Building knowledge base on
Population Ageing in India

Series II, Working Paper-3

Pattern and Correlates of Chronic Non-Communicable Diseases Among Older Adults in Selected States of India

G.K. MINI

UNFPA

Editor's Note

Dear readers,

In most countries of the world, including India, population ageing is likely to become a serious policy and programmatic issue in the coming decades. UNFPA in collaboration with the Institute of Social and Economic Change, Bangalore, the Institute of Economic Growth, Delhi and Tata Institute of Social Science, Mumbai has launched a major research project to build a knowledge base on population ageing in India (BKPAI). The study focuses on social, economic, health and psychological aspects of elderly. This peer reviewed publication is second in the series of working papers based on the data gathered from seven Indian states. We are sure that the findings of this publication will help in generating a healthy debate and policy response amongst a wider cross-section of scholars, professionals, policy makers and civil society.

Editorial Team

Citation Advice:

G.K. MINI, 2014. "Pattern and Correlates of Chronic Non-Communicable Diseases Among Older Adults in Selected States of India", BKPAI Working Paper Series II No.3, United Nations Population Fund (UNFPA), New Delhi.

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Pattern and Correlates of Chronic Non-Communicable Diseases Among Older Adults in Selected States of India

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ABSTRACT

Background: Studies on determinants of chronic non-communicable diseases (NCDs) among elderly population in India are limited. The present study explored the demographic, socio-economic and behavioural determinants of self-reported chronic NCDs in Indian population aged 60 years and older.

Methods: The study used raw data among older population aged 60 years and above collected as part of the United Nations Population Fund (UNFPA) program on Building Knowledge Base on Population Ageing in India in 2011. Data from 9,852 older individuals collected from seven states (Himachal Pradesh, Kerala, Maharashtra, Orissa, Punjab, Tamil Nadu and West Bengal) were included in the analysis. Chronic NCDs, demographic, socio-economic characteristics and behavioral risk factors of the sample were studied. Odds ratios (OR) and 95% confidence intervals (CI) based on multiple logistic regression analysis were used to assess the determinants of chronic NCDs

Results: Overall 63% of older adults were having at least one NCD. The more prevalent chronic NCDs were arthritis, high blood pressure, cataract and diabetes. Twenty-eight percent of men reported current tobacco use and eight percent reported current alcohol use. Older adults in higher economic group were three times (OR 3.20, 95% CI 2.71-3.78) more likely to report an NCD compared to the lowest economic group. Higher age group (OR 1.78, CI 1.62-1.95), women (OR 1.35, CI 1.21-1.50), tobacco users (OR 1.35, CI: 1.22-1.48) alcohol users (OR 1.33, CI 1.11-1.58), forward castes (OR 1.33, CI 1.18-1.49), rural residents (OR 1.32, CI 1.19-1.47) and people having no formal education (OR 1.18, CI 1.07-1.30) were more likely to have at least one NCD compared to their counterparts.

Conclusion: Prevention and control of NCDs need to focus on those in higher economic group, higher age group, tobacco users, alcohol users, forward castes, rural residents and those who do not have any formal education.

CONTENTS

Introduction

The World Health Organization (WHO) estimated that 36 million people die each year due to chronic diseases, and three-fourth of these deaths are among people aged 60 years and above. Tobacco use and excessive alcohol consumption are the two major modifiable risk factors of chronic diseases for all ages. However, epidemiological studies of chronic disease in India have mostly been carried out in populations aged 25-64 years as per the WHO STEPs surveys. Previous research findings anticipated a higher probability of adopting unhealthy behaviors with the changing life style transition in the country. Increasing rates of several chronic illness including chronic obstructive pulmonary disease (COPD), diabetes and cancer were associated with high rates of smoking, obesity and unhealthy behaviors (AARI, 2009). Smoking increased chronic illness by 25% (RAND Health, 2002). Alcoholism is considered a chronic disease (McKay JR et al, 2011). High levels of alcohol consumption increase the risk of developing chronic diseases such as cardiovascular disease, type 2 diabetes and chronic kidney disease and contribute to chronic disease risk factors like high blood pressure and overweight or obesity. (Australian Chronic Disease Prevention Alliance, 2009). Many studies including one meta analysis (Yusuf et al, 2004) indicated the protective effect of low to moderate alcohol consumption on cardiovascular disease risk for population including middle aged and older people. However, several studies found negative association between alcohol and chronic diseases (National Health and Medical Research Council, 2001; National Health and Medical Research Council, 2009; Howard AA, et al, 2004).

