertaken spirometry. Dr Sundeep Salvi used the data that he has received from the survey + spirometry and categorized patients on this basis. He identified a list of participants in whom further information would be useful to clarify the diagnosis (specifically those with borderline or unclear spirometry, or where spirometry and symptoms were mismatched). He would send the list of participants needing clinical assessment to the Centres.

### **The task in the clinical assessment is to reach a clinical decision about the diagnosis.**

You will have the results of the questionnaire survey and the spirometry results. What we need you to do is to use your clinical expertise to decide on clinical grounds what the diagnosis is – or if the patient is normal.

- Take a clinical history; examine the patient; if appropriate arrange further investigations (e.g. repeat spirometry to look for variability; ECG if you suspect a cardiac cause or if the pulse is irregular, CXR if the patient has haemoptysis, FBC if they may be anaemic). The decision to do additional tests is clinical – just as you would in a normal clinical consultation

**Please keep very clear notes.** Please complete the data collection form which has headings for these key components of a clinical assessment:

- History: What history did you take? What did the participant tell you about their symptoms, past history, family history? Any drug treatment?
- Examination: What examination did you do and what did you find? Specifically note findings of respiratory signs/chest examination, but also examination of other systems.
- Tests (if any): What tests did you do – and what was the result? Were there any investigations that might have helped but which were not available in your setting?
- Conclusion (your clinical opinion). What was your conclusion and why? If possible, indicate the cause of chronic respiratory symptoms, but it is understood that sometimes the diagnosis may not be clear – or the participant may have more than one problem
- Add any comments or feedback about the process/assessment

**In summary, what we need from the clinical assessment is your clinical expertise and your feedback on the process.**

It is important to remember that this is a feasibility study; your feedback will help us develop algorithms for the large scale 4CCORD survey. We will compare your expert opinion to the conclusion of the original survey/spirometry and assess the sensitivity/specificity of the 4CCORD survey for detecting COPD, asthma and other CRDs.

**Table S1:** Table of variables included in Lasso regression models

Q#	Question/Variable	Options	Asthma	COPD
	Age		√	√
	Country		√	√
	BMI		√	√
Q1001	What is the participant's sex?	<input type="checkbox"/> Male 01 <input type="checkbox"/> Female 02	√	√
Q1007	Do you usually cough when you don't have a cold? <i>[If yes, continue with Q7A; If no, skip to Q1008]</i>	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1007 A	Are there months in which you cough on most days? <i>[If yes, ask both Q1007B &amp; Q1007C; If no, skip to Q1008]</i>	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1007B	Do you cough on <u>most days</u> for as much as <u>three months each year</u> ?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1007C	For how <u>many years</u> have you had this cough?	<input type="checkbox"/> Less than 2 years 01 <input type="checkbox"/> 2-5 years 02 <input type="checkbox"/> More than 5 years 03  Less than 2 years  Less than 2 years	√	√

Q1008	Do you <u>usually</u> bring up <u>phlegm</u> from your chest, or do you usually have phlegm in your chest that is difficult to bring up when you don't have a cold? [If <b>yes</b> , continue with Q1008A; If <b>no</b> , skip to Q1009]	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	v	v
Q1008 A	Are there months in which you have this phlegm on most days? [If <b>yes</b> , ask both Q1008B & 8C; If <b>no</b> , skip to Q1009]	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	v	v
Q1008B	Are there <u>months</u> in which you have this phlegm on most				
Q1008C	Do you bring up this phlegm on <u>most days</u> for as much as <u>three months each year</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	v	v
	For how many <u>years</u> have you had this phlegm?	<input type="checkbox"/> Less than 2 years <input type="checkbox"/> 2-5 years <input type="checkbox"/> More than 5 years	01 02 03	v	v
Q1009	Have you had <u>wheezing</u> or <u>whistling</u> in your chest at any time in the <u>last 12 months</u> ? [If <b>yes</b> , ask <u>both</u> Q1009A & Q1009B; If <b>no</b> , skip to Q1010]	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	v	v
Q1009 A	In the <u>last 12 months</u> , have you had this wheezing or whistling <u>only</u> when you have a cold?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	v	v
Q1009B	In the <u>last 12 months</u> , have you ever had an attack of wheezing or whistling that has made you feel <u>short of breath</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	v	v
Q1010	Do you ever have trouble with your breathing? [If <b>yes</b> , go to Q1010A or else go to Q1011]	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	v	v

