

Sub-national estimation of population size for female sex workers in South Africa: Review and Bayesian evidence synthesis

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WCE

WORLD CONGRESS OF EPIDEMIOLOGY 2024



background

How many female sex workers (FSW) are there in **South Africa**?



background

How many female sex workers (FSW) are there in the **North West Province**?



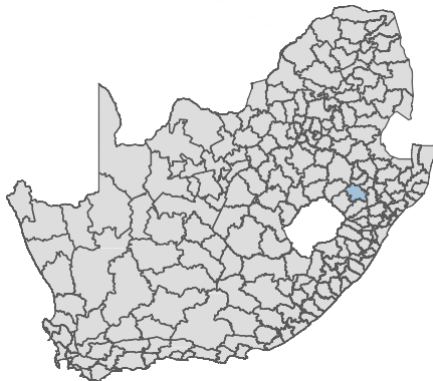
background

How many female sex workers (FSW) are there in the **Central Karoo district**?



background

How many female sex workers (FSW) are there in the **Alfred Duma sub-district**?



background

What is the background of the slide?

[Redacted content]

background

- high-risk/key population for HIV

background

- high-risk/**key population** for HIV
- tailored interventions, resource allocation, equitable & equal service access

background

What is the target population?

- high-risk/**key population** for HIV
- tailored interventions, resource allocation, equitable & equal service access

What is the difficulty?

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What is a high-risk population?

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What is a hidden population?

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What is a...

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- Some studies reported population size estimates (**PSE**) for FSW

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- Differences in estimation method, catchment area, year ...

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- high-risk/**key population** for HIV
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- Some studies reported population size estimates (**PSE**) for FSW
- Often estimate for a small-area level + extrapolation
- Differences in estimation method, catchment area, year ...
- Lack of "synthesized" PSEs on **sub-district and district** level

objective

To estimate population size of FSW in South Africa on **sub-national** level by leveraging data from different existing data sources

methods

- published PSE for FSW on **sub-district or lower** level
- demographic data on South African sub-districts

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Bayesian hierarchical regression model

- outcome: **proportion FSW** among females aged 15-64
- fixed effects: province, boarder, pop density, urbanization index (+ interaction)
- random effects & weights (to account for dependence & estimation method)

methods

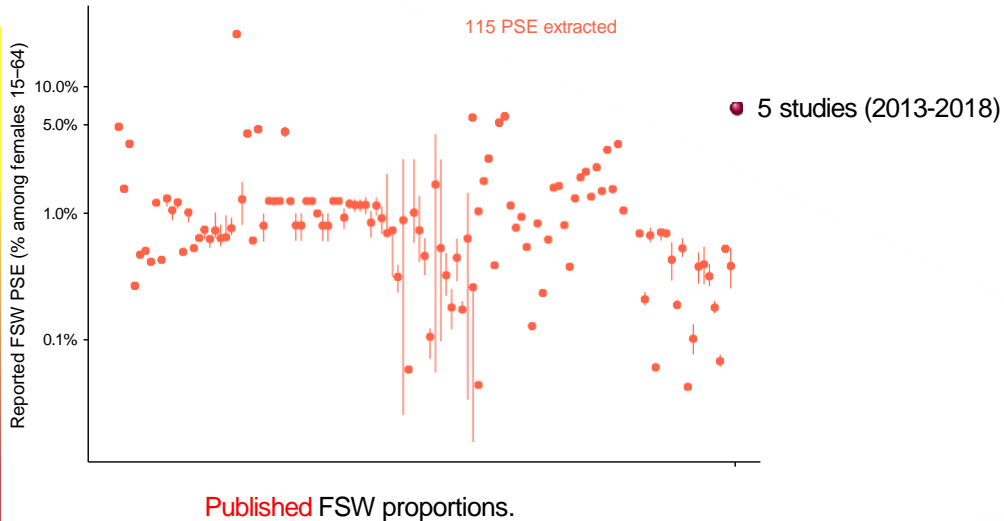
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Bayesian hierarchical regression model