Extensive research has been conducted in the area of tobacco related morbidity and mortality, and the findings of this research could be used by the global community in the formulation of the Framework Convention on Tobacco Control (FCTC) that became the first global public health treaty for tobacco control. Though alcohol consumption is also a major risk factor for chronic non-communicable diseases (NCDs), a public health treaty similar to FCTC is not available. Data on tobacco use and alcohol use and its impact on the health of the older adults in India are extremely limited. Whatever data available are based on small sample sizes that do not represent the country or even the major states. Although prevalence data on tobacco use and alcohol consumption were collected in the National Family Health Surveys (NFHS), these data did not include older adults. Associations between these risk factors and chronic non-communicable diseases were not studied comprehensively even in those populations for which data were collected by the NFHS. This evidence gap can be filled, at least partially, by analyzing the available data among older adults surveyed as part of the United Nations Fund for Population Activities (UNFPA) program on 'Building a Knowledge Base on Population Ageing in India' (BKPAI). The objective of this study was to examine the pattern of self-reported chronic non-communicable diseases in Indian population aged 60 years and older and evaluate the demographic, behavioral and socio-economic determinants of chronic NCDs in India.

Methodology

The study used the raw data among older adults in India collected as part of a program titled "Building Knowledge Base on Population Ageing in India" conducted in 2011 by the UNFPA. The national survey covered all major demographically advanced states with a regional representation. The seven states surveyed were Kerala, Tamil Nadu, Maharashtra, Himachal Pradesh, Punjab, Orissa and West Bengal representing all regions of the country. The information gathered in this survey included demographic characteristics, socio-economic status, work

participation and income and asset holding, living arrangement patterns, behavioral risk factors like tobacco use and alcohol consumption and health status including chronic disease morbidity of the older adults.

Map of India showing the selected seven states for the study

The sample for each state was fixed at 1,280 older adult households. Households having at least one older adult member aged 60 years or above formed the set of sample households and all the elderly in the selected households were interviewed. The fieldwork was carried out during the period May to September, 2011 and a total of 8,329 household interviews and 9,852 elderly interviews were conducted in rural and urban areas. The response rate was 93%.

The survey used multistage random sampling. The total sample consisted of 9,852 people aged 60 years (47% men) and above who were usual residents of the selected households. Detailed methodology is already published (UNFPA, 2012).

Chronic disease morbidity was assessed by asking the question "Has a doctor or nurse ever said you have a disease?" The chronic non–communicable diseases considered for the present study were: arthritis, rheumatism or osteoarthritis, high blood pressure, cataract, loss of all natural teeth, diabetes, asthma, heart disease, osteoporosis, skin disease, paralysis, liver or gall bladder illness, chronic lung disease, depression, Alzheimer's disease, cerebral embolism, stroke or thrombosis, dementia and cancer.

The most prevalent chronic diseases such as arthritis, high blood pressure, diabetes, asthma, heart disease and osteoporosis were separately analyzed by age and sex. In addition to the socio-economic and demographic factors (age, sex, marital status, education, occupation, place of residence, religion and socio-economic status), the study examined tobacco use and alcohol consumption among older adults (60 years and above) in India.

Since the sampling scheme is disproportionately distributed, sampling weights were used. We incorporated the weights in the final analysis. Standard state weights for each of the seven states were used for state

wise results. The data were analyzed using SPSS 17.0. Both bivariate and multivariate techniques were used for data analysis. The association of social, demographic and economic and behavioral characteristics with the prevalence of NCDs was analyzed using bivariate analysis. Multivariate analysis was used to find out the socio-demographic, behavioural and economic predictors of self-reported NCDs.

Results

The background characteristics of the study population are presented in Table 1. The mean age of the study population was 68 years (SD±7.3). Nearly half of the older adults had formal education and 59% were currently married. A small proportion (6%) was living alone in their house, 15% were living with their spouse and the remaining with others.

