

BMJ Open Social factors associated with chronic non-communicable disease and comorbidity with mental health problems in India: a scoping review

Saju Madavanakadu Devassy ^{1,2}, Anuja Maria Benny,² Lorane Scaria,² Anjana Nannatt,¹ Meredith Fendt-Newlin,³ Jacques Joubert,⁴ Lynette Joubert,⁵ Martin Webber ³

To cite: Madavanakadu Devassy S, Benny AM, Scaria L, *et al*. Social factors associated with chronic non-communicable disease and comorbidity with mental health problems in India: a scoping review. *BMJ Open* 2020;**10**:e035590. doi:10.1136/bmjopen-2019-035590

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2019-035590>).

Received 07 November 2019
Revised 11 March 2020
Accepted 21 April 2020



© Author(s) (or their employer(s)) 2020. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to

Professor Martin Webber;
martin.webber@york.ac.uk

ABSTRACT

Objectives The purpose of this study is to examine the existing literature of the major social risk factors which are associated with diabetes, hypertension and the comorbid conditions of depression and anxiety in India.

Design Scoping review.

Data sources Scopus, Embase, CINAHL Plus, PsycINFO, Web of Science and MEDLINE were searched for through September 2019.

Eligibility criteria for selecting studies Studies reporting data on social risk factors for diabetes or hypertension and depression or anxiety in community-based samples of adults from India, published in English in the 10 years to 2019, were included. Studies that did not disaggregate pooled data from other countries were excluded.

Data extraction and synthesis Two independent reviewers extracted study aims; methods; sample size and description; demographic, social and behavioural risk factors and a summary of findings from each paper. Risk factors were synthesised into six emergent themes.

Results Ten studies were considered eligible and included in this review. Nine presented cross-sectional data and one was a qualitative case study. Six themes emerged, that is, demographic factors, economic aspects, social networks, life events, health barriers and health risk behaviours.

Conclusions Literature relating to the major social risk factors associated with diabetes, hypertension and comorbid depression and anxiety in India is sparse. More research is required to better understand the interactions of social context and social risk factors with non-communicable diseases and comorbid mental health problems so as to better inform management of these in the Indian subcontinent.

INTRODUCTION

Non-communicable diseases (NCDs) are responsible for the deaths of over 40 million people worldwide each year, making up 71% of mortality worldwide.¹ Cardiovascular diseases (CVD) are responsible for the majority of NCD deaths. More than 80% of CVD deaths occur in low-income and middle-income

Strengths and limitations of this study

- This is the first scoping review of studies reporting major social risk factors which are associated with diabetes, hypertension and the comorbid conditions of depression and anxiety in India.
- The scoping review was conducted according to an established method and followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses: Extension for Scoping Reviews guidelines.
- Two authors independently applied the eligibility criteria and disagreements were discussed in the research team.
- Only six databases were searched, so it is possible that some papers which met our inclusion criteria were missed.
- We excluded unpublished papers or those with pooled data from multiple countries, so it is possible that we have underestimated the size of the evidence base.

countries.² The burden of NCDs on individuals, families, communities and health systems is significant. Worldwide, 20% of CVD deaths occur in India.³ Compared with Western countries, CVD manifested in the Indian population about a decade earlier⁴ and was responsible for an estimated cost of US\$237 billion in lost productivity and healthcare costs (2005–2015).⁵

Diabetes and hypertension are the most common NCDs and share an association with mental health comorbidities of depression and anxiety.^{6,7} Mental health comorbidities adversely affect adherence to treatment resulting in poorer health outcomes, lowered quality of life and premature death. Poorly treated diabetes and hypertension has significant effects on health outcomes for individuals and the economic cost on societies.⁶

Many CVD deaths in India can be prevented by effectively addressing behavioural risk

factors such as cigarette smoking, alcohol abuse, an unhealthy diet and lack of physical activity.⁸ Importantly, hypertension, dyslipidaemia, diabetes, smoking and obesity often occur together and in the developing world are frequently both undiagnosed and poorly managed.⁹ Social factors such as poverty, levels of education, occupation and social inequality directly impinge on prevention and management of chronic NCDs.^{10 11}

Objectives

The WHO's Global Action Plan¹² has a target of reducing premature deaths from NCDs by one-third in order to achieve the 2030 Agenda for Sustainable Development.¹³ In order to achieve this, the inter-related social risk factors relating to NCDs, in particular CVD, need to be understood. This scoping review aims to examine the existing literature pertaining to the relationship of social factors as they relate to diabetes and hypertension and associated mental health comorbidities. We aim to identify the potential for social interventions in the effective management of these risk factors for CVD. In this context, the review addressed the social factors associated with chronic disease and comorbidity with reference to mental health problems in India.