Q1010A	Do you have this trouble?	<input type="checkbox"/> Continuously so that your breathing is never, quite right? 01 <input type="checkbox"/> Repeatedly, but it always gets completely better? 02 <input type="checkbox"/> Only rarely? 03	v	v
Q1011	Are you <u>unable</u> to walk due to a condition <u>other than</u> shortness of breath? <i>[If <b>yes</b> to Q1011, please describe this condition on the line below and then skip to Q1013. If <b>no</b> or unsure, go directly to Q1012</i>	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	v	v
Nature of condition(s): -----				
Q1013	Have you woken up with a feeling of tightness in your chest at any time in the last <b>12 months</b> ?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	v	v
Q1014	Have you had an attack of shortness of breath that came on during the day when you were at rest at any time in the last <b>12 months</b> ?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	v	v
Q1015	Have you had an attack of shortness of breath that came on <b>following</b> strenuous activity at any time in the last <b>12 months</b> ?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	v	v
Q1016	Have you been woken by an attack of shortness of breath at any time in the last <b>12 months</b> ? <i>[If <b>yes</b>, go to Q 1016A, else go to Q1017]</i>	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	v	v
Q1016A	Have you been woken by an attack of shortness of breath in the last <b>3 months</b> ? <i>[If <b>yes</b>, go to Q1016B, else go to Q1017]</i>	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	v	v

Q1016B	<b>On average</b> have you been woken by an attack of shortness of breath <b>at least once a week in the last 3 months?</b> <i>[If yes, go to Q1016C, else go to Q1017]</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1016C	How many times a week <b>on average</b> have you been woken by shortness of breath in the <b>last 3 months?</b>	_____ times		√	√
Q1017	Have you been woken by an attack of coughing at any time <b>in the last 12 months?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1018	Has a doctor or other health care provider ever told you that you have emphysema?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1019	Has a doctor or other health care provider ever told you that you have asthma, asthmatic bronchitis or allergic bronchitis? <i>[If yes, ask Q1019A. If no, skip to Q1020]</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1019A	Do you still have asthma, asthmatic bronchitis or allergic bronchitis?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1020	Has a doctor or other health care provider ever told you that you have chronic bronchitis? <i>[If yes, ask Q1020A. If no, skip to Q1021]</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1020A	Do you still have chronic bronchitis?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1021	Has a doctor or other health care provider ever told you that you have chronic obstructive pulmonary disease (COPD)? <i>[If yes, ask Q1021A. If no, skip to Q1022]</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1021A	<i>Do you still have COPD?</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√

Q1023	Have you ever had a period when you had breathing problems that got so bad that they interfered with your usual daily activities or caused you to miss work? <i>[If yes, ask Q1023A. If no, skip to Q1024]</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1023A	How many such episodes have you had in the past 12 months? <i>[If Q1023A &gt;0, ask Q1023B and Q1023C, else skip to Q1024]</i>	_____ episodes		√	√
Q1023B	For how many of these episodes did you need to see a doctor or other health care provider in the past 12 months?	_____ episodes		√	√
Q1023C	For how many of these episodes were you hospitalized overnight in the past 12 months? <i>[If Q1023C &gt;0, ask Q123D, else skip to Q1024]</i>	_____ episodes		√	√
Q1023D	Altogether, for how many total days were you hospitalized overnight for breathing problems in the past 12 months?	_____ days		√	√
Q1028	Have you <u>ever</u> smoked cigarettes?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
	<i>("Yes," means more than 20 packs of cigarettes in a lifetime or more than 1 cigarette each day for a year) [if yes, ask Q1028A through Q1028D; otherwise, skip to Q1030]</i>				√
Q1028A	How old were you when you first started regular cigarette smoking?	_____ years old		√	√
Q1028B	<u>If you have stopped smoking</u> , how old were you when you last stopped? (If the participant has not stopped smoking, record as code '99'.)	_____ years old		√	√
Q1028C	On average over the entire time that you smoke(d), about how many cigarettes per day do (did) you smoke?	_____ cigarettes/day		√	√

Q1028D	On average over the entire time that you smoke(d), do (did) you primarily smoke manufactured or hand-rolled cigarettes?	<input type="checkbox"/> Manufactured <input type="checkbox"/> Hand-rolled	01 02	√	√
Q1030	Have you <u>ever</u> smoked a pipe or cigar? [If <b>yes</b> , ask Q1030A. If <b>no</b> , proceed to Q1031]	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1030A	Do you now smoke a pipe or cigar?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1033	Have you been <b>regularly</b> exposed to tobacco smoke in the last <b>12 months</b> ? [‘Regularly’ means on most days or nights]? [If <b>no</b> , go to Q1034, If <b>yes</b> Q1033A]	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1033A	Not counting yourself, how many people in your household smoke regularly?	_____ number		√	√
Q1033B	Do people smoke regularly in the room where you work?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1033C	How many hours per day are you exposed to <b>other people's</b> tobacco smoke?	_____ hours		√	√
Q1033D	How many hours per day, are you exposed to other people’s tobacco smoke in the following locations? a) at home, b) workplace, c) bars, restaurants, cinemas or similar social settings d) elsewhere	_____ hours _____ hours _____ hours _____ hours		√	√
Q1034	Have you ever worked for a year or more in a dusty job? [If <b>yes</b> , ask Q1034A, otherwise skip to Q1035]	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1034A	For how many years have you worked in dusty jobs?	_____ years		√	√

