PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (**http://bmjopen.bmj.com/site/about/resources/checklist.pdf**) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	The prevalence and influence factors of physical activity and sedentary behavior in Chinese rural population: The Henan Rural Cohort Study
AUTHORS	Tu, Runqi; Li, Yuqian; Shen, Lijun; Yuan, HuiJuan; Mao, Zhenxing; Liu, Xiaotian; Zhang, Haiqing; zhang, Liying; Li, Ruiying; Wang, Yikang; Wang, Yuming; Wang, Chongjian

VERSION 1 - REVIEW

REVIEWER	André Oliveira Werneck São Paulo State University
REVIEW RETURNED	10-Mar-2019

GENERAL COMMENTS	The article "The prevalence and influence factors of physical activity and sedentary behavior in Chinese rural population: The Henan Rural Cohort Study" (bmjopen-2019-029590) analyze the prevalence and correlates of physical activity and sedentary behavior among rural china population. The article is well written and have several strengths, including the elevated sample size. However, I found some inconsistencies through the methodology and results. MAJOR ISSUES - The research problem is not clear in the introduction. The authors should also justify the relevance of the present study and where it advances in the current literature. For example, Ding et al. 2018 also investigated PA and SB levels (using Data from China National Nutrition and Health Survey in 2010–2012, with a larger sample) among rural adults. In what your study advances? This should be clear in the introduction. The Physical Activity Patterns among Rural Chinese Adults: Data from China National Nutrition and Health Survey in 2010-2012. Ding C, Song C, Yuan F, Zhang Y, Feng G, Chen Z, Liu A. Int J Environ Res Public Health. 2018 May 9;15(5). pii: E941. doi: 10.3390/ijerph15050941 - The authors should also better describe the sampling process and the representativeness of the current sample. - The authors should insert how they collected sedentary behavior in the methodology. Moreover, the authors should also explain why they adopt the cutoff point of 7.5 h/day, when the most

common is 4 h/day for TV-viewing or even 8 h/day for total sitting time (Patternson et al. 2018; Stubbs et al. 2018; Werneck et al. 2018).

Sedentary behaviour and risk of all-cause, cardiovascular and cancer mortality, and incident type 2 diabetes: a systematic review and dose response meta-analysis. Patterson R, McNamara E, Tainio M, de Sá TH, Smith AD, Sharp SJ, Edwards P, Woodcock J, Brage S, Wijndaele K. Eur J Epidemiol. 2018 Sep;33(9):811-829. doi: 10.1007/s10654-018-0380-1

Relationship between sedentary behavior and depression: A mediation analysis of influential factors across the lifespan among 42,469 people in low- and middle-income countries. Stubbs B, Vancampfort D, Firth J, Schuch FB, Hallgren M, Smith L, Gardner B, Kahl KG, Veronese N, Solmi M, Carvalho AF, Koyanagi A. J Affect Disord. 2018 Mar 15;229:231-238. doi: 10.1016/j.jad.2017.12.104

Associations between TV viewing and depressive symptoms among 60,202 Brazilian adults: The Brazilian national health survey. Werneck AO, Oyeyemi AL, Szwarcwald CL, Vancampfort D, Silva DR. J Affect Disord. 2018 Aug 15;236:23-30. doi: 10.1016/j.jad.2018.04.083

- Considering the sample size, using 95%CI of each value in table 1 and Suppl. Table 1 would be more robust than using t-test or chi-square.

- I agree that the IPAQ give the values of vigorous, moderate and light groups. However, I think that the PA classification according the WHO (2010) (as dichotomic) would let the results clearer.

- This study estimated sampling weights? If so, did the authors included sampling weights for all analyses?

- The authors should build a second model for Table 2, adjusting the model of each predictor for all the other significant predictors of crude model. For example, model 2 of age group predicting SB, should include gender, culture (educational status?), marital status, income, tobacco, alcohol, meat and vegetables consumption and so on for the other models. The organization of the table should be in five columns: [1]Factors, [2]Inactive - crude (according WHO), [3]Inactive – adjusted, [4] Sitting＞7.5 (?) hours per day, [5] crude Sitting＞7.5 (?) hours per day.

MINOR ISSUES
- First paragraph, lines 11-15 (definitions of PA and SB) are not necessary in my opinion.

- The cutoff point for alcohol consumption is not clear for me. If the subject ingest alcohol at least 12 times in the past years was classified as current drinker? If so, the authors should justify this cutoff point.

- The authors should not use only meat ingestion as an indicator of fat consumption. If the authors do not have other types of indicators, they should change "fat consumption" for "meat consumption".

	- The authors should include 95%CI on Figure 2. - Please change "Wome" to "Women" of Figure 3. - The authors should include all reference categories on Table 2, including the reference group of "high fat diet" (or high meat consumption?) and More vegetables intake. - Did the authors accessed culture or educational status?