METHODS

A preliminary search in Scopus and MEDLINE found no reviews of social risk factors for hypertension or diabetes and comorbid mental health problems in India. A scoping review methodology was therefore selected in order to ascertain the extent and strength of evidence in this field in India. The review followed an established framework for scoping reviews.¹⁴ A summary of the methods is presented here according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines: Extension for Scoping Reviews (PRISMA-Scr).¹⁵

Search strategy

Systematic searches were employed using electronic databases of Scopus, Embase, CINAHL Plus, Web of Science, PsycINFO and MEDLINE. These databases were selected as they were likely to guarantee adequate and efficient coverage of the field and minimise the likelihood of missing papers.¹⁶ The search terms were derived from keywords related to the research question and were jointly decided by the authors. The following search string was used in each database:

("chronic disease*" OR "chronic illness*" OR "chronic condition*" OR "chronically ill" OR "chronic disorder") AND ("diabet*" OR "blood sugar" OR hypertension OR "high blood pressure") AND India AND ("mental health" OR depress* OR anxiety* OR anxious* OR "mental disorder" OR "mental illness")

Initial searches across the electronic databases found a modest number of studies. Papers were selected for inclusion in the review based on eligibility criteria. An initial

selection was made based on title, next on abstract and finally on reading the full text.

Eligibility criteria

Eligibility criteria were applied throughout the screening and selection processes. The criteria were strictly related to the research question and were agreed by the authors in a consensus meeting.

To be included in the review, studies were required to report data from adults over the age of 18 years from India who had diabetes or hypertension with comorbid depression or anxiety. Diabetes and hypertension were selected as they are the two most prevalent NCDs in India and they are amenable to treatment. The review focused on these to provide the opportunity to intervene where the need is greatest and where there is the greatest likelihood of improving outcomes for people.

As it is important to ensure that interventions are socially and culturally appropriate, reliable data from India were required to fully understand underpinning social risk factors and their association with comorbid mental health problems. To ensure that this review focused on India, papers with pooled data from countries in addition to India that could not be disaggregated were excluded. However, multi-site studies with disaggregated data for India were included.

Studies were only included if they measured social factors such as area of residence, social structure and social capital; economic factors; adverse life events; health barriers and health risk behaviours. Studies needed to include community-based samples, and those from hospital or clinic-based research were excluded. Studies were excluded if they were not reported in English or included people under the age of 18 years.

The search was restricted to papers published in the previous 10 years prior to the search date (September 2019). This period was selected as it is when CVD became a significant concern in India. It was also important to ensure that data were pertaining to contemporary social factors in order to inform future intervention development; social change may make older studies redundant.

Electronic search results were entered into EndNote bibliographic software and duplicates were deleted. Two authors independently screened titles and abstracts identified by the electronic search and applied the eligibility criteria to potentially relevant papers. A third author confirmed inclusion in the review. The process of searching and applying the inclusion criteria is in [figure 1](#).

Data extraction and synthesis

Data of included papers were extracted by one author using a standardised checklist and checked by a second author as part of quality assurance. Any disagreements were resolved by consensus or by discussion with other authors. Data extracted from the papers included aims; methods; study design; sample size and description; and relevant outcome data and main findings (eg, rates of comorbidities, findings pertaining to social factors).