Q1036	Has a doctor or other health care provider ever told you that you had the following?			√
Q1036A	Heart disease	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036B	Hypertension	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036C	Diabetes	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036D	Lung cancer	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036E	Stroke	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036F	Tuberculosis <i>[If <b>yes</b> to Q1036F, then ask Q1036F1; otherwise, skip to Q1036G]</i>	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036F 1	Are you currently taking medicine for tuberculosis? <i>[If <b>no</b> to Q1036F1, then ask Q1036F2; otherwise, skip to Q1036G]</i>	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036F 2	Have you ever taken medicine for tuberculosis?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036G	Nasal allergies, including hay fever?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036H	Eczema?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1036I	Gastro-oesophageal reflux?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1037	Have you ever had an operation on your chest in which a part of your lung was removed?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√



Q1038	Were you hospitalized as a child for breathing problems <u>prior to</u> the age of 10?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02 <input type="checkbox"/> Don't Know 03	√	√
Q1040	Has a doctor or other health care professional told your father, mother, sister or brother that they had a diagnosis of emphysema, chronic bronchitis or COPD?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1041	Has a doctor or other health care professional told your father, mother, sister or brother that they had a diagnosis of eczema, asthma or hay fever?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1042	Has anyone living in your home (besides yourself) smoked a cigarette, pipe or cigar in your home during the past two weeks?	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1043	In general, would you say your health is: <i>[Check one.]</i>	<input type="checkbox"/> Excellent 01 <input type="checkbox"/> Very good 02 <input type="checkbox"/> Good 03 <input type="checkbox"/> Fair 04 <input type="checkbox"/> Poor 05	√	√
Q1057	Has an indoor open fire with wood, crop residues or dung been used as a primary means of cooking in your home for more than 6 months in your life? <i>[If yes, ask Q1057A to Q1057D, else skip to Q1058]</i>	<input type="checkbox"/> Yes 01 <input type="checkbox"/> No 02	√	√
Q1057A	For how many years have wood, crop residues or dung been used for cooking in your home?	_____ years	√	√
Q1057B	On average, for how many hours a day have you personally spent cooking using wood, crop residues or dung?	_____ hours	√	√

Q1057C	Are wood, crop residues or dung still used for cooking in your home?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1057D	Was (Is) your stove or fire vented to the outside (e.g., through a chimney or window)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1058	Have you used an open fire with coal or coke as a primary means of heating your home for more than 6 months in your life? <i>[If yes, ask Q1058A and Q1058B, else skip to Q1059]</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1058A	For how many years have you used an open fire with coal or coke as a primary means of heating your home?	_____ years		√	√
Q1058B	Do you still use an open fire with coal or coke as a primary means of heating your home?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1059	Have you used an open fire with wood, crop residues or dung as a primary means of heating your home for more than 6 months in your life? <i>[If yes, ask Q1059A and Q1059B, else skip to end of questionnaire]</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
Q1059A	For how many years have you used an open fire with wood, crop residues or dung as a primary means of heating your home?	_____ years		√	√
Q1059B	Do you still use an open fire with wood, crop residues or dung as a primary means of heating your home?	<input type="checkbox"/> Yes <input type="checkbox"/> No	01 02	√	√
	pre_FEV1			√	√
	pre_FEV1_pred			√	√
	pre_FEV1/FVC			√	√
	pre_FVC			√	√
	pre_FVC_pred			√	√

	post_FEV1		√	√
	post_FEV1_pred		√	√
	post_FEV1/FVC		√	√
	post_FVC		√	√
	post_FVC_pred		√	√
	Reversibility		√	

**Table S2.** Table of the prevalence of asthma, COPD, restrictive spirometry (based on GLI predictive values) and ‘other CRD’ at the five sites based on consensus categorization.

<b>Gold Standard Diagnosis</b>	<b>Bangladesh</b>	<b>CMC</b>	<b>KEMHRC</b>	<b>Malaysia</b>	<b>Pakistan</b>	<b>Total</b>
COPD	7	3	2	3	8	23
Asthma (spirometry)	1	0	1	2	4	8
Asthma (symptoms)	13	9	6	19	28	75
Other CRD	1	0	0	9	5	15
RLD	14	13	16	13	9	65
No CRD	47	44	50	32	22	195
Isolated symptom (CRD unlikely)	13	7	11	2	9	42
Restrictive (asymptomatic)	3	21	11	8	2	45
Non-respiratory	2	1	7	6	12	28
Unclear	0	2	2	7	1	12
<b>Total</b>	<b>101</b>	<b>100</b>	<b>106</b>	<b>101</b>	<b>100</b>	<b>508</b>

RLD: Restrictive Lung Disease

No CRD: No Chronic Respiratory Disease

Non-respiratory: Non-respiratory cause for symptoms

Note: The differences in prevalences between the sites are likely to be due the small sample sizes in this feasibility study rather than real differences in populations that would have been captured in a fully powered survey which would have required approximately 1,000 patients/site.

**Table S3:** Table of parameter estimates for a predictive model for COPD for participants with asthma or COPD

<b>Parameter</b>	<b>Lasso predictive model estimate</b>
<i>Intercept</i>	1.877
Age	0.040
Pre-FVC%pred	0.074
Post-FEV1%pred	-0.179
Post-FVC%pred	0.023