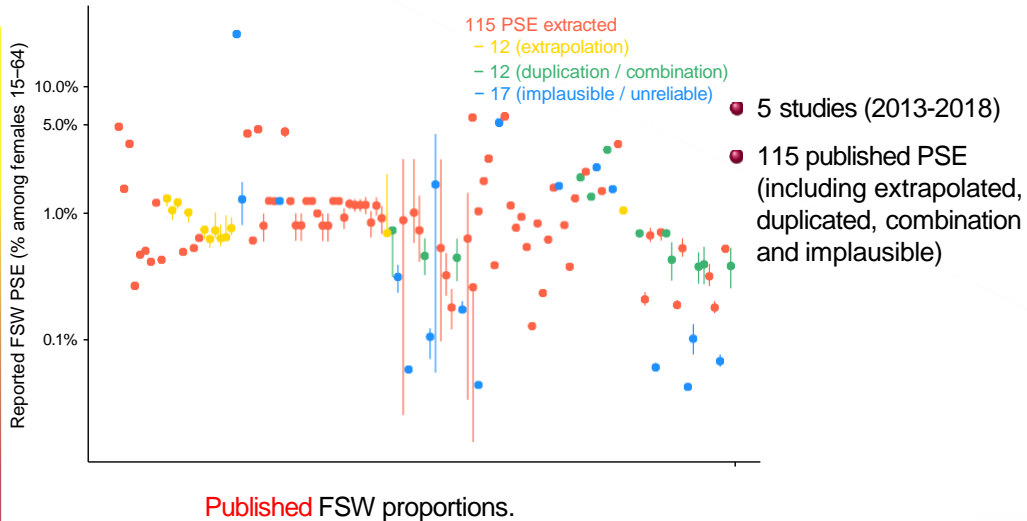
- outcome: **proportion FSW** among females aged 15-64
- fixed effects: province, boarder, pop density, urbanization index (+ interaction)
- random effects & weights (to account for dependence & estimation method)

- % FSW at sub-district level (extrapolation to areas w/o. published PSE).
- aggregate predictions for district-, province-, national-level estimates

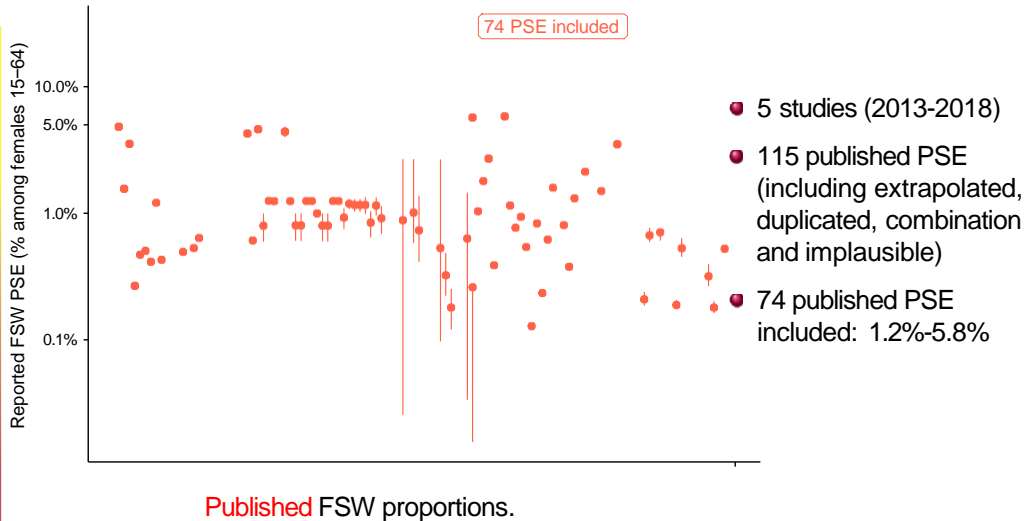
results



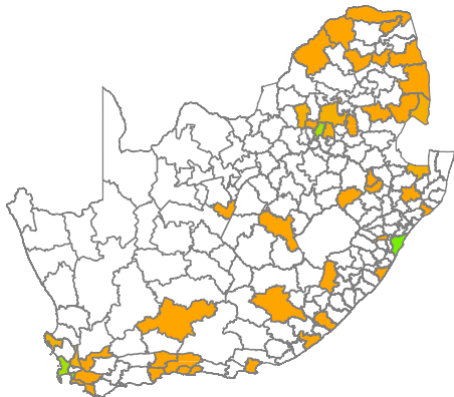
results



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Number of FSW PSE

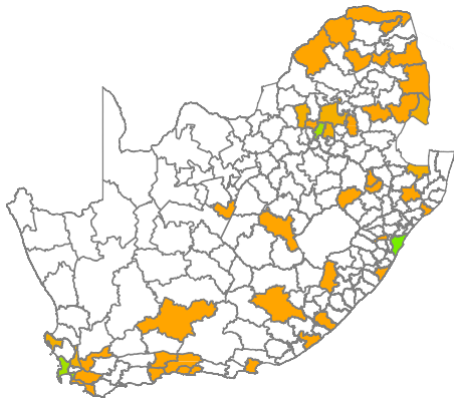


1 2 5 8 10

Number of **published** PSE.

