

## 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

<b>TITLE (PROVISIONAL)</b>	Social and territorial inequalities in breast and cervical cancers screening uptake: a cross-sectional study in France
<b>AUTHORS</b>	Ouanhnon, Lisa; Rougé Bugat, Marie-Eve; LAMY, Sebastien; Druel, Vladimir; Delpierre, Cyrille; Grosclaude, Pascale

### VERSION 1 – REVIEW

<b>REVIEWER</b>	Rizzuto, Ivana Royal Adelaide Hospital, Gynaecology Oncology department
<b>REVIEW RETURNED</b>	12-Aug-2021

<b>GENERAL COMMENTS</b>	the main outcomes in the abstract are different from the results. It is confusing which one is the aim of the study. At the beginning the authors mention that their aim is to establish differences between uptake of mammograms and smear according to age groups and then the results are about differences according to urban areas.
-------------------------	--

<b>REVIEWER</b>	Rollet, Quentin INSERM-University of Caen Normandie
<b>REVIEW RETURNED</b>	27-Sep-2021XX

<b>GENERAL COMMENTS</b>	<p>I found the manuscript entitled "Social and territorial inequalities in gynaecological cancers screening uptake: a cross-sectional study in France" very interesting. Although the area-based approach has already been used to study deprivation and cancer screenings, this study adds interesting individual level data (financial precarity, accessibility to the GP, and having or not a referring physician). Results of the study shows how each factor could be of importance in understanding socio-territorial inequities in cancer screenings. Screening patterns outside the recommended age group are also rare, and this study adds interesting elements in this direction. Yet, I think some aspects of the paper need to be discussed:</p> <p>Point 1 – Breast cancer are generally not classified as gynaecological cancer, and this imprecision is made all along the document.</p> <p>Point 2 – Aim of the study Although they are used as covariates in this study, I think that results for CMU-C, GP PLA and referring physician, and the fact that these results have not changed the EDI effect, are of importance. Yet, they are neither presented in the abstract nor in the aim of the study. I think that adding this information would make the results and the conclusions clearer.</p>
-------------------------	--

	<p><b>Methods</b> Point 3 – The authors defined large urban areas as areas with &gt;10 000 jobs and their suburbs. I think it would be interesting to know how these suburbs are defined.</p> <p><b>Discussion</b> Point 4 – The authors stated in their results how pap smear screening uptake falls after 50 years, but this result is never discussed. I could be interesting to add a reflection on this point.</p> <p>Point 5 – The authors stated that “The social and territorial disparities in mammography uptake were lower in the recommended age group than outside.”. Although this is true for younger women, it does not seem to be that clear in older women. For cervical screening, it seems to be the opposite effect (e.g. a higher gradient in the recommended age group that for younger women). These effects are interesting, and if the authors thought it appropriate, they could add a reflection on this point.</p> <p>Point 6 – The author stated in the results that “There was no social gradient in the other areas, where mammography rate was globally lower than in urban areas”. Although the gradient is less apparent than in large urban areas (mostly because the wealthiest are somehow less participating), the last two deciles of the EDI in “other areas” showed the lowest odds ratio compared with other deciles, and the lowest odds ratio overall. Could it be because the EDI effect in these areas is non-linear? Or because EDI is less efficient to capture the deprivation gradient in these areas? Anyway, I think discussing this result could be of interest.</p> <p><b>Limitations</b> Point 7 – In my understanding, the exams uptake included opportunistic and organized as well as follow-up or diagnosis exams. The reported rates are for all these situations, and I think it should be stated as a limitation.</p> <p>Point 8 – Although the authors used an ecological index, they used classical multivariate regression. Women from the same IRIS are thus considered independent one from another, which could lead to bias in standard error estimates if the intraclass correlation coefficient is significant. When using contextual characteristics, it is recommended to use multilevel models. Although it would probably not change the authors conclusions, I think it may be added as a limitation.</p>
--	--

### VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Dr. Ivana Rizzuto, Royal Adelaide Hospital

> The main outcomes in the abstract are different from the results. It is confusing which one is the aim of the study. At the beginning the authors mention that their aim is to establish differences between uptake of mammograms and smear according to age groups and then the results are about differences according to urban areas.

