

Healthy aging in India: evidence from a panel study

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Abstract

Purpose – Recent public health policy emphasizes the achievement of healthy aging as average life expectancy increases worldwide. Evidence for healthy aging from low- and middle-income countries (LMIC) is limited. The purpose of this paper is to assess the prospects of healthy aging and its associated factors in the Indian context.

Design/methodology/approach – The study was based on a national-level panel survey, the Indian Human Development Survey (IHDS) conducted in 2004-05 and 2011-12. The analytical sample consists of 10,218 elderly individuals who were 60 years old and above at the baseline. Change in health status was assessed based on disability and disease incidence at the follow-up. A generalized estimating equation (GEE) model was performed to assess health status change.

Findings – Increasing age was a risk factor for all dimensions of health outcomes. Elderly from the lowest wealth quintiles were more likely to lose health due to short-term morbidity, whereas the highest wealth quintiles were more likely to lose health due to long-term and multi-morbidity, indicating evidence for the presence of the “disease of affluence”. Social capital, such as living in a joint family acted as a protective factor against health risks.

Originality/value – With the results showing the evidence of the “disease of affluence” and “disease of poverty” in different health outcomes, there should be a health policy focus that copes with undergoing epidemiological transition. It is also important to pay attention to health-protecting factors such as social and familial support to achieve healthy aging.

Keywords Ageing, Healthy aging, Older adults, India

Paper type Research paper

Introduction

Population aging is a global phenomenon, though the aging process is different across regions [1]. An increase in the average life expectancy has been observed across the world, especially since the second half of the 20th century. The demographic transition has been driven by increasing life expectancy and a decline in fertility [2]. This achievement was influenced by improving living conditions, education and sanitation, the use of better health technology, reduced child mortality and accessibility to birth control and family planning measures [3] and economic growth [4]. It is noted that the demographic transition in developing countries is taking place at a rapid pace [2], but the need for public policy intervention is not discussed enough. Population projections indicate that eight in ten elderly will be living in today’s developing countries by the year 2050 [1]. It is also noted that the demographic transition is closely associated with the epidemiological transition, which is common to countries irrespective of the development stage [5]. This combined demographic



and epidemiological transition makes the public policy response more challenging, especially in developing countries [6].

Increased life expectancy will be meaningful when people live healthier with a good quality of life. The paradigm of healthy aging is in contrast with the conventional perspective on aging and views aging as an opportunity by extending the healthy years. There is evidence for those cohorts entering old age now are relatively healthier than the earlier generations, though the improvement is not distributed equally [7]. Achieving healthy aging could be an addition to human resources and can subsequently determine economic progress. Moreover, improvement in health status can significantly contain health costs and may help to prevent poverty [8]. Healthy aging is possible by adding healthy life to years instead of adding years to life. Such a health improvement is achievable by compressing disability and morbidity duration [9, 10].

Generally, the elderly population is noted for high health risks due to diseases, disabilities and low quality of life [11]. Healthy aging is still possible, especially with the help of adjusting modifiable health risk factors [12]. In India, inequality in life expectancy exists based on socioeconomic differences [13], and the elderly are generally noted for higher health burdens [14]. The country is also experiencing rapid demographic and epidemiological transition along with the sub-national level of aging. The growth of the elderly population was almost doubled to 104 million between 1991 and 2011. Historically, most of the public health policies in the Indian context were based on maternal and child interventions. The development of a comprehensive geriatric care policy could be challenging as the country is still working toward achieving Universal Health Coverage (UHC). Population-based data documentation is less common in developing countries, which restricts the availability of evidence of healthy aging in comparison to developed countries. In the Indian context, high informality and illiteracy among the elderly could rise as the most challenging factors before policymakers. This study aims to explore the prospects of healthy aging and its associated factors in the Indian context.

Methods

Data and sample

The study is based on a nationally representative panel study, the Indian Human Development Survey (IHDS), which was conducted in 2004-05 and 2011-12. The IHDS is a multi-topic survey that was jointly conducted by the University of Maryland, USA, and the National Council of Applied Economic Research (NCAER), New Delhi, India. A total of 41,554 households were interviewed from all districts of India in 2004-05. About 85% of these households (including split households in the same community) were re-interviewed during 2011-12. The survey also added new households to adjust for dropout [15]. A panel dataset was constructed based on individuals who were interviewed in both the survey waves. Of the 150,995 individuals interviewed in both rounds, 10,523 individuals were above 60 years at the baseline. The study further excluded 225 individuals with missing values and 80 individuals who were suffering from all three outcomes at the baseline. Thus, the final analytical sample constituted a balanced panel of 10,218 elderly individuals (Figure 1).