Table .1 Background characteristics of the study sample of seven states combined

Variables	Percentage	N
Age (years)		
60-70	63.3	6239
70+	36.7	3613
Sex		
Men	47.4	4672
Women	52.6	5180
Education		
No Formal Schooling	46.0	4528
Formal schooling	54.0	5324
Marital status		
Currently married	59.3	5847
Others	40.7	4005
Religion		
Hindu	79.0	7781
Muslim	8.2	804
Christian	3.3	325
Others	9.6	942
Caste		
SC/ST	24.2	2383
OBC	34.0	3353
Others	41.8	4116
Place of residence		
Rural	52.2	5138
Urban	47.8	4714
Wealth index		
Lowest	19.8	1954
Second	20.0	1974
Middle	19.7	1938
Fourth	19.9	1962
Highest	20.5	2018
Living arrangements		
Living alone	6.2	612
Living with spouse	14.9	1468
others	78.9	7772
Current use of tobacco		
Yes	27.8	2738
No	72.2	7114
Current consumption of alcohol		
Yes	3.9	388
No	96.1	9464

Ever smoking was reported by 31% of men and 2% of women. Among men, 72% ever smokers were currently using it. Smoking prevalence among elderly women was very low. Overall among older adults, 71.5% of ever smokers were current smokers. Ever use of smokeless tobacco was reported by 22% of men and 21% of women. Eighty-six percentage of men and 85% of women who were ever users of smokeless tobacco were using it currently. Men showed higher prevalence of both ever (men 46%, women 22%) and current use (men 38%, women 19%) of any type of tobacco compared to women.

Ever use of alcohol was reported by 7.5% (men 15.4%, women 0.4%). Fifty-three percent of ever alcohol users were currently consuming alcohol. Alcohol consumption among women was negligible. Current use was reported by 3.9% of older adults (men 8.1%, women 0.2%).

State wise prevalence of selected chronic disease is presented in Table 2. Diseases like arthritis, rheumatism or osteoarthritis, high blood pressure, cataract, diabetes etc. were more prevalent among the older adults, both among men and women.

Table 2 Prevalence Rate (Per 1,000) of Chronic NCDs among elderly in selected Indian states

	DISEASES	Himachal Pradesh	Punjab	West Bengal	Orissa	Maharashtra	Kerala	Tamil Nadu	Combined
1	Arthritis, rheumatism or osteoarthritis	390	478	213	253	351	142	215	293
2	High BP	147	329	238	147	130	397	106	210
3	Cataract	105	130	162	70	197	207	44	129
4	Loss of all natural teeth	152	326	160	24	104	89	30	124
5	Diabetes	59	123	77	50	69	281	60	101
6	Asthma	95	70	39	42	116	148	31	77
7	Heart disease	32	83	82	12	20	158	34	58
8	Osteoporosis	56	8	10	0	62	42	1	26
9	Skin disease	18	31	10	12	46	50	10	25
10	Paralysis	18	23	14	25	22	10	13	18
11	Liver or gall bladder illness	11	19	29	5	47	12	0	17
12	Chronic lung disease	11	7	3	9	40	31	8	16
13	Depression	11	26	15	11	24	9	12	15
14	Alzheimer's disease	20	4	24	3	40	1	5	14
15	Cerebral embolism, stroke or thrombosis	9	3	29	1	6	22	3	10
16	Dementia	4	3	3	16	22	10	6	9
17	Cancer	4	6	1	1	3	7	4	7

State wise prevalence of selected common chronic diseases like high blood pressure, diabetes and heart disease showed that the state of Kerala showed the highest prevalence all these diseases.