REVIEWER	Wenfei Zhu Shaanxi Normal University
REVIEW RETURNED	15-Mar-2019

GENERAL COMMENTS	This study estimated the prevalence and influencing factors of physical activity and sedentary behaviors in rural areas of China. The sample size of this study is large (38,515 participants), and there is little evidence for this particular population (people living in rural China). Therefore, the topic is interesting and meaningful. Here are a few questions I have for the manuscript: 1. Page 6 Para 2 Line 49: In this study, physical activity was categorized into three levels were light, moderate and vigorous. However, the authors did not mention why they choose the cut-points. Also, no information is provided about why they set 7.5 hours as the cut-point for sedentary people. References should be added. 2. Page 7 Para 1 Line 18: In the statistical analysis, it was said that differences between groups were tested using t-test. However, there were more than two groups in this study. I believe ANOVA or regression analysis should be done for the analysis. 3. Physical activity and sedentary behaviors are two independent factors which are related to health outcomes. Did the authors control sedentary time when doing regression analysis for physical activity? How about the other way around? 4. The English writing should be improved. I notice several misspellings and gramma errors. Maybe the authors need an English editor to go through the whole manuscript, and make sure everything is correct.

REVIEWER	Danilo Silva Federal University of Sergipe - Brazil
REVIEW RETURNED	26-Mar-2019

GENERAL COMMENTS	Major points Point 1: The introduction have to be reorganized. The content is very general and "state of the art" on the specific topic is not clear. Point 2: "Some target participants with deficient information about their physical activity and sitting time were excluded". How many? Point 3: It is important to show more details of the sampling process. Is this a representative sample? Point 4: More details about the measures are needed. Are they valid? Describe…

	Point 5: Using IPAQ you do not need to convert values in Mets. You can adopted 150 min/wk of MVPA or 75 min/wk of vigorous activity. IPAQ do not provide a good measure of light PA. Point 6: How was sitting time estimate? Probably through IPAQ, but this need to be described. Why the cut point of 7.5h/d? Point 7: Some confusion is observed with regards the concepts of physical inactivity and sedentary behavior, which compromises the results and discussion. I suggest work just with the prevalence of physical inactivity (do not reach the international guidelines) and sedentary behavior (see cut points used). Thus, this paper will provide a great contribution to the field. Minor points Point 1: The current definition of SB includes lying posture. Point 2: Pag 5, line 17 - "A research about prevalence of sitting in 20 countries showed that the sitting median was 300 minutes/day and the mean was 346.2 minutes/day, and also proved that there was a linear positive relationship between light physical activity and sitting time". Please insert reference.

VERSION 1 – AUTHOR RESPONSE

The responding to the point raised by Reviewer #1

MS: bmjopen-2019-029590

Dear Reviewer #1

Firstly, thanks for your kind and critical suggestions which give us much help to perfect research and manuscript. All the points have been responded as follows:

Q1. The research problem is not clear in the introduction. The authors should also justify the relevance of the present study and where it advances in the current literature. For example, Ding et al. 2018 also investigated PA and SB levels (using Data from China National Nutrition and Health Survey in 2010–2012, with a larger sample) among rural adults. In what your study advances? This should be clear in the introduction.

R1. We are sorry for that the introduction was not clear. Thanks for your comment and suggestion. This is good suggestion to improve our manuscript. We have rewritten the introduction. The corresponding revisions about introduction have been showed in the manuscript.

Q2. The authors should also better describe the sampling process and the representativeness of the current sample.

R2. We are sorry about the describe of sampling process and the representativeness. A multistage,

stratified cluster sampling method was used to obtain samples in the general population. In the first stage, five rural counties were selected from different geographical regions (south, central, north, east, and west) in Henan province through simple cluster sampling.In the second stage, one to three rural communities (referred to as'townships') in each county were selected by the local Centre for Disease Control and Prevention in consideration of the coherence of the residents,

population stability and local medical conditions. In the final stage, all permanent residents in each administrative unit (rural village) of the selected township who were 18-79 years and signed informed consent were selected as the study sample. The article about the cohort study have published in the

International Journal of Epidemiology. The detailed could be found by the article. (Liu X et al. 2019)[1].

[1]. Liu X, Mao Z, Li Y, Wu W, Zhang X, Huo W, Yu S, Shen L, Li L, Tu R, Wu H, Li H, He M, Liu L, Wei S, Li W, Wu T, Wang C. The Henan Rural Cohort: a prospective study of chronic non-communicable diseases. Int J Epidemiol. 2019 Mar 26. pii:dyz039. doi: 10.1093/ije/dyz039.

Q3. The authors should insert how they collected sedentary behavior in the methodology. Moreover, the authors should also explain why they adopt the cutoff point of 7.5 h/day, when the most common is 4 h/day for TV-viewing or even 8 h/day for total sitting time (Patternson et al. 2018; Stubbs et al. 2018; Werneck et al. 2018).