Ethical consideration

IHDS followed ethical clearance and norms. All respondents signed a “statement of consent”, which allowed them not to answer any question if they wished. It agreed to use the information solely for research purposes by maintaining the confidentiality of the sensitive information. Ethical approval to use the data was granted by the University of Maryland, USA, and the National Council of Applied Economic Research (NCAER), New Delhi, India [15]. The data were

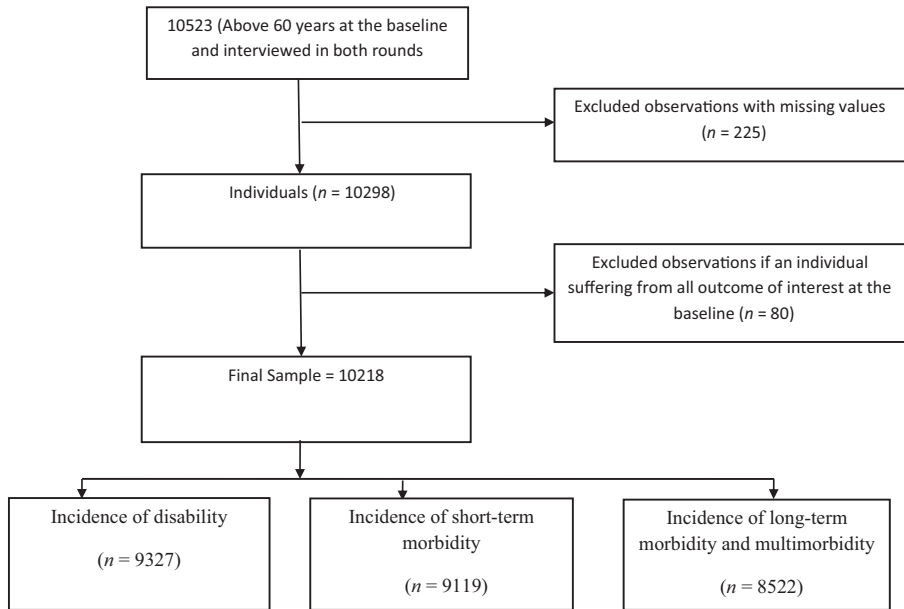


Figure 1. Sample in the study

open for research purposes through the Inter-University Consortium for Political and Social Research data archive at (www.icpsr.umich.edu).

Measurements

To assess the healthy aging and changes in the health status over time, the study considered the incidence of disability and diseases as the outcome variables as suggested earlier [16]. More specifically, the study assessed health status at the follow-up using disability status, the incidence of short-term morbidity and the incidence of long-term and multi-morbidity separately. For the incidence of disability at the follow-up, a binary outcome variable was created by coding zero for no disability and one for the incidence of at least one disability among walking, using the toilet, dressing, hearing, speaking and vision (short and far sight). The analysis was based on 9,327 individuals who were not disabled at the baseline. The incidence of short-term morbidity was based on fever, cough and diarrhea that were reported during the last 30 days at the time of the interview. Long-term morbidity was assessed based on cataracts, tuberculosis, high blood pressure, heart disease, diabetes, cancer, asthma, paralysis, epilepsy, mental illness and other long-term diseases. Incidence of short- and long-term morbidity at the follow-up was converted as a dichotomous outcome variable, by coding zero for no disease and one for the incidence of at least one disease. The analytical sample for short-term morbidity consisted of 9,119 individuals and for long-term morbidity consisted of 8,522 individuals, whose respective morbidity status was “none” at the baseline. The final dimension of health status was assessed based on the incidence of multi-morbidity. For that purpose, a binary outcome variable was created based on the 11 long-term diseases mentioned above. Incidence of two or more long-term morbidities constituted the multi-morbidity. The analytical sample for this outcome was the same individuals for long-term morbidity incidence.

