



Perception of Lay People Regarding Determinants of Health and Factors Affecting It: An Aggregated Analysis from 29 Countries

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Abstract

Background: This study aimed to evaluate the perception of lay people regarding determinants of health at global level and factors affecting it.

Methods: Data was collected from International Social Survey Program (ISSP) and World Bank website. Multilevel regression analysis was done and lay people's perception regarding health behavior, environment, poverty and genes as health determinants was assessed. Various socio demographic factors were used as independent variables.

Results: The highest percentage of people agreed environment as determinant of health. An inverse relationship was observed between GNI quartiles and an individual's agreement with poverty, health behavior, and environment as health determinant. There was a significant negative association of females with health damaging behavior ($P<0.05$) and positive association with environment and genes ($P<0.05$) as health determinants. Elderly people agreed with poverty as determinant of health ($P<0.05$). GNI was negatively related to environment ($P<0.05$) and poverty ($P<0.05$) as health determinant.

Conclusion: The common public is now becoming aware of a broadened concept of health and people belonging to different backgrounds have different perceptions regarding determinants of health. Our results show that highest percentage of people agreed with environment as determinant of health, which is consistent with scientific view of increased burden of disease, caused by environmental factors. Thus, tailored health programs and policies that address an individual's specific problems are likely to induce a change in behavior and attitude, hence decreasing the disease burden.

eywords: ISSP, Determinants of health, Multilevel analysis, Tailored approach

Introduction

Health is a global issue in this era. The prevalence of chronic diseases is increasing drastically, and is predicted to increase over the next two decades (1). There is a dramatic re-emergence of old infectious diseases like tuberculosis and cholera, and appearance of new ones, like HIV and hepatitis C (2). Integrated preventive care, rather than treatment, is more effective in tackling the growing burden of both infectious and chronic diseases. In order to generate these preventive measures, cause of illness and disease models need to be under-

stood. Although these precautionary measures are very effective, but they are difficult to achieve because health is influenced by a number of related factors, all of which need to be coordinated to implement and adopt preventative policies. Previously, it was thought that occurrence of a disease could be explained through "bio-medical model" that assumed that disease is caused by a specific etiological agent inside the body (3), but now health behavior, environment, socio-economic status, and genetic factors are also considered to

be closely interrelated to health along with biological factors (4). The “Social-determinants-of-health school” and the “health field concept” are important continuations of these health theories (5, 6). Infectious diseases are not an exception for these disease models (7), and personal behavior, environment, and socio-economic status are closely related to many infectious diseases (8), e.g., the prevalence of diarrhea and cholera are influenced by clean water, sanitation, and proper hygiene.

This transition regarding determinants of health raised scholars’ interest in public views on health and its determinants (9), and this enhanced centrality of public views has become the norm in health policy as well (10). Previous studies have either focused on health and its determinants in scientific view or just stressed the significance of public opinion for policymaking (9, 11). However, few efforts have been made to evaluate the concept of lay people regarding determinants of health and factors affecting it. People belonging to different social status, education level, and health state have different perceptions regarding health (12) which further influence their health behaviors. There is little point in developing health plans without understanding how people’s belief about health are affected by their individual circumstances, thereby influencing the take-up of services (13). Up to our knowledge prior studies which assessed public opinions and beliefs regarding illness limited their focus to only one specific disease, like obesity or hypertension (14, 15) also ignoring the factors effecting people’s attitude. Furthermore, these studies were done at national level, representing the situation in one country only.

Therefore, our study aimed to evaluate the general (not disease specific) perception of lay people regarding determinants of health at a global level and to identify the effect of various social and demographic factors on public believes. This might help policy makers in developing a good concept of preferences and misconceptions of health among lay people and in designing and implementing reform proposals that can influence their behavior, thus helping to control the disease burden throughout the world. To achieve these goals, we performed a multi-level analysis on data

from 29 countries, most of which are high-income countries.

Materials and Methods

Data source

The study was a cross sectional multilevel one. Data source is 2011 International Social Survey Program (ISSP) data. ISSP is a continuing annual program of cross-national collaboration based on voluntary participation of countries. The topic of 2011 survey was “health and health care”, and it included data from 29 member countries. We included all 29 countries in this study. Data and questionnaire for 2011 module is available on ISSP website (16). ISSP use a standardized questionnaire for survey and all the variables have a validated scale for assessment. ISSP data is nationally representative with individuals as primary sampling unit. Sampling procedure differs for the individual countries like partly simple and partly multi-stage stratified random sampling. Mode of interview also differs for the individual countries including face-to-face interviews, postal survey and web survey (17).

The data for GNI and GINI was collected from the World Bank website (18). Total sample size was 45,563 while sample size for each country is shown in Table 1.