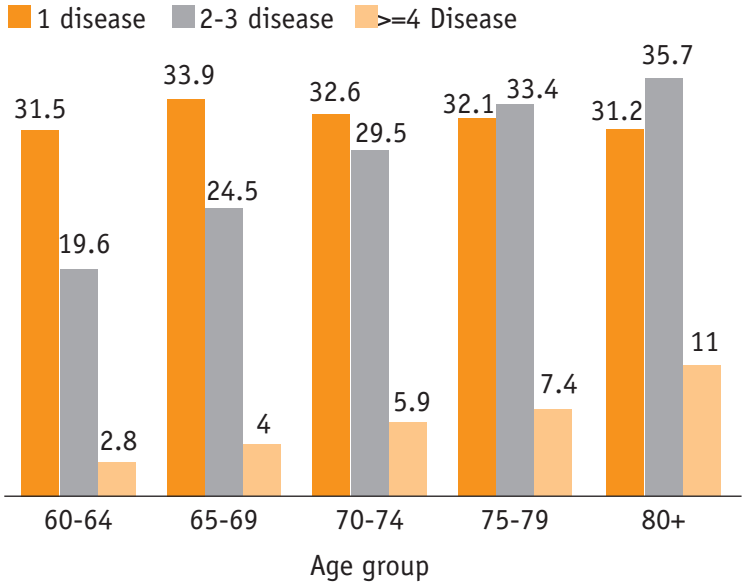
Table 3. Self-reported prevalence Rate (Per 1,000) of selected chronic morbidities among elderly by age and sex of seven states combined

Chronic conditions	Men			Women			Total		
	60-70	70+	All	60-70	70+	All	60-70	70+	All
Arthritis	204	308	243	317	371	338	203	342	293
High BP	158	211	178	226	261	239	194	237	210
Diabetes	98	110	103	105	93	100	102	101	101
Asthma	73	115	89	60	79	67	66	96	77
Heart disease	62	72	65	45	63	52	53	67	58
Osteoporosis	17	24	20	23	43	31	20	34	26

Overall 63% of older adults had at least one chronic NCD. Women showed a higher prevalence of having at least one chronic condition compared to men (women 65.8%, men 60.2%). Among the selected states, Kerala (80.1%) had the highest prevalence of elderly having at least one chronic NCD followed by Punjab (76.3%), Maharashtra (72.3%), Himachal Pradesh (64.7%), West Bengal (63.1%), Orissa (48.5%) and Tamil Nadu (39.1%).

Age wise prevalence of chronic disease is presented in figure 1

Figure1 Chronic conditions by age group in the seven selected states combined (%)



Utilization of different health facilities for the major chronic diseases is presented in Table 4. Among the selected diseases, utilization of government facility was highest for arthritis (30.2%) followed by asthma (29.3%), osteoporosis (26.6%), heart disease (25.8%), diabetes (24.7%), and high blood pressure (23.9%). Three out of five elderly were suffering from at least one chronic NCD. More details on chronic NCD by sex in all the selected states are presented in Table 5.

Table 4. Source of treatment of selected chronic morbidities among elderly by sex and place of residence

Chronic conditions		Government	Private	Others
Arthritis				
	Urban	20.6	70.7	8.7
	Rural	32.9	58.2	8.9
	Men	30.1	60.3	9.6
	Women	30.3	61.4	8.3
	Total	30.2	61.0	8.8
High BP				
	Urban	18.8	76.3	4.9
	Rural	26.1	67.3	6.6
	Men	25.6	66.5	7.9
	Women	22.7	72.3	5.0
	Total	23.9	70.0	6.1
Diabetes				
	Urban	20.1	76.0	3.9
	Rural	27.4	67.4	5.2
	Men	23.6	70.6	5.8
	Women	25.7	70.6	3.7
	Total	24.7	70.6	4.7
Heart Disease				
	Urban	19.5	76.0	4.5
	Rural	28.7	63.7	7.6
	Men	25.5	68.4	6.1
	Women	26.2	66.4	7.4
	Total	25.8	67.5	6.7
Osteoporosis				
	Urban	21.5	71.4	7.1
	Rural	29.0	57.4	13.6
	Men	40.1	46.4	13.5
	Women	19.4	70.1	10.5
	Total	26.6	61.9	11.5

Table 5 Chronic NCDs present (%) by sex in the selected states in India.