Covariates were employed from the first wave of the survey (time-invariant). It included socioeconomic and demographic variables: age (young-old; 60–69 years), old-old

(70–79 years) and oldest-old (above 80 years), sex, marital status, education, residence, household wealth, religion, caste and living arrangement. We expected a significant role by each socioeconomic and demographic factor since health in old age can be influenced by past experiences and the personal background of an individual. Moreover, including these factors can help us to understand healthy aging with a life course approach. Health risk factors such as smoking status, chewing tobacco/gutka and drinking habits were also added as covariates. Generally, controlling these health risk behaviors was considered a health-protective factor.

Statistical analysis

To investigate the determinants of healthy aging, the study applied the generalized estimating equation (GEE) model. The GEE model has the advantage of analyzing repeated categorical data by accounting for the within-subject correlation and produces population-averaged changes in the outcome over time [17, 18]. The regression analysis was performed using survey weights provided in the dataset. All the statistical analysis was performed using STATA software.

Results

Of the 9,327 individuals without any disability at the baseline, 34.6% reported at least one disability at the follow-up. Among 9,119 individuals without any of the three short-term diseases at the baseline, 18.1% reported at least one short-term disease at the end of the follow-up. Incidence of long-term morbidity and multi-morbidity was 29.7% and 8.0% at the follow-up among 8,522 individuals without any long-term disease at the baseline. The mean age of the overall analytical sample was 66.2 years. Among the age group, young-old (60–69 years), old-old (70–79 years) and oldest-old (above 80 years), each constituted 70.2%, 24.9% and 4.9%. About 51.6% were female elderly. The majority of the elderly were living in rural areas (73.8%). A total of 68.1% were currently married against 31.9% unmarried elderly. Based on the education level, more than 60% did not get any formal education. A total of 18% of the elderly had some primary schooling, 17.9% had middle/secondary schooling and 3.3% had studied up to college-level education, [Table 1](#).

Based on the wealth quintile, 24.8% were under the richest household category, followed by 22.7% rich, 21.9% middle, 16.3% poor and 14.3% poorest categories. A total of 82.3% elderly were Hindus, followed by 9.5% Muslims, 3.0% Christians and 5.1% followed other religions. In the caste category, 26.2% were Forward Caste, 36.5% were Other Backward Class (OBC), 17.9% were Scheduled Caste (SC), 5.8% were Scheduled Tribe (ST) and 13.9% were under other categories. A total of 76.9% of the elderly lived with extended family, 21.2% elderly were living in a nuclear family and 1.9% elderly were living alone. Among health risk factors, 92.6% had no drinking habits, 79.4% never used to chew tobacco or gutka and 81.5% were never smokers. Results of the regression analysis are shown in [Table 2](#).

Disability

Age, gender, religion, caste, living arrangement and chewing tobacco/gutka were the significant predictors of disability at the follow-up. In comparison to the young-old category, old-old (OR = 1.70; 99% CI 1.458–1.986) and the oldest-old (OR = 2.436; 99% CI 1.537–3.861) were more likely to experience incidence of disability. Female elderly were 1.35 times more likely to experience disability incidence at the follow-up compared to male counterparts. People from other caste backgrounds (OR = 2.23; 99% CI 1.386–3.583) and those who lived in a nuclear family (OR = 1.21; 95% CI 1.020–1.435) were also more likely to suffer from disability at the follow-up. Those who chewed tobacco/gutka daily (OR = 0.781; 99% CI

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36,4

718

Outcome variables (at the follow-up)

Incidence of disability	34.6
Incidence of at least one short-term morbidity (last 30 days)	18.1
Incidence of at least one long-term morbidity (last 365 days)	29.7
Incidence of at least long-term multi-morbidity morbidity	8.0

Independent variables

Age (years) Mean(SD)	66.2 (6.1)
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Age category (years)

60–69 (young-old)	70.2
70–79 (old-old)	24.9
80+ (oldest-old)	4.9

Gender

Male	48.4
Female	51.6

Residence

Rural	73.8
Urban	26.2

Current marital status

Married	68.1
Not married	31.9

Education

College	3.3
Secondary school	17.9
Primary school	18.0
No formal schooling	60.8

Wealth quintile

Richest	24.8
Rich	22.7
Middle	21.9
Poor	16.3
Poorest	14.3

Religion

Hinduism	82.3
Islam	9.5
Christianity	3.0
Others	5.1

Caste

Forward caste	26.2
Other backward caste (OBC)	36.5
Scheduled caste	17.9
Scheduled tribe	5.8
Others	13.9