Outcome variable

Four indexes were constructed in order to capture public perspectives on the determinants of health. The 2011 ISSP question linked to these indicators is “People suffer from severe health problems”... how much do you agree or disagree with each of the following items? a) Because they behaved in ways that damaged their health, b) because of the environment they are exposed to at work or where they live, c) because of their genes, d) because they are poor. The coding of answers is scaled from 1 to 5 where 5=strongly agree.

Independent variables

A dummy variable was created for gender with ‘1’ for female and ‘0’ for male.

Table 1: Names of countries with sample size and variable data

Country Name	GNI	GINI	Sample size	Sex ratio Male to female	Average age	% of Employment	% of obese	% of smokers
Australia	43300	35.19	1946	0.89	55.06	78.2	70.9	10.5
Belgium	39860	32.97	2983	0.85	49.6	77.6	52.2	19.5
Bulgaria	15450	28.19	1003	0.72	51.93	89.1	55.6	36.1
Chile	21310	52.06	1559	0.65	46.54	69.1	61.1	31.2
Taiwan	20910	33.9	2199	0.97	46.77	69.3	36.2	20.3
Croatia	20200	33.65	1210	0.9	45.6	76.6	53.8	38.8
Czech Republic	24720	25.82	1804	0.8	47.42	82.2	60.5	33.1
Denmark	43430	24.7	1388	0.98	46.28	88	46	21.5
Finland	38220	26.88	1340	0.81	52.09	84.8	53.8	21.9
France	36720	32.74	3319	0.71	46.15	82.3	46.7	22.3
Germany	42230	28.31	1681	1.02	49.5	83.2	54	29.3
Israel	28070	39.2	1220	0.79	45.82	80.4	53.6	26.1
Japan	36300	24.85	1306	0.89	50.53	76.3	27.8	21.9
Korea, Rep.	30970	31.59	1535	0.81	45.98	60.6	21	20.9
Lithuania	23560	37.57	1187	0.71	47.73	82	60.1	27.3
Netherlands	43510	30.9	1472	0.8	53.99	81.7	53.3	18
Norway	66960	25.79	1834	0.87	48.28	88.4	53.7	18.6
Philippines	4380	42.98	1200	1	42.9	45.6	26.9	28.4
Poland	21170	32.73	1115	0.85	47.8	66.3	56	25.8
Portugal	24770	38.45	1022	0.71	51.6	78.9	54.4	22.9
Russian Federation	22720	40.11	1511	0.53	48.12	89.6	57.8	27.3
Slovak Republic	24770	26	1128	0.86	51.93	85.4	61.3	24.4
Slovenia	27240	31.15	1082	0.83	48.64	78.4	53.6	22.4
South Africa	11010	63.14	3004	0.7	40.59	53.2	78	19.9
Sweden	43980	25	1158	0.9	50.02	81.4	50.8	13.4
Switzerland	55090	33.68	1212	1.03	48.92	80.5	44.6	22.4
Turkey	18190	40.03	1559	0.67	42.08	37	51.2	29.2
United Kingdom	37340	35.97	936	0.76	49.72	86.6	58	24.3
United States	52610	40.81	1550	0.76	50	85.8	65.6	23.2

Names of 29 countries included in analysis along with population size of each country and % of smokers, employed and obese people by country is shown

Three dummy variables were assigned for age as younger (19–39 yr.), middle aged (40–59 yr.), and older (60 yr. and above).

Average monthly household income, GNI and GINI variables were changed into a quartile index (scaled 1 to 4, where 4= above the third quartile). An employment-status dummy was produced with '1' for employed and '0' for unemployed.

Four education dummy variables were assigned, i.e., elementary school (0–6 years of education: reference group), junior high school (7–9 years of education), senior high school (10–12 years of education), and post-secondary School (13 or more years of education).

A dummy of health insurance was presented with '1' for having health insurance and '0' otherwise.

A continuous variable of insurance coverage was introduced (scaled 1–3 where 3= covers very well). The following were introduced as health-related dummies. Self-rated health status (Q26: scaled 1 to 5 where 5=very good), BMI (Q28, '1'=overweight or obese, '0'= others), chronic disease (Q27: '0' is No, '1' is Yes), smoking (Q24: '0' is No, '1' is Yes), drinking and physical activity (Q25a and 25b: scaled 1-5 where 1=never and 5=daily).

Statistical analysis

Total number of participants was 45,563 and sample size ranged from 936 to 3,319 among countries. We constructed a box plot by frequency analysis to see the percentage of agreement of people with different determinants of health using IBM SPSS 19 software. Chi square test was performed using SPSS, and a bar graph was generated to analyze trends in the association between agreement with determinant of health and GNI quartiles by using Microsoft excel. Only score 4 and 5 (agree and strongly agree) was used to find percentage of agreement with each health determinant.

Multilevel logistic regression model with individuals as first level and countries as second level was used. A single-model strategy was employed to run the analysis using STATA 12.0 software. The model included all the independent variables and was analyzed separately according to the four dependent variables to obtain the results of the regression.

