POLICY BRIEF

EFFECT OF MOBILE PHONE-BASED SELF-MANAGEMENT EDUCATIONAL INTERVENTIONS ON QUALITY OF LIFE OF PATIENTS WITH COPD

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How this policy brief was developed:

This policy brief is based on the research project "*Effect of mobile phone-based self-management educational interventions on quality of life of patients with COPD*". The research was conducted under the guidance of the Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, India, and benefited from the incentive grant for young researchers provided by the World Health Organization Global NCD Platform and UNITAR's Defeat-NCD Partnership in collaboration with the Alliance for Health Policy and Systems Research.

What is this policy brief about?

This policy brief presents the preliminary results of a randomised controlled trial to determine the effectiveness of a mobile phone-based self-management education intervention compared to the traditional booklet method on the quality of life and clinical status of the individuals with COPD in India.

Who is this policy brief for?

This policy brief primarily targets national, regional and local health policy-makers in India, however, other decision-makers, practitioners and researchers interested in mobile phone-based COPD management solutions may find the content of this policy brief relevant.

This policy brief includes:

- Description of the COPD burden globally and in India
- Methodology and preliminary findings of the randomized control trial currently being implemented

This policy brief does not include:

- Final findings of the study
- Policy implications and recommendations

PROBLEM STATEMENT

- Chronic Obstructive Pulmonary Disease (COPD) is a major global health problem with an estimated 65 million people worldwide suffering from moderate to severe COPD.
- The second leading cause of death in India, the prevalence of COPD is particularly high due to such factors as a large population of smokers, high levels of air pollution, and indoor air pollution from the use of solid fuels and biomass for cooking and heating.
- Under-recognition, under-diagnosis and under-treatment of COPD exacerbate the situation, but inadequate health system orientation, poor health-seeking behaviour and associated stigma among patients in India add further challenges.
- Tackling COPD, therefore, requires a comprehensive approach, including promoting smoking cessation, reducing air pollution and improving access to early diagnosis and quality healthcare.
- Educational interventions for self-management, with or without supervision, can be a cost-effective way of managing patients and help reduce healthcare costs by reducing emergency visits.

IMPLICATIONS

- This policy brief builds on the study currently being implemented and presents the preliminary findings mainly derived from participants' demographic data, health status measures and lifestyle insights.
- The initial data suggest that COPD affects a diverse community with a range of demographic backgrounds and health conditions. Hence, a comprehensive strategy that includes smoking cessation support, comorbidity management and patient-centred treatment is needed to address the complex issues associated with COPD.
- The mobile phone-based application that is being tested in this study has shown the potential to collect a wide range of comprehensive patient data that can be used to develop a database for patient follow-up.
- The final study results will provide evidence for policy-makers and health-care professionals to support the operationalization of the interventions on a large scale and develop new policies and programmes to improve the quality of life and reduce the financial and social costs of COPD in India.

1. FRAMING THE PROBLEM

BACKGROUND

Chronic Obstructive Pulmonary Disease (COPD) affects the airways and cells of the lungs as a result of persistent exposure to harmful substances, particularly tobacco smoke. COPD cannot be cured, but respiratory symptoms can be managed with pharmacological and non-pharmacological interventions. Pharmacological management primarily includes the use of medications such as inhaled bronchodilators.

COPD is a major global health problem affecting people in all regions of the world. The World Health Organisation (WHO) estimates that 65 million people worldwide suffer from moderate to severe COPD, which places a significant economic burden on healthcare systems and societies worldwide. The costs of treating COPD, hospitalization, lost productivity due to illness and early death are high. Low- and middle-income countries (LMICs) are known to account for more than 90% of COPD-related deaths and face a significant economic burden [1,2].

The prevalence of COPD in India is particularly high due to several factors, including a large population of smokers, high levels

of air pollution in urban areas, and indoor air pollution from the use of solid fuels and biomass for cooking and heating in rural areas. COPD is the second leading cause of death in India after cardiovascular diseases [3]. The prevalence of COPD in the country has increased from 3.3% to 4.2% in three decades. By 2025, COPD is estimated to become the leading cause of death worldwide [4, 5, 1].