Living arrangement

Joint family	76.9
Nuclear family	21.2
Alone	1.9

Table 1.
Baseline descriptive
statistics of the sample
(in 2005) (unweighted)

(continued)

<i>Drink alcohol</i>		
Never		92.6
Sometimes		5.4
Daily		2.0
<i>Chew bidi/gutka</i>		
Never		79.4
Sometimes		2.7
Daily		17.9
<i>Smoking</i>		
Never		81.5
Sometimes		3.1
Daily		15.4
<i>Total</i>		10,218

0.648–0.941) and Muslims (OR = 0.401; 99% CI 0.245–0.659) were less likely to report an incidence of disability at the follow-up. Other socioeconomic variables were not significant predictors of disability incidence.

Short-term morbidity

Incidence of short-term morbidity was significantly predicted by age, residence, marital status, wealth quintile, caste, living arrangements and alcohol consumption. Elderly under old-old (OR = 1.26; 95% CI 1.028–1.543) category was more likely to report at least one of the short-term disease at the follow-up compared to the young-old category. A clear wealth gradient was reported with a higher likelihood of getting affected by the short-term disease by those in the lowest wealth quintiles compared to those in the highest quintile. The elderly who lived alone (OR = 4.121; 99% CI 2.401–7.074) and in a nuclear family (OR = 1.720; 99% CI 1.370–2.159) were at high risk to report the incidence of short-term diseases compared to the elderly who lived with their extended family. Elderly who resided in urban areas, unmarried, Other Backward Caste (OBC), Scheduled Tribes and other caste were less likely to report the incidence of short-term morbidity. Among the health risk factors, those who consumed alcohol, but not regularly were less likely to lose health due to short-term morbidity. Gender, education, religion, smoking habits and chewing habits of tobacco/gutka were not significant predictors for the incidence of short-term morbidity.

Long-term morbidity

For the long-term morbidity, incidence at the follow-up, age, wealth quintile, caste, living arrangement and chewing tobacco/gutka were the significant predictors. Higher age categories show a high likelihood of reporting long-term morbidity (old-old OR = 1.229; 95% CI 1.050–1.439) and (oldest-old OR = 1.533; 95% CI 1.033–2.276) compared to young-old category. Those who lived in a nuclear family were 1.26 times more likely to report the incidence of long-term morbidity at the follow-up compared to the elderly who lived with their extended family. Chewing tobacco/gutka was a risk factor for achieving healthy aging, with an odds ratio of 1.421 compared to those without such health behaviors. In contrast to the short-term morbidity, wealth gradient has reversed, indicating that the lowest of the wealth quintiles (Rich, OR = 0.787; 95% CI 0.648–0.955) (Poor, OR = 0.740; 95% CI 0.574–0.953), (Poorest, OR = 0.713; 95% CI 0.544–0.935) were less likely to report long-term disease at the follow-up compared to elderly from the richest background. Scheduled Tribe elderly were also less likely to report the incidence of long-term morbidity with an odds ratio of 0.511

Table 2.
Odds ratio and its 95% CI of disability and diseases in India 2005–2011; generalized estimating equation (GEE)