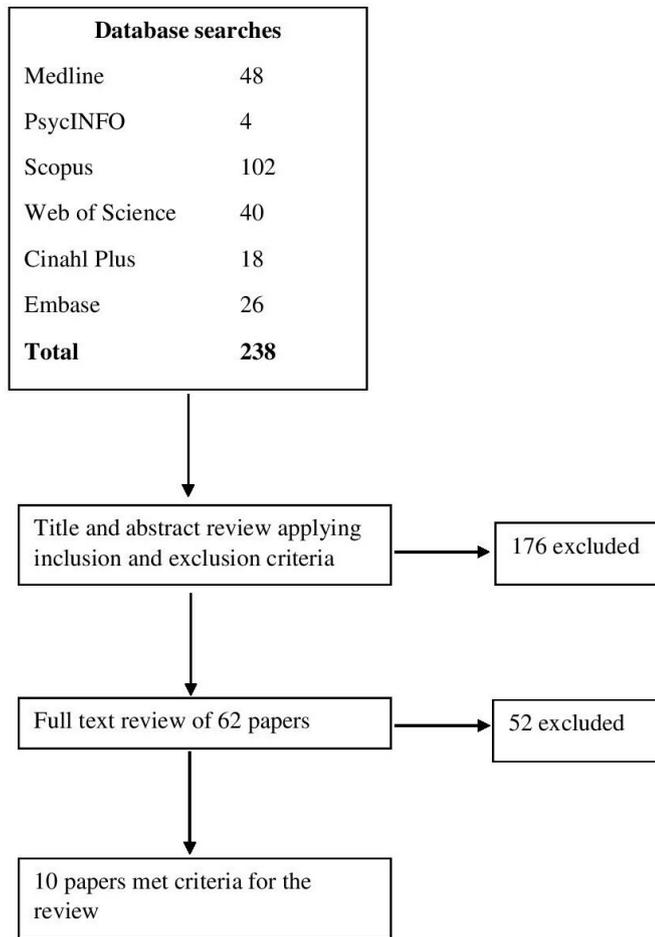


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses flowchart.

Extracted data were coded by two authors and a thematic analysis was used to compare main findings from the papers across the major themes. In particular, the papers were critically scrutinised to identify the social factors associated with the chronic diseases and comorbidities.

Patient and public involvement

This review was the first part of a multi-method capacity building project. Although there was no patient and public involvement in this review, as the literacy levels of the target population were too low to facilitate a meaningful involvement, there was involvement of ASHA workers, local health workers and local officials throughout the remainder of the project.

RESULTS

Characteristics of included studies

Among the 238 reviewed papers, 10 papers^{17–26} satisfied the eligibility criteria (figure 1); one was a qualitative case study²⁶ and nine were cross-sectional studies.^{17–25} Four papers were exclusively conducted in India^{17,22,24,26} and six were multi-country studies, which provided disaggregated data for India.^{18–21,23,25} Six papers^{18–21,23,25} were based on nationally representative data obtained from the first wave

of the WHO Study on global AGEing and adult health (SAGE), conducted in 2007–2010,²⁷ one of which¹⁹ was based on data from the SAGE survey and the Collaborative Research on Ageing in Europe (COURAGE) survey²⁸ and one study²² was a cross-sectional observational analysis of the baseline survey and laboratory data from the Disha study.²⁹ Multi-country studies based on pooled data from which data from India could not be extracted were excluded. Extracted data were summarised in a narrative format in table 1.

Five studies^{17–19,22,24} reported data about multimorbid or comorbid chronic conditions that coexist with diabetes, hypertension, depression and anxiety. Three papers explored comorbidities,^{17,22,24} while four focused on multimorbidity.^{18,19,21,23} Three papers reported the prevalence of depression among people with diabetes.^{17,21,24} In India, 44% of adults had one or more of these chronic conditions: diabetes, hypertension, high cholesterol, obesity and depression.²² The overall prevalence of multimorbidity in India was 22% which may lead to activity limitations, depression and decreasing quality of life.¹⁸ One study found that multimorbidity increased with age, it was more common in women, people with less education, more wealth, people residing in urban locations and unmarried/separated individuals.¹⁹

A thematic analysis of the findings in this review found evidence that demographic factors, social risk factors and adverse health behavioural factors were associated with NCDs and their commonly associated mental health problems in India (table 2). The social factors associated with NCDs included: low educational attainment, rural area of residence, income inequality and unemployment, poverty, limited social capital, stressful life events and low health service use. The findings, however, were heterogeneous (see table 2)

Demographic risk factors

Demographic risk factors included the subthemes of advanced age, female gender and marital status.

Older age

Six papers included in this review made specific reference to advanced age as being a non-modifiable risk factor for chronic illnesses and found that when age advances, poorer health outcomes became more prevalent,^{18,23,25} multimorbidity increases¹⁹ and incidence of depression increases.^{20,21} However, two papers reported that advanced age was not a significant risk factor for any chronic conditions.^{17,24}

Female gender

Six papers^{17,19–23} included in this review made specific reference to female gender as being a demographic non-modifiable risk factor for chronic comorbidities. In particular, female sex was associated with increased risk of depression^{17,20,21} and was linked to higher odds for multimorbidity,¹⁹ and women had a 44% higher risk of a chronic condition if their husband had a chronic

