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

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**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 co-morbid conditions of depression and anxiety in India.

**Design:** Scoping review.

**Data sources:** Scopus, Embase, CINAHL Plus, PsychINFO, 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 ten years to 2019. Studies that did not disaggregate pooled data from other countries were excluded.

**Data extraction and synthesis:** Two independent reviewersextracted 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 i.e. 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 co-morbid depression and anxiety in India is sparse. More research is required to better understand the interactions of social context and social risk factors with NCDs and co-morbid mental health problems so as to better inform management of these in the Indian subcontinent.

**Keywords:** chronic disease, mental health, diabetes, hypertension, cardiovascular disease, non-communicable diseases, depression, anxiety, social factors, risk factors, scoping review

**ARTICLE SUMMARY**

**Strengths and limitations**

* This is the first scoping review of studies reporting major social risk factors which are associated with diabetes, hypertension and the co-morbid conditions of depression and anxiety in India
* The scoping review was conducted according to an established method and followed the PRISMA-ScR 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 under-estimated the size of the evidence base

**INTRODUCTION**

Non-communicable diseases (NCDs) are responsible for the deaths of over 40 million people worldwide each year, making up 71% of mortality world-wide1. Cardiovascular diseases (CVD) are responsible for the majority of NCD deaths. More than 80% of CVD deaths occur in low and middle-income countries (LMIC)2. The burden of NCDs on individuals, families, communities and health systems is significant. Worldwide, 20% of CVD deaths occur in India3. Compared to Western countries, CVD manifests in the Indian population about a decade earlier4, and is responsible for an estimated cost of US$237 billion in lost productivity and health care costs (2005–2015)5.

Diabetes and hypertension are the most common NCDs and share an association with mental health comorbidities of depression and anxiety6 7. Mental health comorbidities adversely affect adherence to treatment resulting in poorer health outcomes, lowered quality of life and premature death. The effect of poorly treated diabetes and hypertension has significant effects on health outcomes for individuals and the economic cost on societies6.

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 activity8. Importantly, hypertension, dyslipidemia, diabetes, smoking and obesity often occur together and in the developing world are frequently both undiagnosed and poorly managed9. Social factors such as poverty, levels of education, occupation and social inequality directly impinge on prevention and management of chronic NCDs10 11.

**Objectives**

The World Health Organisation’s (WHO) Global Action Plan12 has a target of reducing premature deaths from NCDs by one-third in order to achieve the 2030 Agenda for Sustainable Development13. 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 co-morbid 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 reviews14. 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, PsychINFO 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 papers16. 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 from India who had diabetes or hypertension with co-morbid 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 was required to fully understand underpinning social risk factors and their association with co-morbid mental health problems. To ensure 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; 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.

The search was restricted to papers published in the previous ten 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.

**Figure 1 about here**

**Data extraction and synthesis**

Data of included papers were extracted by one author using a standardized 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 (e.g. rates of comorbidities, findings pertaining to social factors). 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 scrutinized to identify the social factors associated with the chronic diseases and co-morbidities.

**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, ten papers17-26 satisfied the eligibility criteria (figure 1); one was a qualitative case study26 and nine were cross sectional studies17-25. Four papers were exclusively conducted in India17 22 24 26 and six were multi-country studies, which provided disaggregated data for India 18-21 23 25. Six papers18-21 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 2007–201027; 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 study29. 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 studies17-19 22 24 reported data about multi-morbid or comorbid chronic conditions that coexist with diabetes, hypertension, depression and anxiety. Three papers explored comorbidities17 22 24 while four focused on multi-morbidity18 19 21 23. Three papers reported the prevalence of depression among people with diabetes17 21 24. In India, 44% of adults had one or more of these chronic conditions: diabetes, hypertension, high cholesterol, obesity and depression22. The overall prevalence of multimorbidity in India was 22% which may lead to activity limitations, depression and decreasing quality of life18.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 individuals19.

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 heterogenous (see table 2)

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author (date)** | **Study aims** | **Methods/ study design** | **Sample size and description** | **Main findings** |
| Aminu et al., 201717 | 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  | 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 et al., 201518 | 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, 2007-1027, 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 et al., 201619 | To identify and describe multi-morbidity patterns | Secondary analysis of previously published data | SAGE27 and COURAGE survey28, n=41,909 aged over 50 | 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 & Shinde, 201520 | 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 survey27, n=12,198 aged 18 and above from 6 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. |
| Lotfalian et al., 201921 | 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 survey27, 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 et al., 201722 | 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 study29,n=7,522 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. |
| Patel et al., 201923 | 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 survey27, 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: 1.99–5.97)) with self-reported depression; self-reported and measured hypertension and diabetes were associated with overweight while hypertension was associated with obesity. |
| Rajkumar et al., 200924 | 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  | Prevalence of geriatric depression within the previous one month was 13%. Low income, experiencing hunger, history of cardiac illnesses, transient ischemic 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 ischemic attack, past head injury, more disability and less nourishment Having more friends was a protective factor depression. |
| Shukla et al., 201425 | 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 survey27, 2007–2010, n=10,915 aged over 18 | The prevalence of obesity in India was 3%. The prevalence of obesity was significantly higher in females. 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, 201626 | To explore interactions between middle-aged women with type 2diabetes 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 body mass index for South Asian communities30. 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.  |