Individual variables were automatically adjusted in the regression model to get rid of bias. We applied an individual weighting factor during analysis to adjust the distribution of primary sampling unit and to correspond with that of each nation's population.

Ethical statement

No ethical approval was needed for this study because we used already assembled data from ISSP and World Bank. Informed consent is taken from all the respondents before survey by ISSP team (16).

Results

General characteristics of study population and countries

Among 45,563 participants out of 29 countries, 47% of participants were male and 52.7 % were female. Norway was the country with highest GNI while Philippines had the lowest GNI. GINI level was highest in South Africa and lowest in Denmark. Average age of people varied between 40 yr to 55 yr. South Korea had the lowest percentage of obese people while South Africa had highest. Percentage of smokers ranged from 10.5 in Australia to 38.8 in Croatia.

Table 1 shows the names of countries included in the analysis, along with their sample size, GNI, GINI, sex ratio, and average age. Percentage of employment, obesity and smokers is also displayed in Table1. Percentage of agreement with different causes as determinants of health among different countries is shown in Table 2.

Level of agreement with different health determinants

Frequency analysis showed that environmental factors had the highest percentage of agreement as determinant of health followed by genes, health behavior, and poverty respectively (Fig. 1).

Chi square test revealed that the percentage of agreement with health behavior, environment, and poverty as health determinants increased with decrease in GNI quartile, but no specific trend was observed for genes (Fig. 2).

Factors affecting perception of lay people regarding health determinants

Beta coefficients and 95% confidence interval obtained from multilevel regression analysis are shown in Table 3. The variables with statistically significant *P* value (less than 0.05) are highlighted. There was a significant negative association of females with health damaging behavior and positive association with environment and genes as health determinants. Elderly people had a positive relation with poverty while all the education dummies were related negatively with health damaging behavior as determinant of health.

Table 2: Percentage of agreement with determinants of health by country

Country Name	% of agreement with behavior	% of agreement with environment	% of agreement with poverty	% of agreement with genes
Australia	55.3	50.1	62.1	42.2
Belgium	52.2	66.3	60.2	52
Bulgaria	62.5	69.9	67.6	78.2
Chile	61.8	63.1	54.9	47.1
Taiwan	61.4	79.9	64.7	29.3
Croatia	51.2	63.4	65.1	48.8
Czech Republic	62.6	77.5	81.3	33.2
Denmark	70.7	56.8	66.2	31.1
Finland	71.9	51.2	69.6	46.5
France	49.5	76.7	62.5	51.6
Germany	71.5	76.6	69.2	48.4
Israel	57.7	62.6	74	48.8
Japan	47.2	61.7	38.8	27.9
Korea, Rep.	53.9	74.3	69.7	65.6
Lithuania	81.5	82.2	80.3	54.3
Netherlands	53.9	51.7	75.5	33.2
Norway	56.5	52.5	57.4	30.4
Philippines	72.5	73.2	64.2	66.1
Poland	63.2	79.9	83.8	73.8
Portugal	59.6	67	74.8	53.2
Russian Federation	60.9	82.5	61.6	61.5
Slovak Republic	59	74.1	78.2	57.4
Slovenia	61.2	77.9	64.1	61.1
South Africa	64.7	69.7	53	52.2
Sweden	67	57.2	48.9	38.4
Switzerland	60.4	54.3	63.7	45.5
Turkey	80.3	76.4	70.5	76.7
United Kingdom	60.8	59	59.1	42.9
United States	58.2	62.3	72.3	53.5

Percentage of people who agreed with each factor (health behavior, environment, poverty and genes) as determinant of health by country are shown