R3. This is a good suggestion to improve our manuscript. We have submitted the questionnaire, from which could get that how collected sedentary behavior. About the cutoff point of 7.5h/day, I referenced some studies of Jeroen Lakerveld et al[1] and Karen Milton[2]. However, the Reviewer also gave a commendable recommendation. I analysis the data according to the cutoff point of 8h/day. The results shown as follows.
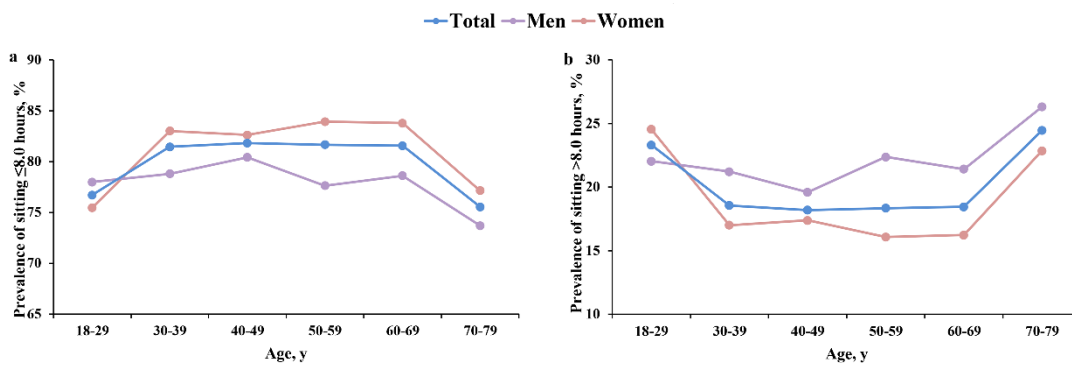

Figure 1. Changes in the age-standardized prevalence of sitting time with aging in different gender. (a) is sitting time≤8 hours per day; (b) is sitting time＞8 hours per day.
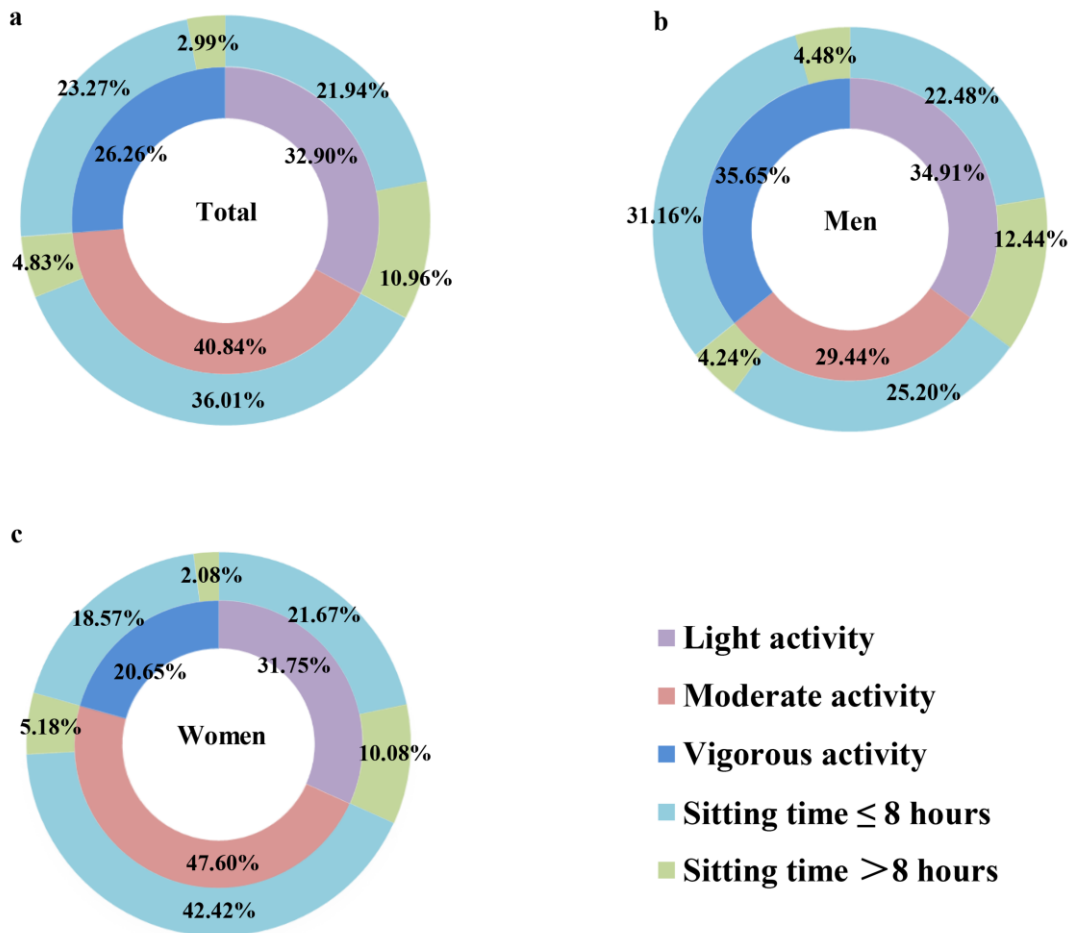
Figure 2. The age-standardized percentage according to the cut-off points of physical activity and sitting time in different gender. (a) is for total; (b) is for men; (c) is for women.