**Table 1** Summary of the characteristics of the included studies

Author (date)	Study aims	Methods/ study design	Sample size and description	Main findings
Aminu <i>et al</i> (2017) ¹⁷	To estimate the prevalence and to identify the factors influencing depression among people with type 2 diabetes in Udupi Taluk, southern India.	Community-based cross-sectional study	n=200, aged over 18 years	The prevalence of depression among people with diabetes in the community was found to be 38%. The prevalence of mild depression was 21% and 5% for severe depression. Female gender, rural residence, unemployment and being unmarried were associated with depression. The presence of diabetic complications and other chronic diseases such as hypertension and obesity were also found to be associated with depression. Age, educational status, socioeconomic status and type of treatment received were among the variables not found to be significantly associated with depression.
Arokiasamy <i>et al</i> (2015) ¹⁸	To explore the prevalence and correlates of multimorbidity in adults; to examine the associations between multimorbidity and self-rated health, depression, physical functioning and subjective well-being.	Secondary analysis of previously published data	SAGE survey, 2007–2010 ²⁷ , n=11 230	The prevalence of having at least one chronic disease in India was 52%. The likelihood of multimorbidity was higher in older age groups and was lower in those with higher socioeconomic status.
Garin <i>et al</i> (2016) ¹⁹	To identify and describe multimorbidity patterns	Secondary analysis of previously published data	SAGE ²⁷ and COURAGE survey, ²⁸ n=41 909 aged over 50 years	The prevalence of depression, diabetes and hypertension in India was 16%, 7% and 38%, respectively. Multimorbidity increased with age. 8% of people with depression had diabetes and 41% had hypertension. Of those with diabetes, 19% had depression and 65% had hypertension and in the case of people with hypertension, 17% had depression and 12% had diabetes.
Kulkarni and Shinde (2015) ²⁰	To estimate the prevalence of depression and determine the factors associated with it in Indians aged 50 years and above	Secondary analysis of previously published data	SAGE survey, ²⁷ n=12 198 aged 18 years and above from six states in India.	Estimated prevalence of mild, moderate and severe depression in the past 12 months was 16%, 12%, and 8%, respectively. Functional disability, cognitive impairment, low quality of life, low wealth status and chronic conditions such as angina, asthma or chronic lung disease were significant risk factors for depression. Risk factors for severe depression found in the multivariate model were lower wealth condition; low quality of life; having angina, lung disease, or asthma; moderate/high cognitive impairment; medium/high functional disability; and residing in south, central, or north region of the country.
Lotfaliany <i>et al</i> (2019) ²¹	To explore the association between depression and other chronic conditions such as type 2 diabetes mellitus, arthritis, asthma, chronic lung disease, angina and stroke	Secondary analysis of previously published data	SAGE survey, ²⁷ 2007–2010, n=33 508	44% of the study population had depression. There is a strong positive association between depression and type 2 diabetes mellitus, arthritis, asthma, chronic lung disease, angina and stroke.
Patel <i>et al</i> (2017) ²²	To test the hypothesis that living with any household member who has a chronic condition-diabetes, common mental disorder, hypertension, obesity and/ or high cholesterol-raises the risk of developing the same or another chronic condition in India	Secondary analysis of previously published data	Disha study, ²⁹ n=7522 with at least one co-residing household member with a chronic condition	44% of adults had one or more chronic conditions such as diabetes, hypertension, high cholesterol, obesity and depression. The most common conditions were hypertension (23%), common mental disorders (13%) and diabetes (11%). Irrespective of familial relationship, adults who resided with another adult with any chronic condition had 29% higher adjusted relative odds of having one or more chronic conditions themselves. Statistically significant associations of diabetes, common mental disorder and hypertension with any chronic condition were found in the analysis of all co-residing household members. Of all associations examined, only the relationship between hypertension and diabetes in the adult-parent dyads was statistically significantly negative.