Under-recognition, under-diagnosis and under-treatment of COPD are major public health problems [4,6]. However, poor health system orientation (inadequate capacity and logistics such as availability of spirometers and inhalers), poor health-seeking behaviour and associated stigma among patients are challenges that need to be addressed.

Tackling COPD, therefore, requires a comprehensive approach, including promoting smoking cessation, reducing air pollution and improving access to early diagnosis and quality healthcare. Public health strategies and interventions to tackle COPD should be prioritized at national and international levels to reduce the burden of this debilitating disease.

Educational interventions for self-management, with or without supervision, need to be tested in people diagnosed with COPD. It can be a cost-effective way of managing patients and help reduce healthcare costs by reducing emergency visits and hospitalizations. Previous studies have shown that self-management interventions can significantly improve patients' overall functioning, disease control and quality of life. It has significantly reduced exacerbations, respiratory-related (±all-cause) hospital admissions and respiratory-related mortality [7-10]. It also improves the self-efficacy, awareness and behavioural intentions of COPD patients, including medication adherence and its correct use. However, there is a paucity of literature from India on self-management education interventions for patients with COPD.

In collaboration with the Defeat NCD partnership and UNITAR, WHO offered an incentive grant for implementation research to drive progress towards SDG 3.4. (SDG 3.4 focuses on reducing premature deaths from noncommunicable diseases (NCDs) by one-third by 2030 through prevention, treatment and promotion of mental well-being.) The grant supported the conduct of a pragmatic randomized controlled trial to determine the effectiveness of the mobile phone-based self-management education intervention compared to the traditional booklet method on the quality of life and clinical status of the individuals with COPD.