Table1. Demographic characteristics of the participants

Variable	Overall (N=38515)	Sitting time per day		P
		≤8 hours (N=31174)	>8 hours (N=7341)	
Age(years), mean±SD	55.65±12.14	55.46±12.03	56.44±12.58	<0.001
Sex, n (%)				<0.001
Women	23331(60.52)	19312(61.95)	3998(54.46)	
Men	15205(39.48)	11862(38.05)	3343(45.54)	
Marital status, n (%)				<0.001
Married/cohabiting	34571(89.76)	28072(90.05)	6499(88.53)	
Widowed/single/divorced/separated	3944(10.24)	3102(9.95)	842(11.47)	
Education, n (%)				0.001
≤Primary school	17277(44.86)	13860(44.46)	3417(46.55)	
≥Junior school	21238(55.14)	17314(55.54)	3924(53.45)	
Per capita monthly income, n (%)				<0.001
≤500RMB	13746(35.69)	10785(34.60)	2961(40.34)	
500RMB~	12657(32.86)	10615(34.05)	2042(27.82)	
≥1000RMB	12112(31.45)	9774(31.35)	2338(31.85)	
Smoking, n (%)				<0.001
Never	28023(72.76)	23000(73.78)	5023(68.42)	
Light	2152(5.59)	1755(5.63)	397(5.41)	
Moderate	1750(4.54)	1384(4.44)	366(4.99)	
Heavy	6590(17.11)	5035(16.15)	1555(21.18)	
Drinking, n (%)				<0.001
Never	29833(77.46)	24328(78.04)	5505(74.99)	
Light	5360(13.92)	4225(13.55)	1135(15.46)	
Moderate	1820(4.73)	1462(4.69)	358(4.88)	
Heavy	1502(3.9)	1159(3.72)	343(4.67)	
Dietary habits (g/day), (mean ± SD)				
Meat and poultry	1.32±1.32	1.32±1.32	1.33±1.31	0.229
Fishery products	0.11±0.16	0.11±0.16	0.13±0.17	<0.001
Vegetables and fruits	13.8±7.47	13.4±7.25	15.49±8.12	<0.001
Soy products	0.48±0.64	0.49±0.65	0.45±0.62	<0.001
Height(cm), mean ± SD	159.69±8.20	159.61±8.19	160.04±8.22	<0.001
Weight(kg), mean ± SD	63.48±11.14	63.58±11.13	63.05±11.13	<0.001
BMI(kg/m^2), mean ± SD	24.84±3.57	24.90±3.57	24.56±3.55	<0.001
WC(cm), mean ± SD	84.07±10.41	84.38±10.38	82.77±10.41	<0.001

Table 2. Association of potential risk factors for physical activity and sitting time.

Factors	OR(95% CI)
	Sitting＞8 hours per day
Age(year)	
18-	1.00
30-	1.02(0.85,1.23)
40-	0.99(0.84,1.17)
50-	1.03(0.87,1.21)
60-	0.96(0.82,1.14)
70-79	1.09(0.91,1.30)
Gender	
Female	1.00
Male	1.26(1.16,1.37)
Education	
≤Primary school	1.00
≥Junior middle school	0.86(0.81,0.92)
Marital status	
Married/cohabiting	1.00
Divorced/widowed/unmarried	1.05(0.96,1.14)
Per capita monthly income	
<500 RMB	1.00
500RMB-	0.74(0.69,0.79)
≥1000 RMB	0.91(0.85,0.97)
Smoking	
Never	1.00
Light	0.85(0.74,0.98)
Moderate	1.00(0.86,1.15)
Heavy	1.15(1.04,1.27)
Drinking,	
Never	1.00
Light	1.02(0.94,1.12)
Moderate	0.90(0.78,1.03)
Heavy	0.97(0.84,1.12)
Dietary habits	
Meat and poultry	0.95(0.93,0.98)
Fishery products	2.35(1.96,2.82)
Vegetables and fruits	1.05(1.05,1.05)
Soy products	0.88(0.84,0.92)
Physical activity	
Vigorous	1.00
Moderate	1.10(1.01,1.18)
Light	4.55(4.24,4.89)

Supplementary Table 1. Prevalence of physical activity and sitting time about various characteristics

| Variable | Sitting time per day | | P |
	≤8 hours (N=31174)	>8 hours (N=7341)	
Age, n (%)			<0.001
18~	1019(81.00)	239(19.00)	
30~	2213(81.38)	506(18.61)	
40~	5895(82.17)	1279(17.83)	
50~	8702(82.04)	1905(17.96)	
60~	9819(81.36)	2249(18.64)	
70~79	3526(75.20)	1163(24.80)	
Sex, n (%)			<0.001
Women	19312(82.85)	3998(17.15)	
Men	11862(78.01)	3343(21.99)	
Marital status, n (%)			<0.001
Married/cohabiting	28072(81.20)	96499(18.80)	
Widowed/single/divorced/separated	3102(78.65)	842(21.35)	
Education, n (%)			0.001
≤Primary school	13860(80.22)	3417(19.78)	
≥Junior school	17314(81.52)	3924(18.48)	
Per capita monthly income, n (%)			<0.001
≤500RMB	10785(78.46)	2961(21.54)	
500RMB~	10615(83.87)	2042(16.13)	
≥1000RMB	9774(80.70)	2338(19.30)	
Smoking, n (%)			<0.001
Never	23000(82.08)	5023(17.92)	
Light	1755(81.55)	397(18.45)	
Moderate	1384(79.09)	366(20.91)	
Heavy	5035(76.40)	1555(23.60)	
Drinking, n (%)			<0.001
Never	24328(81.55)	5505(18.45)	
Light	4225(78.82)	1135(21.18)	
Moderate	1462(80.33)	358(19.67)	
Heavy	1159(77.16)	343(22.84)	

[1]. Lakerveld J, Loyen A, Schotman N, Peeters CFW, Cardon G, van der Ploeg HP, Lien N, Chastin S, Brug J. Sitting too much: A hierarchy of socio-demographic correlates. Prev Med. 2017 Aug;101:77-83. doi: 10.1016/j.ypmed.2017.05.015.