States	Suffering from one chronic NCD			Suffering from two chronic NCD			Suffering from > 2 chronic NCD		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
Himachal Pradesh	30.7	39.3	35.0	16.1	19.9	18.1	10.7	12.2	11.5
Punjab	29.8	27.0	28.4	24.2	21.0	22.5	18.8	31.5	25.4
West Bengal	27.3	34.6	31.1	19.4	19.9	19.7	12.2	12.3	12.2
Orissa	30.9	35.7	33.2	12.9	11.8	12.4	3.3	2.5	2.8
Maharashtra	40.4	40.4	40.4	19.4	18.3	18.7	11.8	14.3	13.1
Kerala	34.0	30.3	31.9	22.9	29.0	26.4	23.6	20.5	21.8
Tamil Nadu	26.1	26.1	26.1	7.9	9.2	8.6	3.1	5.4	4.4
Overall	**31.4**	**33.3**	**32.4**	**17.3**	**18.4**	**17.9**	**11.5**	**14.1**	**12.8**

Logistic regression result of associated factors with persons having at least one morbidity adjusted for marital status is presented in Table 6.

Table 6. Bivariate and multivariate analysis results of having at least one chronic non-communicable disease morbidity and associated factors

Variables		Prevalence (%)	Adjusted OR 95% CI
Age (years)			
	60-70	57.6	Reference
	70+	72.0	1.78(1.62-1.95)
Sex			
	Men	60.2	Reference
	Women	65.8	1.35(1.21-1.50)
Education			
	Formal schooling	61.6	Reference
	No Formal schooling	64.6	1.18(1.07-1.30)
Caste			
	SC/ST	59.6	Reference
	OBC	58.1	0.91(0.81-1.01)
	Others	70.1	1.33(1.18-1.49)
Place of residence			
	Urban	60.6	Reference
	Rural	64.1	1.32(1.19-1.47)
Wealth index			
	Lowest	53.7	Reference
	Second	62.8	1.58(1.40-1.79)
	Middle	65.1	1.87(1.64-2.14)
	Fourth	64.2	1.86(1.61-2.14)
	Highest	75.1	3.20(2.71-3.78)
Ever use of tobacco			
	No	62.2	Reference
	Yes	65.1	1.35(1.22-1.48)
Ever use of alcohol			
	No	62.7	Reference
	Yes	68.4	1.33(1.11-1.58)

CI: Confidence Interval, OR: Odds Ratio

The elderly in the higher economic group were three times (OR 3.20, 95% CI 2.71-3.78) more likely to have a chronic NCD compared to the lowest economic group. The higher age groups – men 78% (OR 1.78, CI 1.62-1.95), women 35% (OR 1.35, CI 1.21-1.50), tobacco users 35% (OR 1.35, CI: 1.22-1.48) alcohol users 33% (OR 1.33, CI 1.11-1.58), forward castes 33% (OR 1.33, CI 1.18-1.49), rural residents 32% (OR 1.32, CI 1.19-1.47) and people having no formal education 18% (OR 1.18, CI 1.07-1.30) – are more likely to have at least one NCD compared to their counterparts.

Since we found higher NCD prevalence among women than men, a further analysis was done to find out the associated factors of NCD prevalence among women. Among women, prevalence of NCDs were significantly lower in urban areas (rural 66.9%, urban 63.0%), living alone (alone 55.0%, with spouse 60.5%, with others 67.9%) and lower age group (age group 60-69: 60.7%; aged 70 and above 74.1%).

Discussion

The health consequences of chronic disease lower life expectancy. A person who reaches age 65 without a chronic condition can expect to live another 22 years to age 87. On the other hand, a person who reaches age 65 with one or two chronic conditions can expect to live another 20 years and a person with three or more chronic conditions can expect to live another 16 years (Joyce, et al 2005). In 1995-96, the elderly in India who reported having at least one chronic morbidity was nearly 75% (Rajan S 2006). Similar to the findings among elderly by Samaun, the present study also found that the most prevalent chronic NCDs were hypertension, osteoporosis, arthritis, diabetes mellitus and cardiovascular disease (Canbaz S, et al 2003).

The chronic disease outcomes seen among elderly were the result of multiple factors. The associated individual factors found here were the behavioural factors such as tobacco and alcohol consumption. Social factors, including caste, place of residence and living arrangement, and demographic factors like marital status and sex were associated with the prevalence of self-reported chronic disease. While developing interventions for the prevention and treatment of chronic NCDs, both population and individual level factors are to be considered.

As seen in our results, arthritis, hypertension and heart disease were the most common chronic conditions of the adult population in other countries like USA (America National Academy 1999). In contrast to the reports from developed countries, our study results indicated that people with higher income were more likely to have chronic conditions.