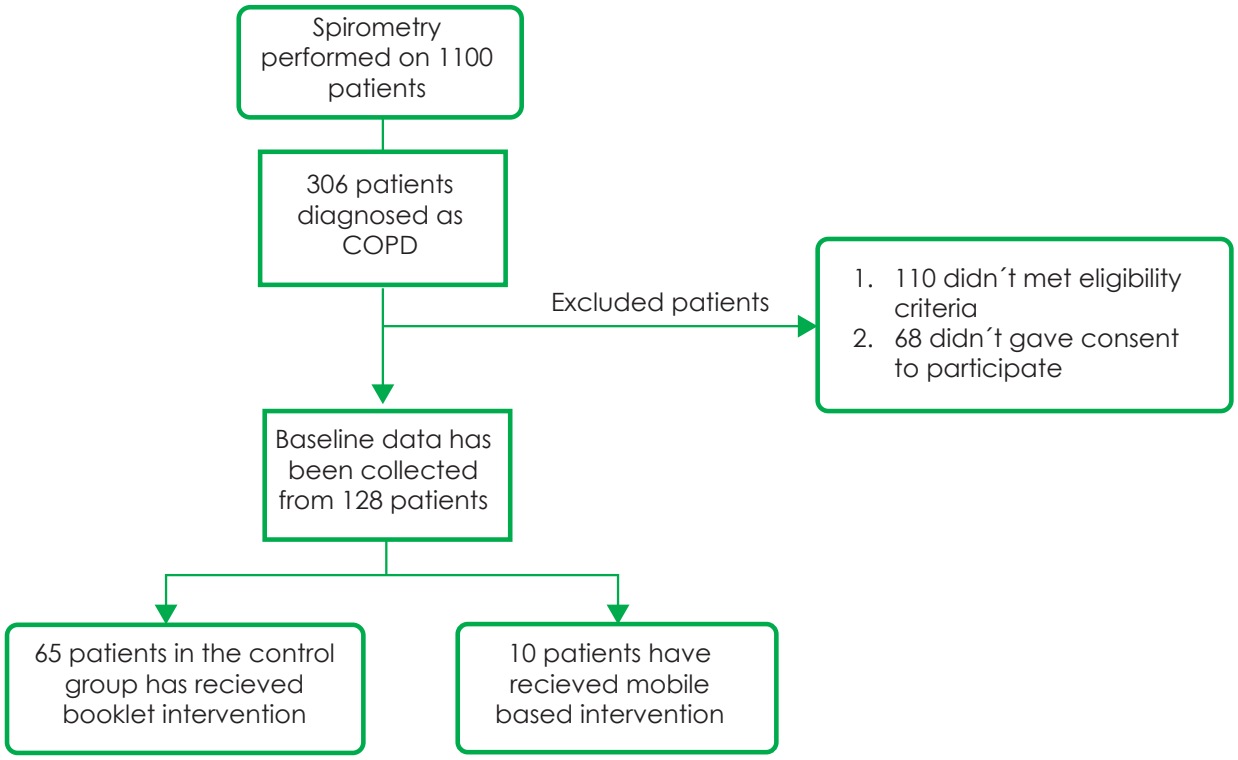

Photo: WHO

METHODS AND DATA SOURCES

This is an ongoing randomized controlled trial. The sample size for this trial is 150 patients (n=75 intervention group and n=75 control group). The patients randomly assigned to the control group will receive the conventional (paper-based) self-management education intervention, and patients assigned randomly to the intervention group will receive the mHealth-based self-management education intervention in the form of the mobile application. This policy brief presents the intermediary results of the trial.

At the time of developing this policy brief, we have successfully performed spirometry tests on 1100 patients. Of these, 306 had a post-bronchodilator FEV1/FVC ratio below 70%, indicating potential COPD. The pulmonologist carefully reviewed all spirometry loops to ensure test quality. Of the 306 patients with confirmed COPD, 110 didn't meet the study criteria, and 68 declined to participate. We have enrolled 128 patients, of which 65 in the active control group have already received the intervention. In the intervention group, ten patients received the mobile application intervention. The flow of diagnosis, exclusion and recruitment of patients is shown in **Figure 1.**

Figure 1: Flow of the diagnosis, exclusion and recruitment of the patients



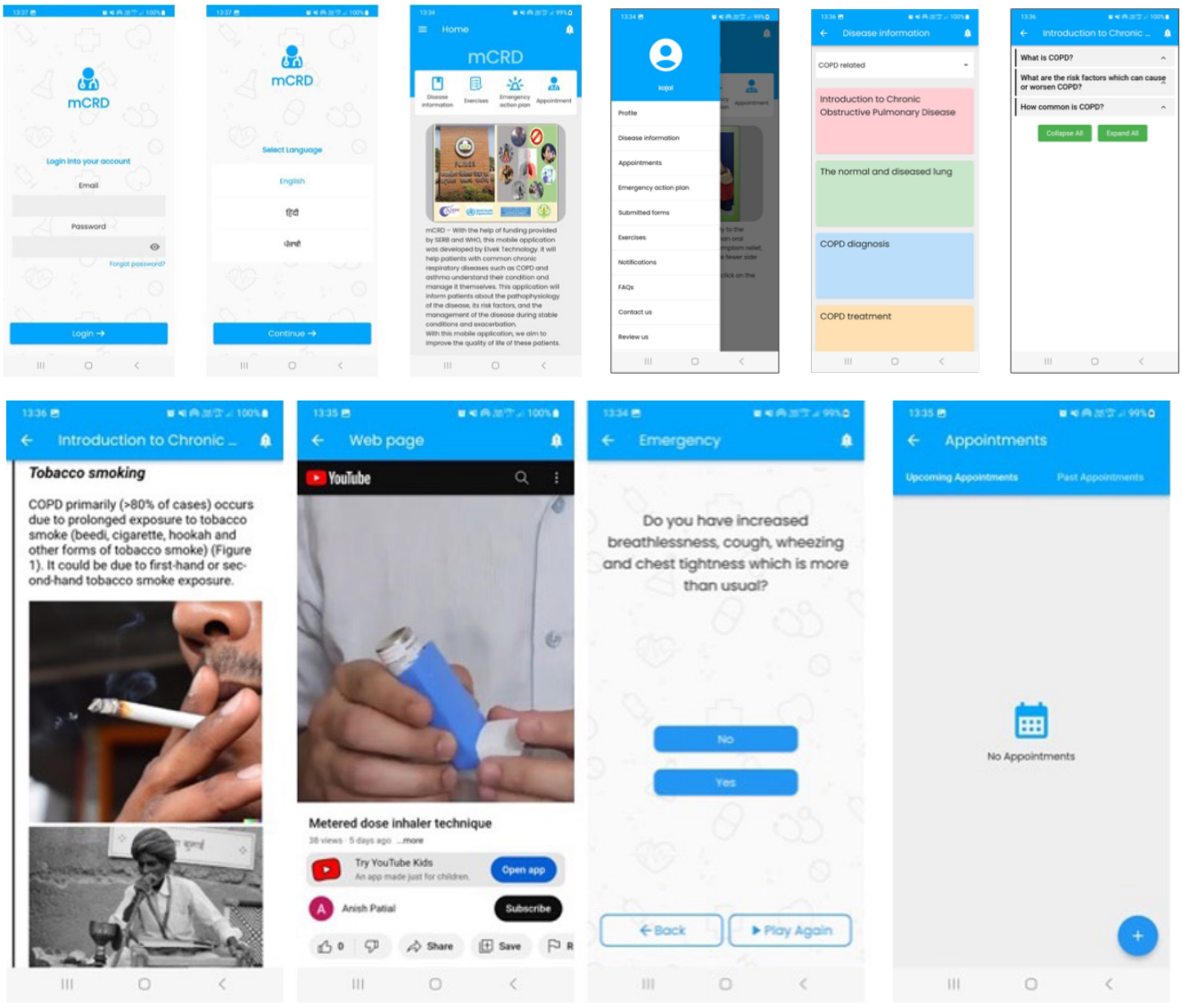
Baseline data were collected from all participants who agreed to participate in the study. Social determinants of health such as gender, age, marital status, socioeconomic status, educational level and area of residence were collected from patients with COPD. Baseline assessment of outcome measures such as knowledge, attitudes and practices related to COPD, medication adherence using the Medication Adherence Rating Scale (MARS), disease control status (dyspnoea using the modified Medical Research Council [mMRC] and exacerbation frequency), healthcare utilization and health-related quality of life using the St George Respiratory Questionnaire were also collected. Details are provided in **Annex 1.**