[2]. Milton K, Gale J, Stamatakis E, Bauman A. Trends in prolonged sitting time among European adults: 27 country analysis. Prev Med. 2015 Aug;77:11-6. doi:10.1016/j.ypmed.2015.04.016.

Q4. Considering the sample size, using 95%CI of each value in table 1 and Suppl. Table 1 would be more robust than using t-test or chi-square.

R4. Thank you for your review, and the kind and critical suggestions and comments give us much help to perfect research and manuscript. I have added 95%CI of each value in supplement Table 2. Supplement Table 1 showed the inner constituent of participants, so it should not be replaced by 95% CI of each value. If the reviewer still think that should be changed, we would revise.

Q5. I agree that the IPAQ give the values of vigorous, moderate and light groups. However, I think that the PA classification according the WHO (2010) (as dichotomic) would let the results clearer.
R5. Thanks for your comment and suggestion. The reviewer gave a good piece of advice. In my opinion, using the values of vigorous, moderate and light groups could make it easy to compare with other studies of Hallal PC et al[1] and Bennie JA et al[2]. I believed that using this values could make the article more easier cited.

[1]. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U; Lancet Physical Activity Series Working Group. Global physical activity levels: surveillance progress, pitfalls, and prospects. Lancet. 2012 Jul 21;380(9838):247-57. doi: 10.1016/S0140-6736(12)60646-1.

[2]. Bennie JA, Chau JY, van der Ploeg HP, Stamatakis E, Do A, Bauman A. The prevalence and correlates of sitting in European adults - a comparison of 32 Eurobarometer-participating countries. Int J Behav Nutr Phys Act. 2013 Sep 11;10:107. doi: 10.1186/1479-5868-10-107.

Q6. This study estimated sampling weights? If so, did the authors included sampling weights for all analyses?

R6. We are sorry about the describe of sampling process and sampling weights. A multistage,

stratified cluster sampling method was used to obtain samples in the general population. In the first stage, five rural counties were selected from different geographical regions (south, central, north, east, and west) in Henan province through simple cluster sampling.In the second stage, one to three rural communities (referred to as'townships') in each county were selected by the local Centre for Disease Control and Prevention in consideration of the coherence of the residents,

population stability and local medical conditions. In the final stage, all permanent residents in each administrative unit (rural village) of the selected township who were 18-79 years and signed informed consent were selected as the study sample. The article about the cohort study have published in the International Journal of Epidemiology. The detailed sampling process could be found by the article. (Liu X et al. 2019)[1].

[1]. Liu X, Mao Z, Li Y, Wu W, Zhang X, Huo W, Yu S, Shen L, Li L, Tu R, Wu H, Li H, He M, Liu L, Wei S, Li W, Wu T, Wang C. The Henan Rural Cohort: a prospective study of chronic non-communicable diseases. Int J Epidemiol. 2019 Mar 26. pii:dyz039. doi: 10.1093/ije/dyz039.

Q7. The authors should build a second model for Table 2, adjusting the model of each predictor for all the other significant predictors of crude model. For example, model 2 of age group predicting SB, should include gender, culture (educational status?), marital status, income, tobacco, alcohol, meat and vegetables consumption and so on for the other models. The organization of the table should be in five columns: [1]Factors, [2]Inactive - crude (according WHO), [3]Inactive – adjusted, [4] Sitting＞7.5 (?) hours per day, [5] crude Sitting＞7.5 (?) hours per day.

R7. Thanks for your comment and suggestion. This is a good suggestion to improve our manuscript. We have checked and re-analyzed the data, Two model were built, and one for crude model and another for full model. The corresponding revisions have been showed in table 2.

Q8. First paragraph, lines 11-15 (definitions of PA and SB) are not necessary in my opinion.

R8. This is a good suggestion to improve our manuscript. so the lines 11-15 (definitions of PA and SB) have been deleted in the First paragraph.

Q9. The cutoff point for alcohol consumption is not clear for me. If the subject ingest alcohol at least 12 times in the past years was classified as current drinker? If so, the authors should justify this cutoff point.

R9. Thank you for your kind suggestion and comment. This is a good suggestion to perfect this manuscript. Based on the reviewer's suggestion, the data had been checked and re-analyzed in the revised manuscript. According to the smoking index of the World Health Organization (WHO) [1], smoking status was reclassified into never smoking, light smoking, moderate smoking, and heavy smoking. In accordance with the daily alcohol intake of WHO [1-2], drinking was divided into four categories: never drinking, light drinking, moderate drinking, and heavy drinking. The smoking and drinking of the study subjects according to PA and SB were revised in the table 1 in the revised manuscript. Furthermore, the data had been re-analyzed using logistic regression to explore the relationship with PA and SB. The relative results were revised and displayed in the table 2. Thanks again very much for your suggestions. Hope it should be better now.

[1].   Ediriweera BR TS, Sir RD, Robin R, International guide for monitoring alcohol consumption and related harm (ed. World Health Organization), Geneva. 51 (2000).

[2] Chinese Nutrition Society (2011) The dietary guidelines for Chinese residents. The Tibet people's Publishing House: Lhasa pp 97, 197, 198.