- published PSE for 45 (out of 213) sub-districts in 31 (out of 52) districts

results

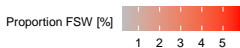
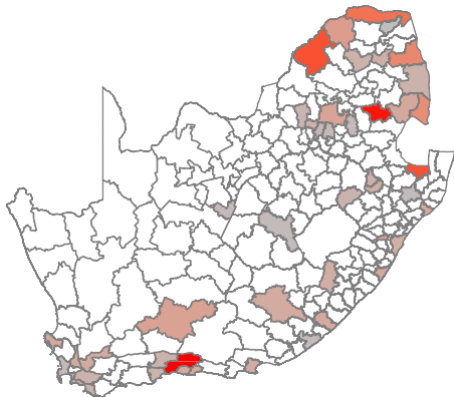


Number of FSW PSE
1 2 5 8 10

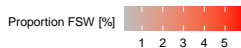
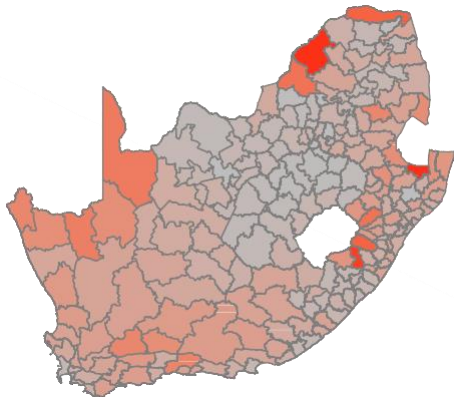
Number of **published** PSE.

- published PSE for 45 (out of 213) sub-districts in 31 (out of 52) districts
- mostly 1 published PSE, but for some up to 10

results

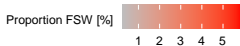
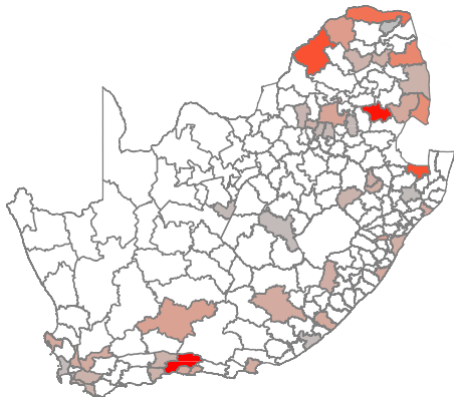


Mean **reported** FSW proportions.

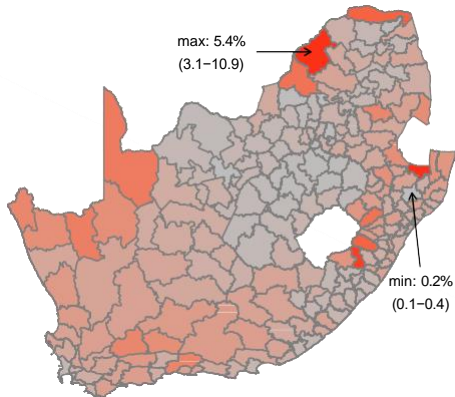


Predicted **sub-district** % FSW.

results

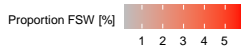


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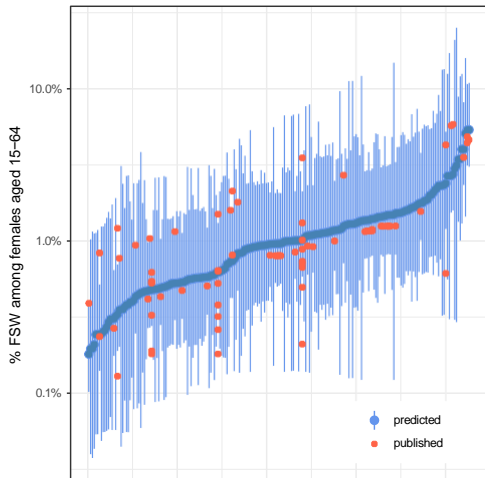
max: 5.4%
(3.1-10.9)

min: 0.2%
(0.1-0.4)