We developed the self-management educational materials after systematically reviewing the literature and conducting a cross-sectional study. The cross-sectional study

was conducted to understand the needs, existing practices and knowledge of patients with COPD and to develop the educational content accordingly. The self-management educational content was developed in three languages (Hindi, Punjabi and English). The intervention package focuses on patient education and provides self-management information to manage the condition without assistance. It includes information on COPD, symptoms, risk factors, available treatments, details of inhaler types (dry powder [DPIs] and pressurized metered dose inhalers [pMDIs]), inhaler techniques (with and without spacer for MDIs), information on smoking cessation, how to prevent and manage acute exacerbations at home (do's and don'ts), when to report to the doctor and how to perform spirometry.

This self-management educational content has been developed in a booklet form and an Android mobile application (available in English, Hindi and Punjabi languages). The mobile application contains educational content in a dynamic format so that it can be updated as new evidence is generated. The application also provides links to videos of the inhaler technique and the spirometry test. An algorithm of the action plan has been developed in a manner to allow patients to self-manage mild exacerbations at home and reduce healthcare utilization. Patients can also consult the doctor through teleconsultation. The current Android application allows us to create a patient database by registering them and maintaining their record, which could help follow up with the patients. The prototype of the application is demonstrated in **Figure 2.**

Figure 2: Interphase of the mobile application for patients with COPD with different features



2. KEY FINDINGS

The mean (SD) age of the 128 participants was 63.6 years (7.6). Most respondents identified as male 124 (96.9%), and a smaller percentage identified as female 4 (3.1%). Of the many respondents, 44 (34.4%) had completed primary school, a quarter of 32 (25.0%) had attended secondary school, 31 (24.2%) participants had completed high school, and 21 (16.4%) respondents had completed at least upper secondary education.

About half of the respondents, 53 (41.4%), identified themselves as white-collar workers, 29 (22.7%) were daily wage earners, 26 (20.3%) participants were pensioners, 12 (9.4%) of respondents were shopkeepers, 3 (2.3%) were housewives and 5 (3.9%) participants were unemployed. In terms of marital status, the majority, 109 (85.2%), identified themselves as married, while a smaller percentage, 19 (14.8%), were widows or widowers.