Independent variables	Healthy outcome		
	Disability (9,327) OR (95% CI)	Short-term morbidity (9,119) OR (95% CI)	Long-term morbidity (8,522) OR (95% CI)
<i>Age: Young Old</i> [®]			Multi-morbidity (8,522) OR (95% CI)
Old-old	1.702 [‡] (1.458–1.986)	1.260 [§] (1.028–1.543)	1.209 (0.934–1.564)
Oldest-old	2.436 [‡] (1.537–3.861)	1.033 (0.622–1.717)	3.232 [‡] (1.630–6.410)
<i>Gender: Male</i> [®]			
Female	1.357 [‡] (1.102–1.670)	1.099 (0.859–1.405)	1.159 (0.853–1.575)
<i>Residence: Rural</i> [®]			
Urban	1.048 (0.885–1.242)	0.844* (0.708–1.006)	0.976 (0.777–1.225)
<i>Education: College</i> [®]			
Secondary school	0.972 (0.698–1.355)	0.915 (0.599–1.396)	1.038 (0.617–1.747)
Primary education	1.023 (0.721–1.451)	1.033 (0.665–1.603)	1.224 (0.707–2.120)
No formal education	1.034 (0.708–1.511)	1.364 (0.873–2.132)	0.726 (0.402–1.310)
<i>Marital Status: Currently married</i> [®]			
Unmarried	1.058 (0.878–1.276)	0.799* (0.623–1.025)	0.863 (0.645–1.154)
<i>Wealth quintile: Richest</i> [®]			
Rich	1.146 (0.870–1.510)	1.237* (0.964–1.587)	0.649 [‡] (0.491–0.858)
Middle	1.174 (0.861–1.601)	1.689 [‡] (1.283–2.222)	0.565 [‡] (0.397–0.802)
Poor	1.240 (0.881–1.745)	1.949 [‡] (1.446–2.628)	0.355 [‡] (0.244–0.518)
Poorest	1.348 (0.932–1.949)	2.052 [‡] (1.463–2.877)	0.481 [‡] (0.286–0.809)
<i>Religion: Hinduism</i> [®]			
Islam	0.401 [‡] (0.245–0.659)	1.403 (0.771–2.551)	0.286 [‡] (0.126–0.647)
Christianity	0.908 (0.552–1.493)	1.128 (0.628–2.026)	0.842 (0.390–1.816)
Other religions	0.808 (0.518–1.259)	1.153 (0.646–2.057)	0.244 [‡] (0.108–0.548)
<i>Caste: Forward Caste</i> [®]			
OBC [®] Forward Caste	1.151 (0.960–1.380)	0.764 [§] (0.612–0.952)	1.452 [‡] (1.093–1.927)
Scheduled caste	1.071 (0.864–1.327)	0.930 (0.703–1.231)	1.024 (0.716–1.463)

(continued)

Independent variables	Healthy outcome		
	Disability (9,327) OR (95% CI)	Short-term morbidity (9,119) OR (95% CI)	Long-term morbidity (8,522) OR (95% CI)
Scheduled tribe	0.912 (0.675–1.233)	0.461 [‡] (0.318–0.669)	0.511 [‡] (0.359–0.729)
Others	2.228 [‡] (1.386–3.583)	0.528 [‡] (0.296–0.942)	1.464 (0.826–2.594)
<i>Living arrangement: Joint family</i> [®]			
Nuclear family	1.210 [‡] (1.020–1.435)	1.720 [‡] (1.370–2.159)	1.262 [‡] (1.054–1.511)
Alone	1.398 (0.902–2.168)	4.121 [‡] (2.401–7.074)	1.259 (0.744–2.132)
<i>Smoking status: Never smoke</i> [®]			
Smoke sometimes	1.029 (0.694–1.526)	0.924 (0.553–1.542)	0.949 (0.612–1.471)
Smoke daily	0.862 (0.699–1.062)	1.106 (0.835–1.465)	0.988 (0.796–1.227)
<i>Chewing habits: Never chew tobacco/gudkha</i> [®]			
Chew bidi/gutka sometime	0.900 (0.621–1.304)	1.008 (0.634–1.603)	1.421 [*] (0.962–2.099)
Chew tobacco/gutka daily	0.781 [‡] (0.648–0.941)	0.915 (0.726–1.153)	0.948 (0.778–1.157)
<i>Alcohol consumption: Never drinks</i> [®]			
Drink alcohol sometimes	1.171 (0.837–1.639)	0.625 [‡] (0.424–0.922)	0.956 (0.677–1.349)
Drink alcohol daily	1.204 (0.778–1.866)	0.863 (0.489–1.523)	0.729 (0.459–1.158)
Constant	0.283 [‡] (0.202–0.397)	0.145 [‡] (0.094–0.222)	0.441 [‡] (0.312–0.624)

Note(s): () sample size; [®] reference group; CI (Confidence Interval); [‡] $p < 0.01$, [§] $p < 0.05$, ^{*} $p < 0.1$

Table 2.

compared to forward caste. Gender, residence, education, marital status, smoking habits and alcohol consumption were not significant predictors for the incidence of long-term morbidity.