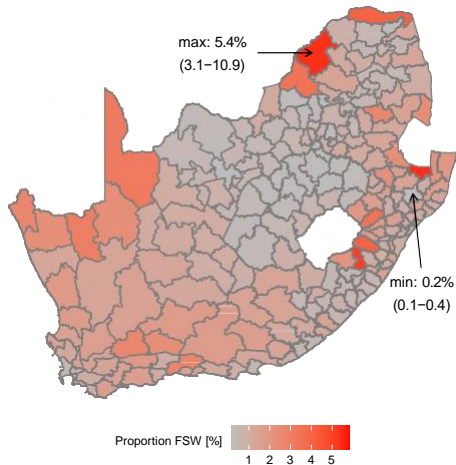


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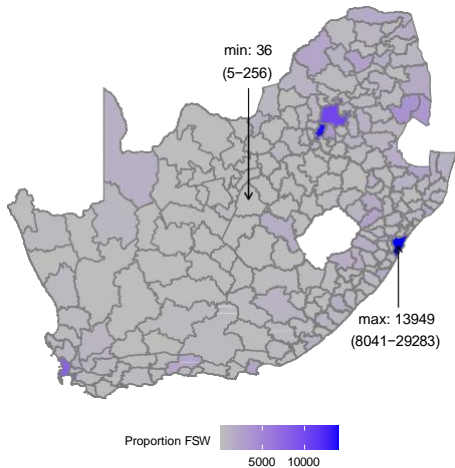


Uncertainty in predictions.

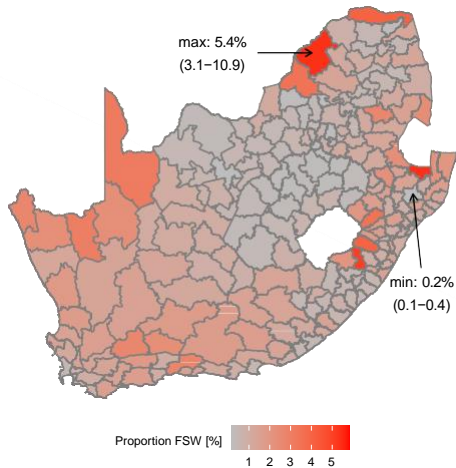


Predicted **sub-district** % FSW.

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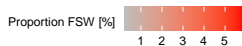
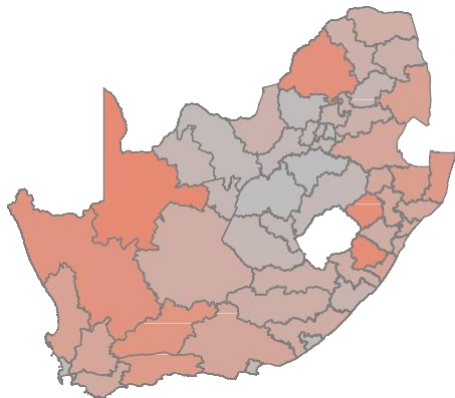


Predicted **sub-district** total FSW.



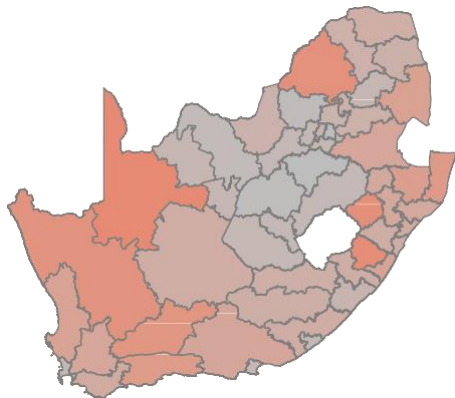
Predicted **sub-district** % FSW.

results



Predicted **district** % FSW.

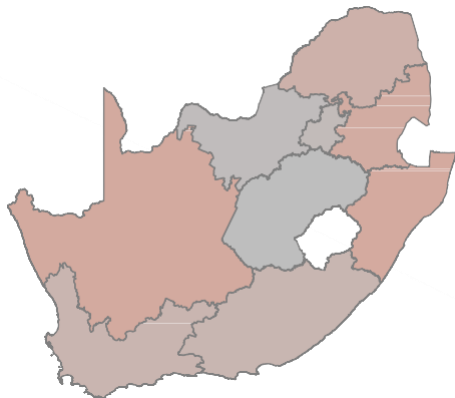
results



Proportion FSW [%]

1 2 3 4 5

Predicted **district** % FSW.