Participants were distributed across different areas of residence, with a significant proportion, 88 (68.8%), living in rural areas and the remaining respondents, 40 (31.3%), living in urban areas. In terms of religion, the majority, 127 (99.2%), identified as Hindu, with a minimal representation of one (0.8%) Muslim participant. The median monthly per capita income of the patients whose data were collected was INR 2,450, with an interquartile range (IQR) of INR 1,906 to INR 4,000.

There was a notable prevalence of smoking, with 123 (96.1%) having ever smoked, including 41 (33.3%) current smokers and 82 (66.7%) former smokers. The median duration of smoking was 35 years, ranging from 22.3 to 42.0 years (IQR). In addition, exposure to ETS was evident in years, with a mean of 32.3 years at home and 30.1 years at work. Among former smokers, the median duration of quitting was five years, ranging from 2.0 to 13.0 years (IQR).

Several comorbidities were present in patients with COPD. Hypertension was the most common, affecting 72 (56.3%) of respondents, followed by coronary heart disease in 42 (32.8%) and diabetes mellitus in 20 (15.6%). A further 8 (6.3%) reported other comorbid conditions, while 41 (32.0%) had no reported comorbidities.

The assessment of the quality of life in people with COPD in terms of symptoms showed a mean score of 50.1 (23.9), activity-related quality of life, which assesses the impact of COPD on physical functioning and engagement, had a mean score of 65.4 (23.2).

3. IMPLICATIONS AND RECOMMENDATIONS

A multidimensional portrait of people with COPD has emerged. This study collected a wide range of demographic data, health status measures and lifestyle insights to create comprehensive data in the following stages of the study. COPD affects many different aspects of life. Results of the data collected from 128 participants so far suggest that COPD affects a diverse community with a range of demographic backgrounds and health conditions. A comprehensive strategy that includes socio-economic variables, smoking cessation support, comorbidity management and patient-centred treatment is needed to address the complex issues associated with COPD.

We have developed such an intervention in the form of a mobile application and a booklet. The results of the current study will provide evidence for policy-makers and healthcare professionals to operationalize the interventions on a large scale and develop new policies and programmes to improve the quality of life and reduce the financial and social costs of COPD.

References

1. Mccabe C, Mccann M, Brady AM. Computer and mobile technology interventions for self-management in chronic obstructive pulmonary disease. Cochrane Database Syst Rev [Internet]. 2017 May 23 [cited 2020 Feb 14];2017(5). http://doi.wiley.com/10.1002/14651858.CD011425.pub2.
2. Howcroft M, Walters EH, Wood-Baker R, Walters JA. Action plans with brief patient education for exacerbations in chronic obstructive pulmonary disease. Cochrane Database Syst Rev. 2016 Dec 19;2016(12).
3. India: Health of the Nation's States [Internet]. 2016 [cited 2020 May 28]. https://www.healthdata.org/sites/default/files/files/policy_report/2017/India_Health_of_the_Nation%27s_States_Report_2017.pdf
4. Quaderi SA, Hurst JR. The unmet global burden of COPD. Vol. 3, Global Health, Epidemiology and Genomics. Cambridge University Press; 2018.
5. Gadoury MA, Schwartzman K, Rouleau M, Maltais F, Julien M, Beaupré A, et al. Self-management reduces both short- and long-term hospitalisation in COPD. Eur Respir J. 2005;26(5):853–7.
6. Alharbey R, Chatterjee S. An mHealth assistive system "MyLung" to empower patients with chronic obstructive pulmonary disease: Design science research. J Med Internet Res. 2019 Mar 1;21(3).
7. Bloom DE, Mahal A, Rosenberg L, Sevilla J. Economic security arrangements in the context of population ageing in India [Internet]. Vol. 63, International Social Security Review. 2010 [cited 2020 May 28]. Available from: http://www.hsph.harvard.edu/pgda/working.htm
8. Zwerink M, Brusse-Keizer M, van der Valk PDLPM, Zielhuis GA, Monninkhof EM, van der Palen J, et al. Self management for patients with chronic obstructive pulmonary disease. Vol. 2014, Cochrane Database of Systematic Reviews. John Wiley and Sons Ltd; 2014.
9. Lenferink A, Brusse-Keizer M, van der Valk PDLPM, Frith PA, Zwerink M, Monninkhof EM, et al. Self-management interventions including action plans for exacerbations versus usual care in patients with chronic obstructive pulmonary disease. Vol. 2017, Cochrane Database of Systematic Reviews. John Wiley and Sons Ltd; 2017.
10. Alharbey R, Chatterjee S. An mHealth assistive system "MyLung" to empower patients with chronic obstructive pulmonary disease: Design science research. J Med Internet Res. 2019 Mar 1;21(3).