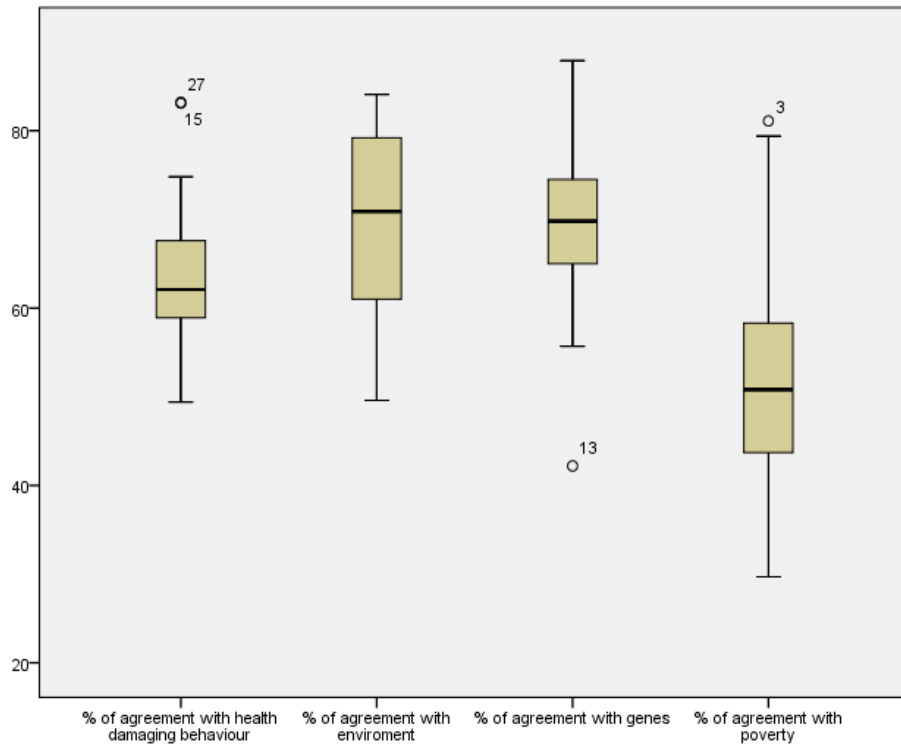
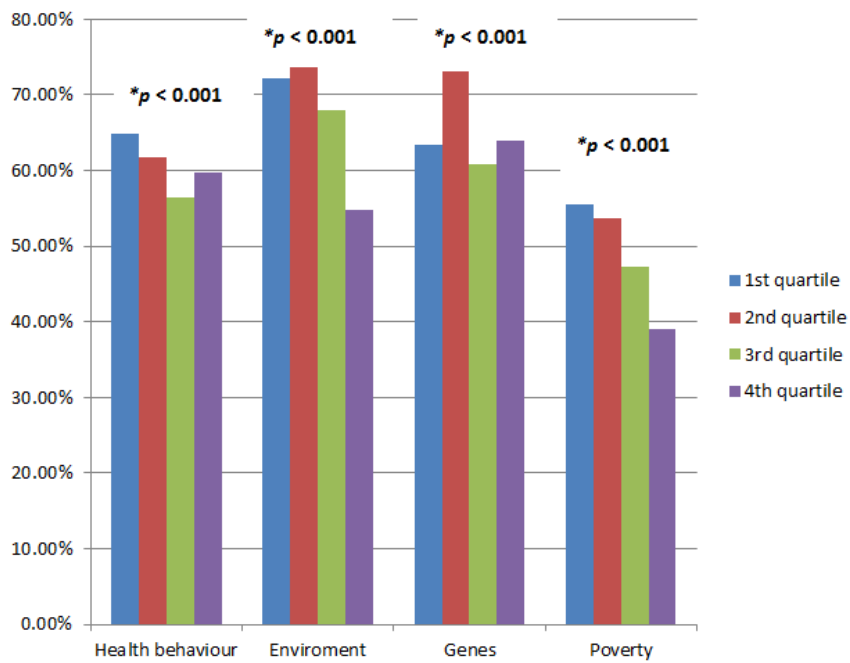


Fig. 1: Total % of agreement with determinants of health



*Chi square for trend

Fig. 2: % of agreement with different determinants of health according to GNI quartiles

