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# Estimating Completeness of Administrative Health Databases for Ascertaining Chronic Disease Cases: A Numeric Example with Parkinson's Disease

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# Outline

- Background
- Research Objective
- Methods
- Results
- Conclusions
- Summary



# Background

- Physicians have traditionally been remunerated by the fee-for-service (FFS) method
  - Physicians submit billing claims to their ministry of health for all services provided to patients
  - These claims are captured in electronic administrative databases
- An increasing number of physicians are remunerated by non-fee-for-service (NFFS) methods, such as salaries and contracts
  - **Shadow billing** is the practice by which NFFS physicians submit claims, using the same procedures as FFS physicians
  - Not all jurisdictions require physicians to shadow bill



# Background

- Gaps in administrative databases associated with a lack of shadow billing may result in biased estimates of:
  - Healthcare use
  - Chronic disease prevalence and incidence rates
- Existing statistical models could be used to estimate the bias in disease prevalence and incidence rates. Examples of these models include:
  - Missing data models
  - Prediction models
  - Capture-recapture models



## Research Objective

- To demonstrate the use of capture-recapture statistical models to estimate the potential number of missed cases of chronic disease in physician billing claims due to NFFS physician remuneration
- This numeric examples focuses on Parkinson's Disease (PD)
  - Diagnosis codes in administrative health data have good sensitivity and specific to ascertain cases of PD
  - There is increasing interest in the use of administrative health data for surveillance of neurological conditions
- **Comparative results are reported for Osteoporosis (OP)**



## Data Sources (from Saskatchewan)

- Physician claims
  - One ICD-9 diagnosis code on each claim
  - Types of claims
    - From physicians remunerated by the FFS method
    - From physician remunerated by NFFS methods
- Hospital abstracts
  - Up to 25 ICD-10-CA diagnosis codes on each abstract
- Population registration file
  - Dates of health insurance coverage and socio-demographic characteristics of patients



# Capture-Recapture Model Development

## Ascertain PD Cases

ICD-9 332 or 333; ICD-10-CA G20, G21, G25

## Identify Source of Case Ascertainment

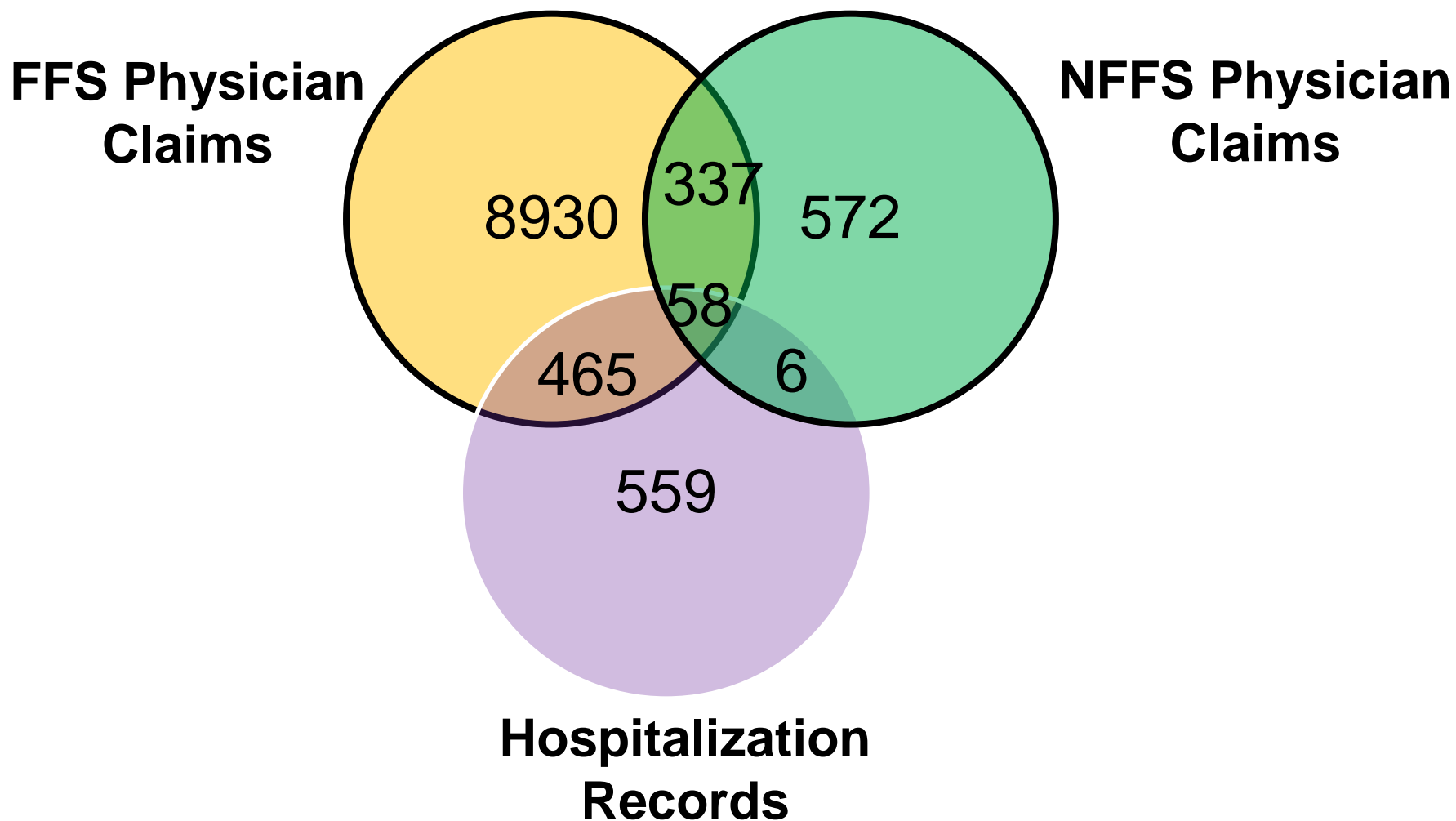
1) FFS claims only, (2) NFFS claims only, (3) both types of claims