Q10. The authors should not use only meat ingestion as an indicator of fat consumption. If the authors do not have other types of indicators, they should change "fat consumption" for "meat consumption".

R10. Thank you for your kind suggestion and comment. This is a good suggestion to perfect this manuscript. In accordance with the dietary guidelines for Chinese residents [1], we use dietary habits (meat and poultry, fishery products, vegetables and fruits, and soy products) instead of variables adequate vegetables and fruits intake and high-fat diet. The dietary habits of the study subjects according to PA and SB were revised in the table 1 in the revised manuscript. Furthermore, the data had been re-analyzed using logistic regression to explore the association with PA and SB after adjusting for a wide range of related risk factors. The relative results were revised and displayed in the table 2. Thanks again very much for your suggestions. Hope it should be better now.

[1] Chinese Nutrition Society (2011) The dietary guidelines for Chinese residents. The Tibet people's Publishing House: Lhasa pp 97, 197, 198.

Q11. The authors should include 95%CI on Figure 2.

R11. We are sorry for this. However the results showed the value of 95% CI was so small that could not display.

Q12. Please change "Wome" to "Women" of Figure 3.

R12. We are sorry for that there are some inaccurate statements. so the"Wome"has been changed to "Women" in Figure 3.

Q13. The authors should include all reference categories on Table 2, including the reference group of "high fat diet" (or high meat consumption?) and More vegetables intake.

R13. We are sorry for that there are some inaccurate statements. so I added the reference categories in table 2.

Q14. Did the authors accessed culture or educational status?

R14. We are sorry for that there are some inaccurate statements. I changed the "culture" into "educational".

The responding to the point raised by Reviewer #2

MS: bmjopen-2019-029590

Dear Reviewer #2

Firstly, thanks for your kind and critical suggestions which give us much help to perfect research and manuscript. We will respond to all the points as follows:

Q1. Page 6 Para 2 Line 49: In this study, physical activity was categorized into three levels were light, moderate and vigorous. However, the authors did not mention why they choose the cut-points. Also, no information is provided about why they set 7.5 hours as the cut-point for sedentary people. References should be added.

R1. We want to apologize for my inaccurate. About values of vigorous, moderate and light groups, I referenced some studies. (Hallal PC et al.[1]; Bennie JA et al.[2]). and the cutoff point of 7.5h/day, I referenced some studies. (Jeroen Lakerveld et al.[3]; Karen Milton et al.[4]). the References have been added in the revised manuscript

[1]. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U; Lancet Physical Activity Series Working Group. Global physical activity levels: surveillance progress, pitfalls, and prospects. Lancet. 2012 Jul 21;380(9838):247-57. doi: 10.1016/S0140-6736(12)60646-1.

[2]. Bennie JA, Chau JY, van der Ploeg HP, Stamatakis E, Do A, Bauman A. The prevalence and correlates of sitting in European adults - a comparison of 32 Eurobarometer-participating countries. Int J Behav Nutr Phys Act. 2013 Sep 11;10:107. doi: 10.1186/1479-5868-10-107.

[3]. Lakerveld J, Loyen A, Schotman N, Peeters CFW, Cardon G, van der Ploeg HP, Lien N, Chastin S, Brug J. Sitting too much: A hierarchy of socio-demographic correlates. Prev Med. 2017 Aug;101:77-83. doi: 10.1016/j.ypmed.2017.05.015.

[4]. Milton K, Gale J, Stamatakis E, Bauman A. Trends in prolonged sitting time among European adults: 27 country analysis. Prev Med. 2015 Aug;77:11-6. doi:10.1016/j.ypmed.2015.04.016.

Q2. Page 7 Para 1 Line 18: In the statistical analysis, it was said that differences between groups were tested using t-test. However, there were more than two groups in this study. I believe ANOVA or regression analysis should be done for the analysis

R2. I'm sorry for that you misunderstood the meaning of this sentence because of the problem of my statement. Actually, the more than two groups were tested using ANOVA, and the sentence has been changed to "Continuous variables were presented as mean ± standard deviation (SD). Differences between two groups were tested using t-test and more than two group were tested using ANOVA. " in the revised manuscript. Hope it should be better now.

Q3. Physical activity and sedentary behaviors are two independent factors which are related to health outcomes. Did the authors control sedentary time when doing regression analysis for physical activity? How about the other way around?

R3. Thank you for your kind suggestion and comment. This is a good suggestion to perfect this manuscript. Based on the reviewer's suggestion, the data had been re-analyzed in the revised manuscript. Sedentary time has been adjusted in the regression analysis for physical activity and the other way around. The results showed in table 2.

Q4. The English writing should be improved. I notice several misspellings and gramma errors. Maybe the authors need an English editor to go through the whole manuscript, and make sure everything is correct.

R4. We want to apologize for some language and writing issues in this manuscript. We not only checked carefully the final manuscript, but also asked a native English-speaking colleague named Dr. Maryam Tabesh who read critically the manuscript. Hope it should be better now.

The responding to the point raised by Reviewer #3

MS: bmjopen-2019-029590

Dear Reviewer #3

Firstly, thanks for your kind and critical suggestions which give us much help to perfect research and manuscript. We will respond to all the points as follows:

Q1. The introduction have to be reorganized. The content is very general and "state of the art" on the specific topic is not clear.