Table 3: Multilevel models for dependent variables

Independent variables	Dependent variables (Beta coefficients with 95% confidence interval)			
	Health damaging behavior	Environment	Genes	Poverty
Demographic characters				
Sex (females)	-0.110* (-0.152 to -0.069)	0.029* (0.004 to 0.055)	0.063* (0.029 to 0.097)	0.016 (-0.032 to 0.064)
Age				
Older (60yr and older)	0.041 (-0.018 to 0.099)	-0.037 (-0.107 to 0.033)	0.019 (-0.041 to 0.079)	0.068* (0.007 to 0.130)
Middle-age (40-59yr)	-0.013 (-0.052 to 0.027)	0.001 (-0.046 to 0.048)	0.005 (-0.028 to 0.039)	0.048 (0.012 to 0.084)
Education				
Junior High school	-0.059* (-0.111 to -0.008)	0.007 (-0.032 to 0.046)	0.008 (-0.033 to 0.049)	-0.002 (-0.058 to 0.053)
Senior high school	-0.096* (-0.163 to -0.029)	0.004 (-0.039 to 0.047)	0.032 (-0.011 to 0.076)	-0.017 (-0.108 to 0.073)
Post-secondary level	-0.124* (-0.179 to -0.069)	-0.064 (-0.111 to -0.017)	0.001 (-0.045 to 0.047)	0.018 (-0.069 to 0.106)
Socio-economic status				
Average monthly household income	-0.005 (-0.020 to 0.010)	-0.036* (-0.056 to -0.016)	0.014* (0.000 to 0.028)	-0.067* (-0.092 to 0.043)
Employment	-0.039* (-0.069 to -0.009)	0.051* (0.023 to 0.079)	0.026 (-0.008 to 0.059)	0.053* (0.007 to 0.099)
GNI	-0.042 (-0.982 to 0.013)	-0.135* (-0.181 to -0.089)	-0.027 (-0.084 to 0.030)	-0.194* (-0.282 to -0.106)
GINI	-0.000 (-0.058 to 0.057)	-0.013 (-0.082 to 0.056)	-0.016 (-0.088 to 0.056)	0.008 (-0.089 to 0.104)
Health insurance				
Having insurance	-0.009 (-0.737 to 0.717)	-0.167 (-0.495 to 0.161)	-0.022 (-0.747 to 0.704)	0.026 (-0.206 to 0.258)
Insurance Coverage	-0.011 (-0.045 to 0.023)	0.037 (-0.005 to 0.079)	-0.016 (-0.051 to 0.019)	0.083* (0.033 to 0.134)
Health status				
Self-Rated Health status	0.049 (0.022 to 0.078)*	-0.029* (-0.049 to -0.010)	-0.013 (-0.039 to 0.012)	-0.045* (-0.069 to -0.022)
Long-standing illness/chronic condition/disability	-0.028 (-0.063 to 0.006)	0.055* (0.019 to 0.091)	0.072 (0.032 to 0.111)*	0.066* (0.023 to 0.110)
Health behavior				
Current smoker	-0.053* (-0.095 to -0.011)	0.038* (0.005 to 0.071)	0.019 (-0.013 to 0.051)	0.091* (0.054 to 0.128)
Drinker	-0.015 (-0.030 to 0.001)	-0.017 (-0.033 to -0.001)*	-0.007 (-0.025 to 0.011)	-0.014 (-0.035 to 0.008)
Physical activity	0.021* (0.011 to 0.032)	0.009 (-0.000 to 0.019)	0.001 (-0.013 to 0.014)	-0.003 (-0.019 to 0.014)
Overweight or obese (BMI)	-0.012 (-0.035 to 0.011)	0.013 (-0.016 to 0.042)	0.009 (-0.019 to 0.037)	0.029 (-0.006 to 0.064)

Average income showed a negative association to environment and poverty along with a positive relation to genes, while employment status had a negative relation with health-damaging behavior and positive relation with environment and poverty. GNI was negatively related to environment and poverty whereas people with good insurance coverage agreed that poverty was a health determinant.

Health damaging behavior was positively associated with self-related health status while environment and poverty were negatively related to it.

Chronic illness had a positive relation with environment, genes, and poverty.

Smokers agreed to environment and poverty and disagreed to health behavior as health determinant. Drinkers had a negative relation with environment and physical activity was associated positively with health behavior as health determinants. The rest of the variables were insignificant.

Discussion

Our study shows that the highest percentage of people agreed with the work and living environment as determinant of health. Previously, general

public believed that access to health care and personal behavior were the strongest determinants of health (19), but our results suggest that now lay people are well aware that other social factors, like environment can also influence their health. This increased public awareness can be attributed to larger media campaigns (20) as well as to an increase in environmental disease burden. An estimated 24% of global disease burden and 23% of all deaths are attributable to environmental factors (21).

Our results also show that more than 60% of people agreed that genes and health behavior are determinants of health. Health behavior has a strong influence on health outcomes, and factors like smoking, alcohol and improper hygiene (infectious diseases) kill millions of people globally (22, 23) while genetic factors are also closely related to many chronic diseases, like COPD and dementia, contributing to the disease burden throughout the world (24).

Poverty is also an important risk factor to health, and many evidences support a link between poverty, malnutrition, and poor health (25). In our analysis, more than 50% of the respondents agreed that poverty is a determinant of health suggesting that even in high-income countries; people are sensitive to this issue. All these findings propose that common people are now getting aware of the broadened concept of health, and their thoughts are becoming consistent with new paradigm of social determinants of health model.

Our analysis suggests that people with different socio-demographic characteristics have different perceptions about determinants of health. According to our findings, men agreed more with health-damaging behavior while women agreed more with environment and genes as determinants of health. As men are more exposed to socio-economic stress, the prevalence of unhealthy behavior like smoking and unbalance diet is more common in them (26), resulting in their perception of health behavior as cause of illness while women are mostly more health and diet conscious and instead of health behavior other social and environmental factors are more important to them as health determinants (27). Females also agreed

more with genetic causes than males possibly because most genetic disorders are congenital and are diagnosed during pregnancy or immediately after birth (28), increasing the physical and psychological suffering of mother along with baby (29) resulting in women becoming more conscious and aware of genes being a health determinant.

Old people agreed that poverty was a health determinant. Most people suffer from chronic diseases with advancing age, resulting in an increase in their medical expenses (30). People above the age of 60 are retired and are usually unemployed. Thus, they cannot afford the high cost of medical treatments, which make them sensitive to poverty as a determinant of health.