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**Table 2: Effect of social factors on comorbid chronic disease**

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| --- | --- | --- |
| **Themes** | **Subthemes** | **Included papers** |
| Aminu et al., 201717 | Arokiasamy et al., 201518 | Garin et al., 201519 | Kulkarni & Shinde, 201520 | Lotfalian et al., 201921 | Patel et al., 201722 | Patel et al., 201923 | Rajkumar et al., 200924 | Shukla et al., 201425 | Weaver, 201626 |
| **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

D: depression, M: multi-morbidity, C: chronic condition (unspecified), DM: Diabetes Mellitus, H: Hypertension

***Demographic risk factors***

Demographic risk factors included the sub themes 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 prevalent18 23 25, multi-morbidity increases19 and incidence of depression increases20 21. However, two papers reported that advanced age was not a significant risk factor for any chronic conditions17 24.

*- Female gender:*Six papers17 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 depression17 20 21; was linked to higher odds for multi-morbidity19; and women had a 44% higher risk of a chronic condition if their husband had a chronic condition22. Only one paper found that female gender was not associated with depression24.

*- Marital status (married):*Five studies17 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 depression17 20 21 24 or experience multiple chronic illnesses19 unless a spouse also had a chronic condition22.

***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 co-morbid chronic diseases and common mental health problems, specifically income inequality, unemployment and poverty.

*- Low educational attainment:*Five papers18-21 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 co-morbidities19 and depression20 21. One study reported that there was no association between education status and the incidence of depression17.

*- Rural area of residence:*Five papers included in this review17 19-21 23 found area of residence was associated with chronic illnesses and mental health problems. Some studies found that in rural populations multi-morbidity was less prevalent19, and depression was more prevalent17 20 21.

*- Income inequality and unemployment:*Five papers found income inequality was associated with chronic illness17 19 21 24 26.People with a higher income were found to have a lower prevalence of depression17 21 24. In the qualitative case study, a woman with co-morbid diabetes and depression, who was able to afford to pay for childcare for her daughter, reduced her care-giving burden and enhanced her wellbeing26. One paper reported that depression was significantly related to unemployment17.

*- Poverty:*Three papers19 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 depressed24. The prevalence of co-morbid 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 life20. Interestingly, one paper found that the wealthiest participants were more likely to experience psychiatric co-morbidity than those who were poorer19.

*- Limited social capital:*Three papers reported an association between low social capital and connectedness and psychiatric comorbidities20 24 26. In these studies it was found that having more friends reduced the incidence of depression24 and low social cohesion increased prevalence of depression20. Findings of a case study reported that being chronically ill with diabetes had reduced the social connectedness of the participant26. 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 depression24.

*- Stressful life events:* Only one study explored major life events as being associated with NCDs and psychiatric co-morbidities26. 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 co-morbid 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 health care services. In another study19 having depression led to low medication adherence.

***Adverse Health behaviours***

Health risk behaviours associated with NCDs and comorbidities were mentioned in five papers20 21 23 24 26.

*- Physical inactivity:* One study found that physical inactivity was more prevalent in urban areas compared to rural areas21.In two papers it was found that the prevalence of mild, moderate, and severe depression was lowest among persons with high levels of physical activities20 23 and one found that a lack of physical activity led to obesity, which increases the risk of hypertension and diabetes26.

*- Poor diet and obesity:* Lower consumption of fruit and vegetables were associated with the presence of depression in four studies20 21 23-25.One of the studies found that in India the prevalence of obesity was significantly higher in females than males25. This study also found that depression and hypertension was more prevalent in overweight people.

*- Tobacco and alcohol use:* Alcohol misuse was lowest in India compared to China, Russia and South Africa, but the rate of cigarette smoking was higher in India than any other country23.

**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 researched6 7 but social factors which may impinge on these are seldom mentioned in the literature. In this review we found only ten papers which documented social factors. Most studies emphasized 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 data31-34. Physical activity and diet were found to relate only modestly to diabetes, hypertension, depression and anxiety, again not as strongly as in other international studies35 36. In this review we found that psychiatric co-morbidities increased with age, in keeping with data from other studies in this area37 38. 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 worldwide39.

Overall, the review found a lack of research in India of social risk factors associated with diabetes, hypertension and their co-morbidities 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 co-morbid 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 sub-groups 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 co-morbid 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 under-estimated 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 health care services for people with NCDs and the co-morbid 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 health care. Few studies have been conducted in this field and more research is required to understand the relationship between these social factors and co-morbid chronic disease and mental health problems. Such studies will inform the development of more effective interventions in addressing NCDs in India.

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**Author Contributions**

All authors meet the criteria for authorship according to the ICMJE guidance, having made substantial contributions to the work. Specifically:

Webber, M. and Saju, MD were the principal investigators providing leadership for the research team, co-designed the study and co-authoring the paper;

Benny AM, Scaria L & Anjana N undertook the database searches, data extraction, data synthesis and drafted the paper;

Fendt-Newlin M, Joubert L & Joubert J co-designed the study, advised on methodology and co-authored the paper.

**Conflicts of interest**

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi\_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

**Data sharing statement**

All data is included in the paper.

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