Continued

Table 1 Continued

Author (date)	Study aims	Methods/ study design	Sample size and description	Main findings
Patel <i>et al</i> (2019) ²³	To identify the association of behavioural risk factors with self-reported and symptom or measured chronic diseases among adult population (18–69 years) in India	Secondary analysis of previously published data	SAGE survey, ²⁷ 2007–2010, n=9839 aged 18–69	Moderate and vigorous physical activity was less likely to be associated with self-reported depression. Adequate intake of fruits and vegetables had an increased odds of being associated (OR 3.45 (95% CI 1.99 to 5.97)) with self-reported depression; self-reported and measured hypertension and diabetes were associated with overweight while hypertension was associated with obesity.
Rajkumar <i>et al</i> (2009) ²⁴	To establish the nature, prevalence and factors associated with geriatric depression in a rural south Indian community	Community-based cross-sectional study	n=1000, aged over 65 years	Prevalence of geriatric depression within the previous 1 month was 13%. Low income, experiencing hunger, history of cardiac illnesses, transient ischaemic attack, past head injury and diabetes increased the risk for geriatric depression after adjusting for other determinants. Having more confidants was a significant protective factor. Age, female gender, cognitive impairment and disability status were not significantly associated with geriatric depression. Major depression was significantly correlated with experiencing hunger, diabetes, transient ischaemic attack, past head injury, more disability and less nourishment. Having more friends was a protective factor for depression.
Shukla <i>et al</i> (2014) ²⁵	To examine the factors associated with obesity in four of the BRICS countries (China, India, Russia and South Africa) and to examine the linkage of obesity with selected morbidities	Secondary analysis of previously published data	SAGE survey, ²⁷ 2007–2010, n=10 915 aged over 18 years	The prevalence of obesity in India was 3%. The prevalence of obesity was significantly higher in women. Increased wealth was associated with being overweight. Being overweight or obese was positively associated with hypertension and diabetes. In India, obese respondents were significantly more likely than the normal respondents to have hypertension or diabetes. No relationship was found between obesity and depression.
Weaver (2016) ²⁶	To explore interactions between middle-aged women with type 2 diabetes and their daughters in relation to their comorbid chronic illnesses in India.	Cross-sectional survey and qualitative interviews	Two case studies were drawn from 30 in-depth interviews with women with diabetes, from a larger sample of 184 women	The diabetic women in the larger sample were generally overweight, with an average body mass index of 28, placing them in the category of obese for South Asian populations based on the WHO estimates of the body mass index for South Asian communities. ³⁹ 27% reported levels of anxiety symptoms suggesting a potential clinical disorder, while 18% did so for depression symptoms. The paper explores personal and interpersonal suffering in cases of comorbid chronic diseases based on two case studies.

COURAGE, Collaborative Research on Ageing in Europe; SAGE, Study on global AGEing and adult health.

condition.²² Only one paper found that female gender was not associated with depression.²⁴

Marital status (married)

Five studies^{17 19–21 24} documented the incidence of chronic illnesses as being lower in married people. Further, studies found that married people were less likely to have symptoms of depression^{17 20 21 24} or experience multiple chronic illnesses¹⁹ unless a spouse also had a chronic condition.²²

Social risk factors

Themes such as low educational attainment, rural area of residence, limited access to social support and low social capital and connectedness emerged from eight papers during the analysis (table 2). Many of the papers also referred to economic factors associated with the comorbid

chronic diseases and common mental health problems, specifically income inequality, unemployment and poverty.

Low educational attainment

Five papers^{18–21 23} included in the review referred to lower educational attainment as a factor which was associated with chronic illness and mental comorbidities. Studies demonstrated that low levels or a lack of education increases prevalence of comorbidities¹⁹ and depression.^{20 21} One study reported that there was no association between education status and the incidence of depression.¹⁷

Rural area of residence

Five papers included in this review^{17 19–21 23} found that area of residence was associated with chronic illnesses and mental health problems. Some studies found that in

Table 2 Effect of social factors on comorbid chronic disease

Themes	Subthemes	Included papers									
		Aminu <i>et al</i> ¹⁷	Arokia samy <i>et al</i> ¹⁸	Garin <i>et al</i> ¹⁹	Kulkarni and Shinde ²⁰	Lotfalian <i>et al</i> ²¹	Patel <i>et al</i> ²²	Patel <i>et al</i> ²³	Raj kumar <i>et al</i> ²⁴	Shukla <i>et al</i> ²⁵	Weaver ²⁶
Demographic risk factors	Older age		+(M)	+(M)	+(D)	+(D)		+(DM/H)	+(C)		
	Female gender	+(D)		+(M)	+(D)	+(D)	+(C)	+(DM/H)			
	Marital status (married)	-(D)		-(M)	-(D)	-(D)			-(D)		
Social risk factors	Low educational attainment		+(M)	+(M)	+(D)	+(D)		+(C)			
	Rural area of residence	+(D)		-(M)	+(D)	+(D)		-(C)			
	Income inequality and unemployment	+(D)		-(M)		+(D)			+(D)		
	Poverty			-(M)	+(D)				+(D)		
	Limited social capital				-(D)				-(D)		-(DM)
	Stressful life events										+(D)
	Low health service use				-(D)						-(DM)
Adverse health behaviours	Physical inactivity				+(D)			+(D/C)			+(DM)
	Poor diet and obesity				+(D)	+(D)		+(D/DM/H)	+(D)	+(DM/H)	
	Tobacco and alcohol use					+(D)		+(DM)			

(+) positive association, (-) negative association, blank: information not available or no association. C, chronic condition (unspecified); D, depression; DM, diabetes mellitus; H, hypertension; M, multimorbidity.

rural populations multimorbidity was less prevalent,¹⁹ and depression was more prevalent.^{17 20 21}