Among the education variables, there was a significant negative association of educated people to health-damaging behavior as determinant of health. Previous studies suggest that as education level of people increase, their knowledge is broadened, and they understand that health is no longer limited to individual behavior but is rather related to other social, economic, and environmental factors (31) while people who are uneducated have a limited focus and they consider only personal behavior to affect health, being unaware of contemporary concepts of health and its determinants.

People with low-income agreed with environment and poverty while high-income people agreed with genes as determinant of health. Low-income people are usual victim of poverty, and poverty is strongly interrelated to many chronic and infectious diseases (32). Additionally, work and living environment of poor people increase the risk of illness and disability due to, for example, lack of access to clean water and sanitation and an increase in accidents and injuries at the workplace (25). All these factors contribute to perception of low-income people for environment and poverty as health determinants.

Many previous studies have proven that high-income individuals are well-educated (33) and have better concepts about health than low-income individuals have. Therefore, high level of education of rich people may be the cause for their agreement with genes as determinant of health, ignor-

ing environment and poverty, which are controllable factors for them.

With respect to employment status, unemployed individuals agreed more with health damaging behavior while employed people agreed more to environment and poverty as health determinants. Many previous studies have suggested that unemployment is associated with poor health behavior and adverse health outcomes (34) while employed people are more exposed to mental stress and to hazards of their work environment (35) and are more sensitive to economic changes and poverty, resulting in difference of opinion on health determinants among them.

There was an increase in percentage of agreement with health behavior, environment, and poverty as determinants of health with a decrease in GNI quartiles while no specific trend was observed for genes, as health determinant (Fig. 2). There was a significant negative relationship of environment and poverty to GNI. This may be due to the fact that people living in a country with high GNI usually have better work and living environment (36) and are less exposed to poverty and its related risk factors unlike people of low GNI countries who are victims of poverty and are exposed to more hazardous work and living environment that expose them to poor hygiene, improper sanitation, and unsafe drinking water (25). Our analysis has revealed a significant positive association of insurance coverage to poverty as a health determinant. Many previous studies have proved that people with proper health insurance coverage have easy access to health care and preventive services and have better health outcomes (37), making them aware of insurance benefits and convincing them to think poverty as determinant of health which hinder poor people to afford proper health insurance.

Individuals with good self-related health status agreed that health-damaging behavior was a determinant of health while individuals with poor self-reported health status and those with chronic illness agreed to environment, genes, and poverty. Individuals who report good health usually have good functional abilities and better health outcomes (38) that may be due to their healthy life-

style thus, suggesting that they are well aware of the impacts of their behavior on health while people with poor self-related health may not be adopting healthy behavior and will attribute the cause of their illness to other uncontrollable factors. Additionally many previous studies have suggested that chronically ill people with poor health are considerably more likely to be poor, either due to their low income or increased medical expenditures (39), making them more sensitive to poverty as health determinant. As discussed earlier many chronic diseases have a genetic etiology (24), and some people with chronic illness may have a misconception about its genetic origin (40) thus, convincing the ones with poor self-reported health and with chronic illness for genes to be the determinant of health.

Among health behavior variables, non-smokers and physically active people agreed that health behavior was determinant while smokers agreed that environment and poverty were determinants of health. This finding may be because non-smokers and physically active people are well aware of the adverse effects of smoking and sedentary lifestyle (41, 42). Thus, they are more likely to believe that health behavior is determinant of health. On the other hand, smokers are either unaware of the risk factors of smoking to their health (41) or may underestimate the magnitude of these risk factors (43). Thus, they neglect health behavior to be a cause of illness. Furthermore, many studies have reported that smoking prevalence is more common among poor people with low socio-economic status (44) who is also exposed to hazardous work and living environment consequently reinforcing their belief that poverty and environment are health determinants. On the contrary, there was a significant negative relationship of alcoholics to environment as health determinant. Alcoholism is mostly associated with antisocial behavior and other personality disorders (45), which make alcoholics ignorant of their surrounding environment and of its effects on their health. Our study has some limitations. Firstly, we have presented a general concept of people regarding health determinants, but they may have different perceptions on the origin of specific diseases.

However, we did not completely ignore disease-specific focus and added some covariates, like chronic illness, disability, and health status. Secondly, this study has adopted a global approach and all the countries are high-income countries except Philippines, which is a low middle-income country according to World Bank classification. Therefore, our study results are generalizable for high-income countries only. Thirdly, these countries are not selected randomly but are based on voluntary participation in ISSP survey, which make the external validity uncertain for even high-income countries. Further exploratory studies are needed to clarify the public opinion regarding health and its determinants with focus on individual countries. This can help in policymaking and implication according to particular situation in a specific country.