R1. We are sorry for that the introduction was not clear. Thanks for your comment and suggestion. This is good suggestion to improve our manuscript. We have rewritten the introduction. The corresponding revisions about introduction have been showed in the manuscript.

Q2. "Some target participants with deficient information about their physical activity and sitting time were excluded". How many?

R2. We want to apologize for deficient information about their physical activity and sitting time were excluded. There were 744 participants. And this information was added in the manuscript.

Q3. It is important to show more details of the sampling process. Is this a representative sample?

R3. We are sorry about the describe of sampling process and the representativeness. A multistage,

stratified cluster sampling method was used to obtain samples in the general population. In the first stage, five rural counties were selected from different geographical regions (south, central, north, east, and west) in Henan province through simple cluster sampling. In the second stage, one to three rural communities (referred to as 'townships') in each county were selected by the local Centre for Disease Control and Prevention in consideration of the coherence of the residents,

population stability and local medical conditions. In the final stage, all permanent residents in each administrative unit (rural village) of the selected township who were 18-79 years and signed informed consent were selected as the study sample. The article about the cohort study have published in the International Journal of Epidemiology. The detailed sampling process could be found by the article. (Liu X et al. 2019)[1].

[1]. Liu X, Mao Z, Li Y, Wu W, Zhang X, Huo W, Yu S, Shen L, Li L, Tu R, Wu H, Li H, He M, Liu L, Wei S, Li W, Wu T, Wang C. The Henan Rural Cohort: a prospective study of chronic non-communicable diseases. Int J Epidemiol. 2019 Mar 26. pii:dyz039. doi: 10.1093/ije/dyz039.

Q4. Point 4: More details about the measures are needed. Are they valid? Describe…

R4. Thanks very much for your review, which is a good suggestion to improve this manuscript and research. In fact, a pilot study was conducted and implemented a formal investigation six months ago, and the aim was to evaluate whether the questionnaire was easy to understand, each item was clear, etc. After that, the questionnaire revised and modified for the language and relevant items. In addition, the completion time was determined before the formal investigation.

After the pilot study, the validity and reliability of the questionnaire was assessed by a small simple survey. A total of 396 participants were asked to complete the questionnaire on the same day. After a week, the second survey was conducted in the same subjects, and the response rate was 100%. The internal consistency was assessed by Cronbach's alpha coefficient was 0.731. The test-retest reliability was examined by Bivariate Correlation statistics, and the correlation coefficients were 0.832-0.916, and the internal consistency Cronbach's alpha coefficients (ICC) was 0.958, which suggested that the questionnaires have high test-retest reliability. The results of the evaluation showed that the questionnaire has better validity and reliability.

Q5. Using IPAQ you do not need to convert values in Mets. You can adopted 150 min/wk of MVPA or 75 min/wk of vigorous activity. IPAQ do not provide a good measure of light PA.

R5. Thanks for your comment and suggestion, which gave a good piece of advice. Using the values of vigorous, moderate and light groups could make it easy to compare with other studies of Hallal PC et al[1] and Bennie JA et al[2]. I believed that using this values could make the article more easier cited.

[1]. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U; Lancet Physical Activity Series Working Group. Global physical activity levels: surveillance progress, pitfalls, and prospects. Lancet. 2012 Jul 21;380(9838):247-57. doi: 10.1016/S0140-6736(12)60646-1.

[2]. Bennie JA, Chau JY, van der Ploeg HP, Stamatakis E, Do A, Bauman A. The prevalence and correlates of sitting in European adults - a comparison of 32 Eurobarometer-participating countries. Int J Behav Nutr Phys Act. 2013 Sep 11;10:107. doi: 10.1186/1479-5868-10-107.

Q6. How was sitting time estimate? Probably through IPAQ, but this need to be described. Why the cut point of 7.5h/d?

R6. Firstly, we want to apologize for this. Secondly, The questionnaire had submitted, from which could get that how collected sedentary behavior. Lastly, About the cutoff point of 7.5h/day, I referenced some studies. (Jeroen Lakerveld et al. [1]; Karen Milton et al. [2]). The corresponding revisions about sitting time estimate have been showed in the manuscript.

[1]. Lakerveld J, Loyen A, Schotman N, Peeters CFW, Cardon G, van der Ploeg HP, Lien N, Chastin S, Brug J. Sitting too much: A hierarchy of socio-demographic correlates. Prev Med. 2017 Aug;101:77-83. doi: 10.1016/j.ypmed.2017.05.015.

[2]. Milton K, Gale J, Stamatakis E, Bauman A. Trends in prolonged sitting time among European adults: 27 country analysis. Prev Med. 2015 Aug;77:11-6. doi:10.1016/j.ypmed.2015.04.016.

Q7. Some confusion is observed with regards the concepts of physical inactivity and sedentary behavior, which compromises the results and discussion. I suggest work just with the prevalence of physical inactivity (do not reach the international guidelines) and sedentary behavior (see cut points used). Thus, this paper will provide a great contribution to the field.

R7. Thanks for your comment and suggestion. The reviewer gave me a wonderful idea. The physical inactivity would be the next study point.

Q8. The current definition of SB includes lying posture.