Multi-morbidity

Age, wealth quintile, religion, caste and living arrangement were the significant predictors of multi-morbidity at the follow-up. Oldest-old (OR = 3.232; 99% CI 1.630 - 6.410), OBC (OR = 1.452; 99% CI 1.093–1.927), other castes (OR = 6.217; 99% CI 2.804–13.78), those who live in a nuclear family (OR = 1.509; 99% CI 1.106–2.059) and lived alone (OR = 2.340, 90% CI 0.894–6.126) were highly likely to suffer from multi-morbidity at the follow-up. Similar to the association between long-term morbidity and wealth quintile, lower odds ratios among the lowest wealth quintiles were reported, indicating that the richest were more likely to suffer from multi-morbidity. Gender, residence, education and marital status were not significant predictors of multi-morbidity. All three health risk factors were also not significant.

Discussion

The study aimed to explore the predictors of healthy aging based on socioeconomic and demographic and health risk factors. The study employed panel data and assessed healthy aging using disease and disability dimensions. The study noted that the effect of various health determining factors was not the same across the different measures of healthy aging outcomes. Among the covariates, age and gender were identified as the significant determinants for the incidence of disability, and age alone was a significant predictor for all the three dimensions of morbidity incidence. This result is consistent with previous studies [19]. The result indicates that urban elderly were expected to lose healthy years of life due to short-term morbidity in comparison to rural counterparts. The role of rural-urban settings in determining the health status of the elderly is varied across studies [20]. Currently unmarried elderly were less likely to report short-term morbidity at the follow-up, and evidence for such an association is weak in the literature. Generally, the role of marriage as a protective factor against health risks is well-established in the literature [21]. The elderly who live alone or live in a nuclear family are at high risk regarding their health status in comparison to the elderly who live with their extended family. This indicates the advantage of having better social capital in determining health in late life. This finding is in agreement with an earlier study that confirmed the role of familial and social support as a protective factor against health loss [22]. The elderly in the lowest wealth quintiles were more likely to get affected with short-term morbidity. On the contrary, higher odds for the incidence of long-term morbidity and multi-morbidity were found among the richest wealth quintile, which is in agreement with previous findings [23]. This could be possible because most of the long-term diseases (noncommunicable diseases) in the present study are related to lifestyle-related factors that are mostly diagnosed among the affluent and thus indicate the evidence of the disease of affluence [24].

Among the health risk factors, the elderly who used to chew tobacco/gutka were less likely to lose healthy years due to disability, which was rarely found in the literature [25], whereas the same risk factors affected health by long-term morbidity. A contradicting finding is that those who consume alcohol sometimes, but not regularly had lower odds to get affected by short-term morbidity at the follow-up. This may be due to the fact that most of the health risks by alcohol consumption are associated with long-term morbidity than short-term morbidity [26]. Smoking habit and education levels were not a significant predictor for the health loss in any of the outcomes at the follow-up though the role of education, and avoiding smoking has been identified as a protective factor against health loss in the literature.

Strengths and limitation

To our knowledge, this is the first study on healthy aging using panel data at the national level. The main advantage of the study is that it utilized a longitudinal approach in assessing health status change over time. Though the assessment of health status was based on the incidence of disease and disability, the study did not explore subjective domains of health status such as quality of life, well-being and happiness as the health outcome. We recommend that future research should consider broader domains of health assessment (both subjective and objective) along with considering a wide range of information covering from micro (individual) to macro (public policy) level as health status determinants. India as a large country shows evidence for the experience of the sub-national level of aging or internal polarization of aging. This study provides national-level estimates with the survey conducted a few years back, thus the recent situation might have changed. There is scope for future research to be conducted by considering issues that are related to the regional or sub-national level of aging.

Conclusion

It can be concluded that social capital such as living in a joint family and avoiding health risk behaviors can act as a protective factor against overall health loss, indicating that healthy aging is possible through healthy life management. The study finds evidence for the prevalence of “disease of affluence” and “disease of poverty” under different health outcomes among the study subjects, which point toward the diverse healthy aging experience among elderly with different backgrounds. Thus, there is a need for public health policy intervention that should address the combined demographic and epidemiological transition with a holistic approach.

Conflict of Interest: None

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