Despite these limitations, our study is unique in many ways. Unlike previous studies, we have focused on the perceptions that lay people hold on the determinants of health. Second, along with health behavior we have also analyzed the awareness of lay people about new emerging concept of other social determinants of health. Third, a number of social, economic, and demographic characteristics have been taken into account to observe their effects on public perception regarding health. Fourth, this study includes data from 29 countries of the world, which increase the generalizability of our results.

Conclusion

People are now becoming aware of a broadened concept of health, and they now understand that their health can be affected by a number of surrounding economic and environmental factors. Our study also indicates that people belonging to different social, demographic, and economic backgrounds have different perceptions regarding determinants of health, which subsequently affect their attitudes and health behavior. In order to develop health education programs and preventive services that are compatible with individuals' beliefs, policy makers must be able to identify and

understand the specific factors that influence the individuals' perception and behaviors with respect to health. Education programs and materials that are customized to address the unique needs and concerns of specific patients have shown promise in changing a range of health related behaviors (46, 47). People are more likely to thoughtfully process information when they perceive it to be personally relevant. Thus, "tailored" health programs and policies that address an individual's specific problems and concerns are more likely to stimulate change in behaviors and attitudes. Therefore, the result could be an increase in the uptake of preventive services and a decrease in disease burden.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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The authors declare that there is no conflict of interests.

References

1. Yach D, Hawkes C, Gould CL, Hofman KJ (2004). The global burden of chronic diseases: overcoming impediments to prevention and control. *JAMA*, 291(21):2616-22.
2. Morens DM, Folkers GK, Fauci AS (2004). The challenge of emerging and re-emerging infectious diseases. *Nature*, 430(6996):242-9.
3. Bodenheimer ST, Grumbach K (2009). *Understanding health policy*. 5th edition. The McGraw Hill, USA, pp:53.
4. Honjo K (2004). Social epidemiology: Definition, history, and research examples. *Environ Health Prev Med*, 9(5):193-9.
5. Dennis R (2006). Social determinants of health: Present status, unanswered questions and future directions. *Int J Health Serv*, 36: 651-677.
6. Raeburn JM, Rootman I (1988). Towards an expanded health field concept: conceptual and

- research issues in a new era of health promotion. *Health Promot Int*, 3(4):383-392.
7. Dean HD, Fenton KA (2010). Addressing social determinants of health in the prevention and control of HIV/AIDS, viral hepatitis, sexually transmitted infection, and tuberculosis. *Public Health Rep*, 125(4): 1–5.
 8. McMichael AJ (2004). Environmental and social influences on emerging infectious diseases: past, present and future. *Philos Trans R Soc Lond B Biol Sci*, 359(1447):1049-58.
 9. Sullivan M (2003). The new subjective medicine: taking the patient's point of view on health care and health. *Soc Sci Med*, 56(7):1595-1604.
 10. Clark S, Weale A (2012). Social values in health priority setting: a conceptual framework. *Journal of Health Organization and Management*, 26(3):293-316.
 11. Charles C, DeMaio S (1993). Lay participation in health care decision making: a conceptual framework. *J Health Polit Policy Law*, 18(4):881-904.
 12. Ansari Z, Carson NJ, Ackland MJ, Vaughan L, Serraglio A (2003). A public health model of the social determinants of health. *Sozial- und Präventivmedizin/ Social Prev Med*, 48(4):242-251.
 13. Bowling A (2003). *Research methods in health*. 2nd edition. The McGraw Hill, USA, p:20.
 14. King JB (1982). The impact of patients' perceptions of high blood pressure on attendance at screening. *Soc Sci Med*, 16(10):1079-1091.
 15. Barry CL, Brescoll VL, Brownell KD, Schlesinger M (2009). Obesity metaphors: how beliefs about the causes of obesity affect support for public policy. *Milbank Q*, 87(1):7-47.
 16. ISSP (2011). "Health and Health Care". ZA No. 5800. Available from: <http://www.gesis.org/en/issp/issp-modules-profiles/health/2011/>
 17. GESIS Data catalogue 2.0 (2011). Available from: <https://dbk.gesis.org/dbksearch/sdesc2.asp?no=5800&db=E&tab=2>
 18. World Bank statistics. Available from: <http://data.worldbank.org/indicator>
 19. Niederdeppe J, Bu QL, Borah P, Kindig DA, Robert SA (2008). Message design strategies to raise public awareness of social determinants of health and population health disparities. *Milbank Quarterly*, 86(3):481-513.
 20. Sampei Y, Aoyagi-Usui M (2009). Mass-media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions. *Glob Environ Chang*, 19(2):203-212.
 21. Corvalán C, Ustun PA (2006). Preventing disease through healthy environments ;Towards an estimate of the environmental burden of disease. *WHO Report*. Available from: http://cdrwww.who.int/quantifying_ehimpacts/publications/preventingdiseasebegin.pdf
 22. Ezzati M, Lopez AD (2003). Estimates of global mortality attributable to smoking in 2000. *The Lancet*, 362:847-852.
 23. Prüss A, Kay D, Fewtrell L, Bartram J (2002). Estimating the burden of disease from water , sanitation , and hygiene at a global Level. *WHO Report*, 110(5). Available from: http://www.who.int/quantifying_ehimpacts/global/en/ArticleEHP052002.pdf
 24. Alice MW, Robert AS (2006). The genetics of chronic obstructive pulmonary disease. *Respir Res*, 7:130.
 25. Murray S (2006). Poverty and health. *CMAJ*, 174(7):2006.
 26. Fagerli RA, Wandel M (1999). Gender differences in opinions and practices with regard to a "healthy diet". *Appetite*, 32(2):171-190.
 27. Denton M, Walters V (1999). Gender differences in structural and behavioral determinants of health: An analysis of the social production of health. *Soc Sci Med*, 48(9):1221-1235.
 28. WHO (1999). Primary health care approaches for prevention and control of congenital and genetic disorders. *WHO Report*. Available at: http://whqlibdoc.who.int/hq/2000/WHO_HGN_WG_00.1.pdf
 29. Shosha GM (2014). Needs and concerns of Jordanian mothers with thalassaemic children: A Qualitative Study. *J Am Sci*, 10(1):11-16.
 30. Mueller C, Schur C, Connell JO (1997). Prescription drug spending: the impact of age and chronic disease status. *Am J Public Health*, 87:1626–1629.
 31. Sudarmadi S, Suzuki S, Kawada T, Netti H, Soemantri S, Tri Tugawati a (2001). A survey of perception, knowledge, awareness, and attitude in regard to environmental problems in a sample of two different social groups in