R8. I agree the reviewer. In the course of the investigation, we also definition of SB includes lying posture, and I had corrected in the article. The corresponding revisions about definition of sitting time estimate have been showed in the manuscript.

Q9. Pag 5, line 17 - "A research about prevalence of sitting in 20 countries showed that the sitting median was 300 minutes/day and the mean was 346.2 minutes/day, and also proved that there was a linear positive relationship between light physical activity and sitting time". Please insert reference.

R9. We are sorry for that there are some inaccurate statements. The insert reference has been added, The corresponding revisions have been showed in the manuscript.

VERSION 2 – REVIEW

REVIEWER	André O. Werneck Universidade Estadual Paulista "Júlio de Mesquita Filho"
REVIEW RETURNED	14-May-2019

GENERAL COMMENTS	The authors substantially improved the manuscript "The prevalence and influence factors of physical activity and sedentary behavior in Chinese rural population: The Henan Rural Cohort Study" (bmjopen-2019-029590.R1). I have just few more minor comments. Q1: Was the SB measures also based on IPAQ indicator? If so, the authors should insert this in the methods as inserting "International Physical Activity Questionnaire (IPAQ) was used to assess the levels of PA and SB" instead only "International Physical Activity Questionnaire (IPAQ) was used to assess the levels of PA". Q2: Table 1: I think that it is better to present % and 95%CI instead of n and %. Q3: Ok, even the "moderate, vigorous and light" of IPAQ being biased, I agree that it is comparable with previous studies, but I still suggesting inserting at least as a supplementary table, the analysis using PA classification according the WHO as it would increase the comparability even more. Q4: I suggest caution in the interpretation of "light" from IPAQ through the discussion. Q5: Line 4, Page 13: Maybe "Determinants" instead of "factors"? Q6: The authors also should insert the potential bias of interpretation IPAQ according different levels, specially the "light" as limitation.

REVIEWER	Danilo Silva Federal University of Sergipe - Brazil
REVIEW RETURNED	13-May-2019

GENERAL COMMENTS	Minor points 1) Please, fit the study according the STROBE document. 2) Clarify SB abbreviation in the begining of the introduction. 3) Include sitting time/sedentary behavior on the conclusion.

The responding to the point raised by Reviewer #1

MS: bmjopen-2019-029590

Dear Reviewer #1

Firstly, thanks for your kind and critical suggestions which give us much help to perfect research and manuscript. All the points have been responded as follows:

Q1. Was the SB measures also based on IPAQ indicator? If so, the authors should insert this in the methods as inserting "International Physical Activity Questionnaire (IPAQ) was used to assess the levels of PA and SB" instead only "International Physical Activity Questionnaire (IPAQ) was used to assess the levels of PA".

R1. We are sorry for that the introduction was not clear. Thanks for your comment and suggestion. This is a good suggestion to perfect this manuscript. Based on the reviewer's suggestion, in the methods,"International Physical Activity Questionnaire (IPAQ) was used to assess the levels of PA" have been replaced by "International Physical Activity Questionnaire (IPAQ) was used to assess the levels of PA and SB".

Q2. Table 1: I think that it is better to present % and 95%CI instead of n and %.

R2. This is a good suggestion to improve our manuscript. I have changed the Table 1.

Q3. Ok, even the "moderate, vigorous and light" of IPAQ being biased, I agree that it is comparable with previous studies, but I still suggesting inserting at least as a supplementary table, the analysis using PA classification according the WHO as it would increase the comparability even more.

R3. This is a good suggestion to improve our manuscript, and the kind and critical suggestions and comments give us much help to perfect research and manuscript. The Reviewer also gave a commendable recommendation. I analysis the data according to the WHO. The results shown supplementary.

Q4. I suggest caution in the interpretation of "light" from IPAQ through the discussion.

R4. Thank you for your review, and the kind and critical suggestions and comments give us much help to perfect research and manuscript. I have rewritten the discussion about the interpretation of "light" from IPAQ.

Q5. Line 4, Page 13: Maybe "Determinants" instead of "factors"?

R5. Thanks for your comment and suggestion. The reviewer gave a good piece of advice. I have changed the factors to determinants,

Q6. The authors also should insert the potential bias of interpretation IPAQ according different levels, specially the "light" as limitation.

R6. Thanks for your comment and suggestion. This is a good suggestion to improve our manuscript. We have inserted the potential bias in the discussion.

The responding to the point raised by Reviewer #3

MS: bmjopen-2019-029590

Dear Reviewer #3

Firstly, thanks for your kind and critical suggestions which give us much help to perfect research and manuscript. We will respond to all the points as follows:

Q1. Please, fit the study according the STROBE document.

R1. We are sorry for the inaccurate statements. According the STROBE document, the study have been changed.

Q2. Clarify SB abbreviation in the beginning of the introduction.

R2. We are sorry for that there are some inaccurate statements. So I clarified SB abbreviation in the beginning of the introduction.

Q3. Include sitting time/sedentary behavior on the conclusion.

R3. Thanks for your comment and suggestion. This is a good suggestion to improve our manuscript. We have changed the conclusion.

VERSION 3 - REVIEW

REVIEWER	André de Oliveira Werneck Universidade Estadual Paulista "Júlio de Mesquita Filho"
REVIEW RETURNED	27-Jun-2019

GENERAL COMMENTS	The authors addressed all my suggestions and I have no further comments.