We thank the reviewer for this remark which could avoid a misunderstanding. We modified the abstract (aim and results) and the formulation of the objective of the study to be clearer. The objective was to investigate the impact of socio-territorial characteristics on mammography and pap smear uptake. We studied this impact according to the place of residence. We repeated these analyses in different subgroups: first in the recommended age groups, and secondly outside the recommended age groups.

Reviewer: 2

Dr. Quentin Rollet, INSERM-University of Caen Normandie

I found the manuscript entitled "Social and territorial inequalities in gynaecological cancers screening uptake: a cross-sectional study in France" very interesting. Although the area-based approach has already been used to study deprivation and cancer screenings, this study adds interesting individual level data (financial precarity, accessibility to the GP, and having or not a referring physician). Results of the study shows how each factor could be of importance in understanding socio-territorial inequities in cancer screenings. Screening patterns outside the recommended age group are also rare, and this study adds interesting elements in this direction. Yet, I think some aspects of the paper need to be discussed:

> Point 1 – Breast cancer are generally not classified as gynaecological cancer, and this imprecision is made all along the document.

We thank the reviewer for his watchfulness. We corrected this mistake.

> Point 2 – Aim of the study

Although they are used as covariates in this study, I think that results for CMU-C, GP PLA and referring physician, and the fact that these results have not changed the EDI effect, are of importance. Yet, they are neither presented in the abstract nor in the aim of the study. I think that adding this information would make the results and the conclusions clearer.

We agree with the reviewer: these results are interesting. This is why we discussed them in the discussion (p17 of the marked copy of the manuscript). We added this information in the aim of the study: "We used French healthcare insurance reimbursement data, merged with socio-territorial information, to assess and investigate the influence of deprivation on mammography and pap smear uptake, according to the place of residence, in the recommended age groups, and secondly outside the recommended age groups. To this end, we investigated the role of variables indicating financial precarity, healthcare accessibility, and adherence to the healthcare system.". However, this is not the primary objective of the study so we did not add it in the abstract to avoid misunderstanding.

Methods

> Point 3 – The authors defined large urban areas as areas with >10 000 jobs and their suburbs. I think it would be interesting to know how these suburbs are defined.

In INSEE's 2010 zoning in urban areas (<https://www.insee.fr/fr/statistiques/1281191>), the suburbs are defined as urban units in which at least 40% of the active residents work in the urban centre or in the towns attracted by it. We added this information and the reference in the method.

Discussion

> Point 4 – The authors stated in their results how pap smear screening uptake falls after 50 years, but this result is never discussed. I could be interesting to add a reflection on this point.

This result is interesting. However, we had a lot of results directly linked to the aim of the study to discuss in this article and the fall of the pap smear uptake after menopause is a well-known phenomenon (Célant N. L'Enquête santé européenne - Enquête santé et protection sociale (EHIS-ESPS) 2014; Haute Autorité de Santé. Dépistage et prévention du cancer du col de l'utérus.

Actualisation du référentiel de pratiques de l'examen périodique de santé (EPS) 2013). This is why we decided not to add a reflection on this point in the discussion.

> Point 5 – The authors stated that “The social and territorial disparities in mammography uptake were lower in the recommended age group than outside.”. Although this is true for younger women, it does not seem to be that clear in older women. For cervical screening, it seems to be the opposite effect (e.g. a higher gradient in the recommended age group than for younger women). These effects are interesting, and if the authors thought it appropriate, they could add a reflection on this point. The first goal of this sentence was to highlight the difference between a nationally organised screening programme for breast cancer (with reminders, information campaign, no upfront payment and full reimbursement) and an individual screening for cervical cancer. We wanted to suggest that this kind of screening programme could probably decrease these socio-territorial disparities. To be clearer, we changed this sentence to talk about the younger women. For older women, we can observe a less strong social gradient but only 4% of them had a mammography in the year. However, even in older women, we observed important territorial disparities, with a lower access in rural areas and a larger association with GP accessibility (the same trend is observed for pap smear). This is why we added elements of reflection about the difficulties in adapting to territorial barriers for older people (p19).