Income inequality and unemployment

Five papers found that income inequality was associated with chronic illness.^{17 19 21 24 26} People with a higher income were found to have a lower prevalence of depression.^{17 21 24} In the qualitative case study, a woman with comorbid diabetes and depression, who was able to afford to pay for child-care for her daughter, reduced her care-giving burden and enhanced her wellbeing.²⁶ One paper reported that depression was significantly related to unemployment.¹⁷

Poverty

Three papers^{19 20 24} included in this review made specific reference to poverty as being a social factor associated with a higher prevalence of chronic illness and mental health problems. For example, experiencing hunger was associated with people being depressed.²⁴ The prevalence of comorbid depression and chronic illness was highest for those persons exposed to poverty. A lack of material resources led to inadequate nutrition, inability to assess medical care and a poor quality of life.²⁰ Interestingly, one paper found that the wealthiest participants were more likely to experience psychiatric comorbidity than those who were poorer.¹⁹

Limited social capital

Three papers reported an association between low social capital and connectedness and psychiatric comorbidities.^{20 24 26} In these studies, it was found that having more friends reduced the incidence of depression²⁴ and low social cohesion increased prevalence of depression.²⁰ Findings of a case study reported that being chronically ill with diabetes had reduced the social connectedness of the participant.²⁶ This study found an association between social isolation and chronic illnesses. The subordinate position of a woman in a socially conservative family, a lack of freedom to go out alone, and the self-effacement and personal concern about the effects of the illness on her family limited her access to preventative care and medicines. One paper found that social support is a protective factor against depression.²⁴

Stressful life events

Only one study explored major life events as being associated with NCDs and psychiatric comorbidities.²⁶ This qualitative case study found that stressful life events triggered by comorbid illness, and guilt and worry about being disabled, contributed to the onset of depression for one woman.

Low health service use

Persons with comorbid mental health problems and chronic conditions had low levels of health service use. This

was evidenced in one study²⁶ which found that the feeling of being a burden was associated with decreased access to healthcare services. In another study,¹⁹ having depression led to low medication adherence.

Adverse health behaviours

Health risk behaviours associated with NCDs and comorbidities were mentioned in five papers.^{20 21 23 24 26}

Physical inactivity

One study found that physical inactivity was more prevalent in urban areas compared with rural areas.²¹ In two papers, it was found that the prevalence of mild, moderate and severe depression was lowest among persons with high levels of physical activities^{20 23} and one found that a lack of physical activity led to obesity, which increases the risk of hypertension and diabetes.²⁶

Poor diet and obesity

Lower consumption of fruit and vegetables were associated with the presence of depression in four studies.^{20 21 23–25} One of the studies found that in India the prevalence of obesity was significantly higher in women than men.²⁵ This study also found that depression and hypertension were more prevalent in overweight people.

Tobacco and alcohol use

Alcohol misuse was lowest in India compared with China, Russia and South Africa, but the rate of cigarette smoking was higher in India than any other country.²³

DISCUSSION

To our knowledge, this is the first review addressing social factors in India as they relate to chronic NCDs and their frequently associated mental health comorbidities. Our review demonstrated an overall lack of primary evidence relating to this from Indian sources. The association between diabetes, hypertension and depression and anxiety is well researched⁶⁷ but social factors which may impinge on these are seldom mentioned in the literature. In this review, we found only 10 papers which documented social factors. Most studies emphasised demographic and economic factors rather than factors such as social networks, support and the presence of significant life events. Moreover, behavioural risk factors for diabetes and hypertension, such as physical inactivity, diet, smoking and alcoholism, were documented only infrequently in these papers. This highlights the need for further research into this field.

In this review, behavioural risk factors of smoking and excessive alcohol use were not as strongly related to the prevalence of the NCDs and comorbidities, findings that are contrary to other published data.^{30–33} Physical activity and diet were found to relate only modestly to diabetes, hypertension, depression and anxiety, again not as strongly as in other international studies.^{34 35} In this review, we found that psychiatric comorbidities increased with age, in keeping with data from other studies in this area.^{36 37} The importance of social support and social networks in the

management of NCDs has been highlighted by this review. This was similar to the findings of a Cochrane review of 21 studies worldwide.³⁸

Overall, the review found a lack of research in India of social risk factors associated with diabetes, hypertension and their comorbidities of depression and anxiety. Further research is required to confirm the tentative findings of this review that social factors are important in the aetiology and management of comorbid chronic disease risks for CVD in India. In particular, studies exploring the clustering of social, behavioural and demographic factors occurring within individuals, families and communities in India are required to fully understand the barriers to the effective management of diabetes and hypertension. This will assist the development and targeting of interventions in population subgroups which may help to manage CVD risks more effectively and thereby reduce morbidity.