Besides the health problem, social problems resulting from health problems were high, especially among the elderly (Resnick NM, 1999). Socio-economic characteristics were also found to be associated with health status (Mackenbanch JP 2008, et al; Huijts T, et al 2010; WHO, 2008). As expected, the burden of chronic disease, i.e. the number of chronic diseases present, grows with a person's age. The burden of chronic diseases was greater for high income older adults, which was contrary to that of the findings from older Americans (AARI, 2009). Here we assessed the chronic NCDs by asking the question whether a doctor or a nurse ever told them that they have a disease. This is applicable to those who had gone for treatment to a medical practitioner. Since utilization of health services is higher among high income groups in India, this may be the reason for the high prevalence of self-reported chronic NCDs among high income groups

The results from the regionally representative states on the prevalence of tobacco and alcohol (ever and current) use among older adults is the first of its kind in India. State wise results of chronic morbidity provide more insight into a comparative analysis. The study results will be a resource for those involved in planning, policy development, and public health advocacy for prevention and control of chronic NCDs with particular reference to the older population in India. Understanding the correlates of chronic non-communicable diseases among older adults helps to plan intervention programs in the specific direction.

The study findings would be significant considering the present rapid epidemiological transition in India and its effect on the elderly, mainly in the areas of increasing health care cost, unpreparedness on the part of the public health system and increasing out-of-pocket expenditure. As the chronic diseases and their risk factors are more prevalent among the older adults, the findings of this study will be particularly relevant for policy makers in India. Moreover, vulnerability to other infectious diseases among those suffering from chronic diseases is high, especially among older people.

Limitations of the study

There is a chance for under-estimation of the prevalence of chronic diseases because of the limitation of self-reporting. However, this study estimates chronic disease morbidity based on chronic conditions as reported by a doctor or a nurse to a patient. This has the advantage of being more accurate as compared to self-reporting by the elderly.

ACKNOWLEDGEMENT

The author is thankful to Prof. K. R Thankappan and Prof. P. S. Sarma, Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, India for their intellectual input during the preparation of the report.

Funding

The study was supported by a grant from the United Nations Population Fund (UNFPA) as part of the research project on "Building knowledgebase on Ageing in India"

A note on the data used in this report

With the Government of India, the United Nations Population Fund (UNFPA) started the research project on "Building a Knowledge Base on Population Ageing in India (BKPAI)" with two main aims: (i) research using secondary data; and (ii) collecting primary data through sample surveys on the socio-economic status, health and living conditions of the elderly that can be used for further research, advocacy, policy dialogue and programming. This project is coordinated by the Population Research Centre at the Institute for Social and Economic Change (ISEC), Bangalore and the Institute of Economic Growth (IEG), Delhi. Collaboration with the Tata Institute of Social Sciences (TISS), Mumbai was initiated at a later stage for developing an enabling environment through advocacy and networking with stakeholders

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About the Project

The United Nations Population Fund - UNFPA supported project BUILDING KNOWLEDGE BASE ON POPULATION AGEING IN INDIA aims at contributing and further expanding the existing knowledge base on the emerging population dynamics in India which are resulting in significant shifts in the age structure towards higher proportions of older persons aged 60 years and above. In first stage, the project supported the preparation of a series of thematic studies using existing secondary data sources. In the second stage the project initiated a primary survey in seven states in India. Dissemination of the findings to various stakeholders is a key objective of the project to help enhance the overall understanding of the situation of elderly in the country for further research and policy analysis on the growing numbers of India's senior citizens. The project is a partnership between the Institute for Social and Economic Change (ISEC), Bangalore, the Institute of Economic Growth (IEG), New Delhi and Tata Institute of Social Sciences, Mumbai

More information on the project can be obtained from http://www.isec.ac.in/prc.html or www.indiaunfpa.org

The second phase of the project involves an updated situation analysis through the collection of primary data from seven states in India which have relatively higher proportions of elderly. These are Himachal Pradesh, Kerala, Maharashtra, Orissa, Punjab, Tamil Nadu and West Bengal. The survey data includes socio-economic characteristics, family dynamics, living arrangements, health and awareness of social security programmes of the elderly. This paper is based on the data gathered from the seven states.

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