> Point 6 – The author stated in the results that “There was no social gradient in the other areas, where mammography rate was globally lower than in urban areas”. Although the gradient is less apparent than in large urban areas (mostly because the wealthiest are somehow less participating), the last two deciles of the EDI in “other areas” showed the lowest odds ratio compared with other deciles, and the lowest odds ratio overall. Could it be because the EDI effect in these areas is non-linear? Or because EDI is less efficient to capture the deprivation gradient in these areas? Anyway, I think discussing this result could be of interest.

We changed this sentence in the results to be more precise: “We observed that the social and territorial disparities in mammography uptake were lower inside the recommended age group than for younger women.” p18. Globally, mammography rates were lower in rural area and there is no clear social gradient of screening uptake for the first EDI deciles but a decrease appears in the last deciles: this result showed that even if screening tests are globally less performed, the uptake of the most deprived is even worse than the rest of the population. We added a point on this in the discussion : “But even in the other areas, the most deprived populations had a lower screening access.. These results corroborates the assumption that the social gradient exists is stronger only if the healthcare supply is sufficient, but access to care of the most deprived remains lower whatever the place.” p18.

#### Limitations

> Point 7 – In my understanding, the exams uptake included opportunistic and organized as well as follow-up or diagnosis exams. The reported rates are for all these situations, and I think it should be stated as a limitation.

We agree with the reviewer: this is an important point that has to be developed in the limitations of the study. For pap smear, we have no way to make the difference between screening and diagnosis exam. However, for mammography, we only included screening exams, but we cannot differentiate between opportunistic and organized screening. We added the following information in the method and limitations:

- Method: “Regarding mammography, we only included screening exams, but we could not differentiate between opportunistic and organized screening.” p7

- Limitations: “In our dataset, pap smears prescribed for diagnostic purposes could not be distinguished from those performed in a screening context.” p16

> Point 8 – Although the authors used an ecological index, they used classical multivariate regression. Women from the same IRIS are thus considered independent one from another, with could lead to bias in standard error estimates if the intraclass correlation coefficient is significant. When using contextual characteristics, it is recommended to use multilevel models. Although it would probably not change the authors conclusions, I think it may be added as a limitation.

As women in the same IRIS may not be independent, we considered the value of using a multilevel analysis. But we decided not to use such a model in our study because there was no true hierarchical structure to our data. Indeed, the selection of the population and the choice of the outcomes were independent from the IRIS. Moreover, the heterogeneity of the size of the IRIS (1 to 3760 women per IRIS) would have limited the benefit of using this kind of analysis that would complexify the model and lead to convergence problems (Goldstein, H. (2011), Multilevel Statistical Models, 4th Edition. Chichester, Wiley.).

### VERSION 2 – REVIEW

<b>REVIEWER</b>	Rollet, Quentin INSERM-University of Caen Normandie
<b>REVIEW RETURNED</b>	21-Dec-2021

<b>GENERAL COMMENTS</b>	<p>The authors changed the mistake of considering breast cancer as a gynaecological cancer is the body of the document, but not in the title.</p> <p>A little mistake has been added in the first sentence "Breast and cervical cancers are the two most frequent cancers in women worldwide". This is true for breast cancer (which is the most frequent), but cervical cancer is the 4th after colorectal and lung cancers.</p> <p>Adding modifications also brought some little typographical error (missing spaces, duplicate words).</p> <p>Otherwise, the article is very interesting and suitable for publication.</p>
-------------------------	---

### VERSION 2 – AUTHOR RESPONSE

Reviewer: 2

Dr. Quentin Rollet, INSERM-University of Caen Normandie

> The authors changed the mistake of considering breast cancer as a gynaecological cancer is the body of the document, but not in the title.

We thank the reviewer for his watchfulness. We corrected this mistake

>A little mistake has been added in the first sentence "Breast and cervical cancers are the two most frequent cancers in women worldwide". This is true for breast cancer (which is the most frequent), but cervical cancer is the 4th after colorectal and lung cancers.

We changed this sentence to precise that they are among the most frequent cancers in women.

>Adding modifications also brought some little typographical error (missing spaces, duplicate words).

We thank the reviewer for this remark and we corrected these mistakes.