Strengths and limitations of this study

This is the first scoping review of studies reporting major social risk factors which are associated with diabetes, hypertension and the comorbid conditions of depression and anxiety in India. It was conducted according to the PRISMA-ScR guidelines and the eligibility criteria were rigorously applied. Two researchers independently applied the inclusion criteria and the final decision about the included papers was made by the research team.

This review also has some limitations. We only searched six databases, so it is possible that some papers which met our inclusion criteria in other databases were not found. Our focus on peer-reviewed studies was a further limitation as it excluded research reported in the grey literature. It is a scoping review, rather than a full systematic review of the empirical findings, though the extent of the literature would make the latter rather difficult. Finally, we excluded unpublished papers or those with pooled data from multiple countries, so it is possible that we have underestimated the size of the evidence base for India. However, It is vital to have robust data from India to ensure that accurate decisions are being made about the development of social and healthcare services for people with NCDs and the comorbid psychiatric conditions.

CONCLUSION

This review found major themes which potentially have a significant impact on common NCDs and common, often associated mental health problems in India. These include poverty, social networks, life events and poor access to healthcare. Few studies have been conducted in this field and more research is required to understand the relationship between these social factors and comorbid chronic disease and mental health problems. Such studies will inform the development of more effective interventions in addressing NCDs in India.

Author affiliations

¹Department of Social Work, Rajagiri College of Social Sciences, Cochin, Kerala, India

²Rajagiri International Center for Consortium Research Social Care (ICRS), Rajagiri College of Social Sciences, Cochin, Kerala, India

³Department of Social Policy and Social Work, University of York, York, UK

⁴Medicine, Dentistry and Health Sciences, University of Melbourne, Melbourne, Victoria, Australia

⁵Department of Social Work, University of Melbourne, Melbourne, Victoria, Australia

Twitter Martin Webber @mgoat73

Contributors All authors meet the criteria for authorship according to the ICMJE guidance, having made substantial contributions to the work. Specifically, MW and SMD were the principal investigators providing leadership for the research team, co-designed the study and co-authoring the paper; AMB, LS and AN undertook the database searches, data extraction, data synthesis and drafted the paper; MF-N, LJ and JJ co-designed the study, advised on methodology and co-authored the paper.

Funding This scoping review is part of a larger study funded by the British Council's UK-India Education and Research Initiative (UKIERI).

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Saju Madavanakadu Devassy <http://orcid.org/0000-0002-6188-9267>