Annex 1.

Table 1. Socio-demographic, behavioral and comorbidity characteristics of patients with COPD

	Total (N-128)	
	n	(%)
Mean (SD) Age (in years)	63.6	(7.6)
Male	124	(96.9)
Female	4	(3.1)
Education		
Primary school	44	(34.4)
Middle School	32	(25.0)
High School	31	(24.2)
≥Higher Secondary School	21	(16.4)
Occupation		
Salaried	53	(41.4)
Daily Wager	29	(22.7)
Retired	26	(20.3)
Shopkeeper	12	(9.4)
Homemaker	3	(2.3)
Unemployed	5	(3.9)
Marital Status		
Married	109	(85.2)
Widow	19	(14.8)
Area of Residence		
Rural	88	(68.8)
Urban	40	(31.3)
Religion		
Hindu	127	(99.2)
Muslim	1	(0.8)
Median (IQR) monthly per capita income (INR)	2450	(1906-4000)
Smoking status		
Never Smoker	5	(3.9)
Ever Smoker	123	(96.1)
Current smokers	*41*	*(33.3)*
Past smokers	82	*(66.7)*
Median (IQR) duration (years) of smoking	35	(22.3-42.0)
Second hand smoke exposure at home	32.3	(13.3)
Second hand smoke exposure at workplace	30.1	(11.5)
Median (IQR) duration (years) of quitting[a]	5	(2.0-13.0)
Presence of comorbidities		
Hypertension	72	(56.3)
Coronary Artery Disease	42	(32.8)
Diabetes Mellitus	20	(15.6)
Others*	8	(6.3)
None	41	(32.0)

Quality of life among patients with COPD	**Mean**	**(SD)**
Symptom	50.1	(23.9)
Activity	65.4	(23.2)
Impact	33.8	(21.2)
Total	46.1	(20.2)
Spirometry values		
FVC	2.5	(0.8)
FEV_1	1.6	(0.8)
FEV_1/FVC	51.7	(11.8)
FEV_1 predicted %	60.5	(23.3)
Dyspnoea grade (mMRC)		
Grade 0	6	(4.7)
Grade 1	40	(31.3)
Grade 2	47	(36.7)
Grade 3	26	(20.3)
Grade 4	9	(7.0)
Current use of Inhaled Medications		
Yes	84	(65.6)
Metered Dose Inhaler	77	*(60.2)*
Dry Powder Inhaler	7	*(5.5)*
No	44	(34.4)
Details of current medications		
Oral bronchodilator	75	(58.6)
Inhaled corticosteroid and bronchodilator	70	(54.7)
Antihistamine/Antiallergic	40	(31.3)
Multivitamin	28	(21.9)
Inhaled bronchodilator	19	(14.8)
Analgesics/Antipyretics	16	(12.5)
Mucolytics	8	(6.3)
Antiulcerants and antisecretory	9	(7.0)
Digestive enzymes	6	(4.7)
Antibiotic	4	(3.1)
Oral corticosteroid	3	(2.3)
medication for other illness	87	(68.0)
Median (IQR) Medication Adherence Rating (MARS-5) Score	17	(6.3-22.8)
Stage of smoking cessation among current tobacco smokers	n (41)	(%) (32.0)
Not interested to quit	8	(19.5)
Interested to quit	33	(80.5)
Quit within next month	5	(12.2)
Quit within next twelve months	13	(31.7)
Quit someday but not in next twelve months	15	(36.6)
Refused to answer/ Don't know	1	(2.4)

**Benign prostatic hyperplasia, Hernia, Chronic Kidney Disease, Liver Disease*

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