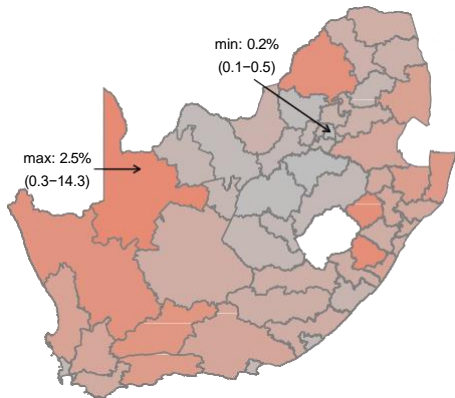


Proportion FSW [%]

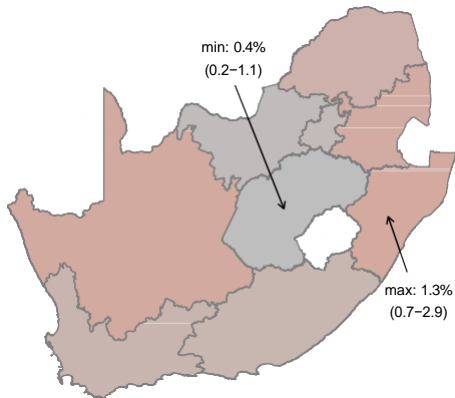
1 2 3 4 5

Predicted **province** % FSW.

results

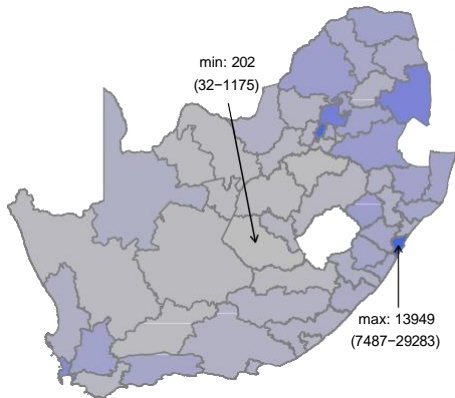


Predicted **district** % FSW.

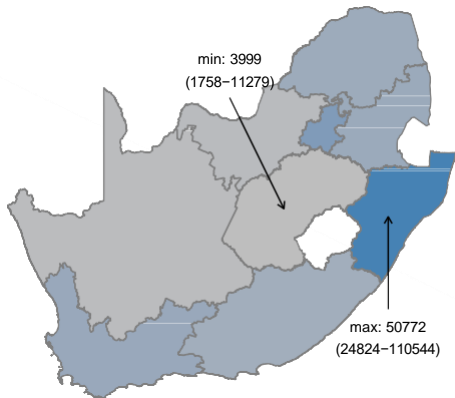


Predicted **province** % FSW.

results



Predicted **district** total FSW.



Predicted **province** total FSW.

summary

- large variability in predicted % FSW on sub-district level, reduced on district and province level

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- quality of input data (reported PSE)?
- high uncertainty in estimates
- outlook: include routine data (PrEP), spatial correlation

summary

How many female sex workers (FSW) are there in **South Africa**?

0.9% (0.6-1.6%) among females aged 15-64



summary

How many female sex workers (FSW) are there in the **North West Province**?

0.5% (0.1-2.0%) among females aged 15-64



summary

How many female sex workers (FSW) are there in the **Central Karoo district**?

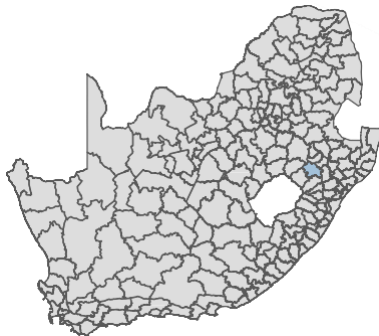
2.1% (0.9-5.3%) among females aged 15-64



summary

How many female sex workers (FSW) are there in the **Alfred Duma sub-district**?

1.6% (0.6-4.7%) among females aged 15-64



acknowledgements

- Leigh Johnson
- Oliver Stevens



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