Martin Webber <http://orcid.org/0000-0003-3604-1376>

REFERENCES

- Naghavi M, Abajobir AA, Abbafati C, et al. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the global burden of disease study 2016. *Lancet* 2017;390:1151–210.
- Bowry ADK, Lewey J, Dugani SB, et al. The burden of cardiovascular disease in low- and middle-income countries: epidemiology and management. *Can J Cardiol* 2015;31:1151–9.
- Ke C, Gupta R, Xavier D, et al. Divergent trends in ischaemic heart disease and stroke mortality in India from 2000 to 2015: a nationally representative mortality study. *Lancet Glob Health* 2018;6:e914–23.
- Joshi P, Islam S, Pais P, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *JAMA* 2007;297:286–94.
- World Health Organization. *Global atlas on cardiovascular disease prevention and control*. Geneva: World Health Organization, 2011.
- Ducat L, Philipson LH, Anderson BJ. The mental health comorbidities of diabetes. *JAMA* 2014;312:691–2.
- Stein DJ, Aguilar-Gaxiola S, Alonso J, et al. Associations between mental disorders and subsequent onset of hypertension. *Gen Hosp Psychiatry* 2014;36:142–9.
- Prabhakaran D, Jeemon P, Roy A. Cardiovascular diseases in India 2016;133:1605–20.
- Damasceno A, Steyn K. Lifestyle and Related Risk Factors for Chronic Diseases. In: Dean RG, Jamison T, eds. *Disease and mortality in sub-Saharan Africa*. 2 edn. Washington DC: The World Bank, 2006: 247–66.
- Cockerham WC, Hamby BW, Oates GR. The social determinants of chronic disease. *Am J Prev Med* 2017;52:S5–12.
- National Research Council, Institute of Medicine. The National Academies Collection: Reports funded by National Institutes of Health. In: Woolf SH, Aron L, eds. *Us health in international perspective: shorter lives, poorer health*. Washington (DC): National Academies Press (US), 2013.
- World Health Organisation. *Global action plan for the prevention and control of noncommunicable diseases 2013–2020*. Geneva: World Health Organisation, 2013.
- United Nations. *Transforming our world: the 2030 agenda for sustainable development*. New York: United Nations, 2015.
- Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8:19–32.
- Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med* 2018;169:467–73.
- Bramer WM, Rethlefsen ML, Kleijnen J, et al. Optimal database combinations for literature searches in systematic reviews: a prospective exploratory study. *Syst Rev* 2017;6:245–45.
- Aminu A, Chandrasekaran V, Nair S. Depression among patients with diabetes: a community-based study in South India. *J Med Sci* 2017;37:237–44.
- Arokiasamy P, Uttamacharya U, Jain K, et al. The impact of multimorbidity on adult physical and mental health in low- and middle-income countries: what does the study on global ageing and adult health (SAGE) reveal? *BMC Med* 2015;13:178.
- Garin N, Koyanagi A, Chatterji S, et al. Global multimorbidity patterns: a cross-sectional, population-based, Multi-Country study. *J Gerontol A Biol Sci Med Sci* 2016;71:205–14.
- Kulkarni RS, Shinde RL. Depression and its associated factors in older Indians: a study based on study of global aging and adult health (SAGE)-2007. *J Aging Health* 2015;27:622–49.
- Lotfaliani M, Agustini B, Kowal P, et al. Co-occurrence of depression with chronic diseases among the older population living in low- and middle-income countries: a compound health challenge. *Ann Clin Psychiatry* 2019;31:95–105.
- Patel SA, Dhillion PK, Kondal D, et al. Chronic disease concordance within Indian households: a cross-sectional study. *PLoS Med* 2017;14:e1002395.
- Patel S, Ram F, Patel SK, et al. Association of behavioral risk factors with self-reported and symptom or measured chronic diseases among adult population (18–69 years) in India: evidence from SAGE study. *BMC Public Health* 2019;19:560.
- Rajkumar AP, Thangadurai P, Senthilkumar P, et al. Nature, prevalence and factors associated with depression among the elderly in a rural South Indian community. *Int Psychogeriatr* 2009;21:372–8.
- Shukla A, Kumar K, Singh A. Association between obesity and selected morbidities: a study of BRICS countries. *PLoS One* 2014;9:e94433.
- Weaver LJ. Transactions in suffering: mothers, daughters, and chronic disease comorbidities in New Delhi, India. *Med Anthropol Q* 2016;30:498–514.
- Kowal P, Chatterji S, Naidoo N, et al. Data resource profile: the world Health organization study on global ageing and adult health (SAGE). *Int J Epidemiol* 2012;41:1639–49.
- Boden WE. Interpreting the results of the courage trial: a non-interventional perspective. *Rev Cardiovasc Med* 2009;10:S34–44.
- Jeemon P, Narayanan G, Kondal D, et al. Task shifting of frontline community health workers for cardiovascular risk reduction: design and rationale of a cluster randomised controlled trial (DISHA study) in India. *BMC Public Health* 2016;16:264.
- Chang SA. Smoking and type 2 diabetes mellitus. *Diabetes Metab J* 2012;36:399–403.
- Virdis A, Giannarelli C, Neves MF, et al. Cigarette smoking and hypertension. *Curr Pharm Des* 2010;16:2518–25.
- Gao K, Shi X, Wang W. The life-course impact of smoking on hypertension, myocardial infarction and respiratory diseases. *Sci Rep* 2017;7:4330.
- Sesso HD, Cook NR, Buring JE, et al. Alcohol consumption and the risk of hypertension in women and men. *Hypertension* 2008;51:1080–7.
- Linardakis M, Papadaki A, Smpokos E, et al. Association of behavioral risk factors for chronic diseases with physical and mental health in European adults aged 50 years or older, 2004–2005. *Prev Chronic Dis* 2015;12:E149.
- Olivares DEV, Chambi FRV, Chañi EMM, et al. Risk factors for chronic diseases and multimorbidity in a primary care context of central Argentina: a web-based interactive and cross-sectional study. *Int J Environ Res Public Health* 2017;14. doi:10.3390/ijerph14030251. [Epub ahead of print: 02 Mar 2017].
- Fortin M, Lapointe L, Hudon C, et al. Multimorbidity is common to family practice: is it commonly researched? *Can Fam Physician* 2005;51:244–5.
- Ozbay F, Fitterling H, Charney D, et al. Social support and resilience to stress across the life span: a neurobiologic framework. *Curr Psychiatry Rep* 2008;10:304–10.
- de Jongh T, Gurol-Urganci I, Vodopivec-Jamsek V, et al. Mobile phone messaging for facilitating self-management of long-term illnesses. *Cochrane Database Syst Rev* 2012;12:Cd007459.
- WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet* 2004;363:157–63.