- Jakarta, Indonesia. *Environ Dev Sustain*, 3(2):169-183.
32. Torphy JM (2007). Poverty and health. *JAMA*, 298(16):1968.
 33. Chapple A, May C, Campion P (1995). Lay understanding of genetic disease: a British study of families attending a genetic counseling service. *J Genet Couns*, 4(4):281-300.
 34. Drydakis N (2015). The effect of unemployment on self-reported health and mental health in Greece from 2008 to 2013: A longitudinal study before and during the financial crisis. *Soc Sci Med*, 128:43-51.
 35. Klein LW, Miller DL, Balter S, Laskey W, Haines D, Norbash A et al (2010). Occupational health hazards in the interventional laboratory: Time for a safer environment. *J Radiol Nurs*, 29(3):75-82.
 36. Grossman GM, Krueger AB (1995). Economic Growth and the Environment. *Quarter J Econ*, 110 (2): 353-377.
 37. Andrew PW, Steffie W, Karen EL, Danny MC, David HB, David UH (2009). Health insurance and mortality in US adults. *Am J Public Health*, 99(12): 2289–2295.
 38. Karen BD, Nicole B, Kristi R, Jiang H, Paul M (2006). Mortality prediction with a single general self-rated health question. *J Gen Intern Med*, 21(3):p 267-275.
 39. Diane M, Michael T, Goran D, Margaret W (2006). What are the economic consequences for households of illness and of paying for health care in low- and middle-income country contexts? *Soc Sci Med*, 62(4):858-865.
 40. Walter FM, Emery J, Braithwaite D, Marteau TM (2004). Lay understanding of familial risk of common chronic diseases: A systematic review and synthesis of qualitative research. *Ann Fam Med*, 2(6):583-594.
 41. Jilan Y, David H, Pete D, Geoffrey TF, Yuan J (2010). Health knowledge and perception of risks among Chinese smokers and non-smokers: findings from the Wave 1 ITC China Survey. *Tob Control*, 19:i18-i23.
 42. Haase A, Steptoe A, Sallis JF, Wardle J (2004). Leisure-time physical activity in university students from 23 countries: associations with health beliefs, risk awareness, and national economic development. *Prev Med (Baltim)*, 39(1):182-90.
 43. Marie HL, Lucia MS (2008). Acculturation Matters: Risk Perceptions of smoking among Bosnian refugees living in the United States. *J Immigr Minor Health*, 10(5): 423-428.
 44. Rosemary H, Linda B, Amanda A, Jennifer AF, Marcus M (2012). Socioeconomic status and smoking: a review. *Ann N Y Acad Sci*, 1248:107-123.
 45. Mulder RT (2002). Alcoholism and personality. *Australasian And N.Z. J. Of Psychiatr*, 36(1):44–52.
 46. Paul K, James OP, Joseph SR (2010). A meta-analysis of computer-tailored interventions for health behavior change. *Prev Med*, 51(3-4):214–221.
 47. Kreuter MW, Wray RJ (2003). Tailored and targeted health communication: Strategies for enhancing information relevance. *Am J Health Behav*, 27(Suppl 3):227-232.