## Apply Multinomial Logistic Regression Model

Include covariates to account for heterogeneity in the probability of case capture

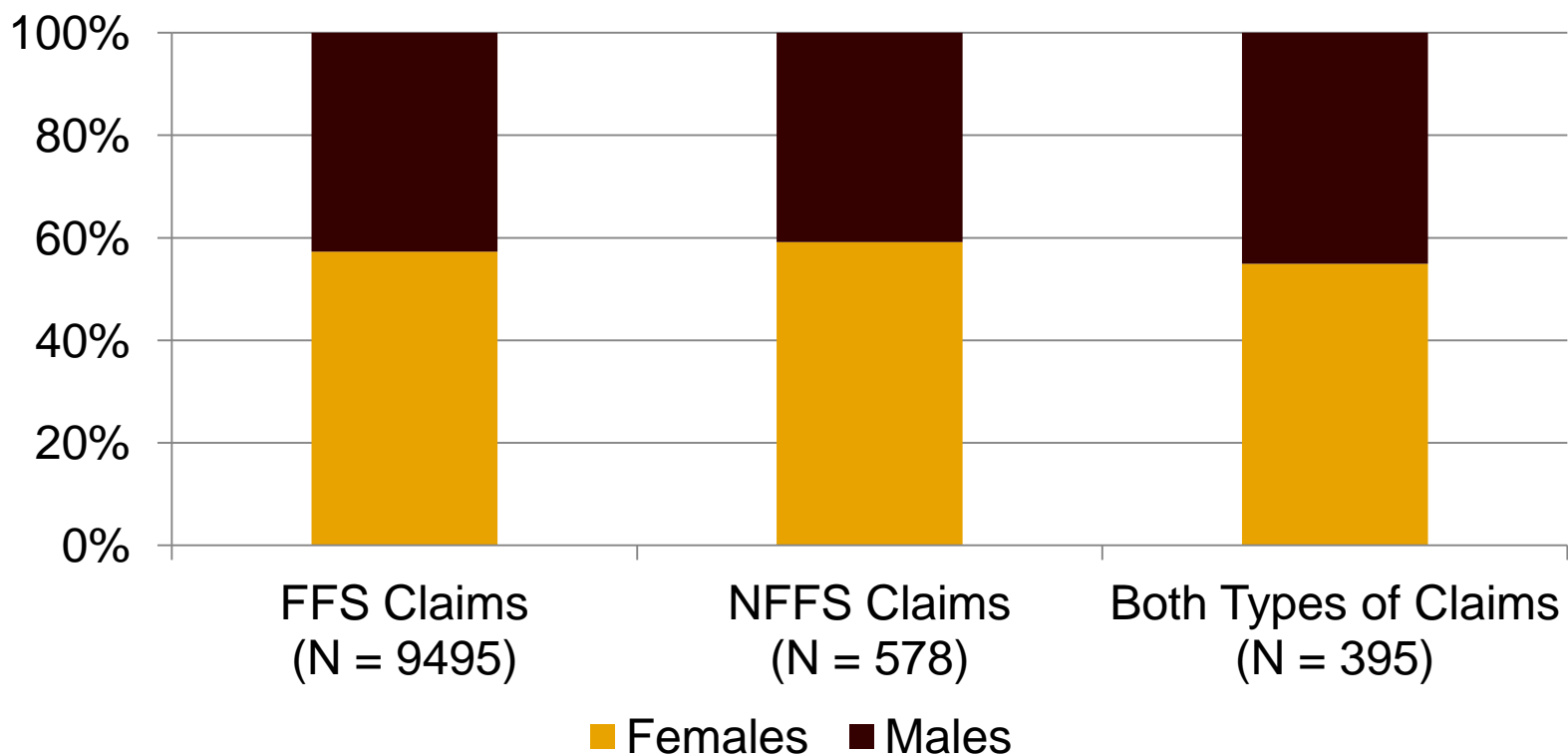
**Sum Observed and Predicted Cases**

# Distribution of PD Cases in Administrative Data, 2004/05 – 2008/09

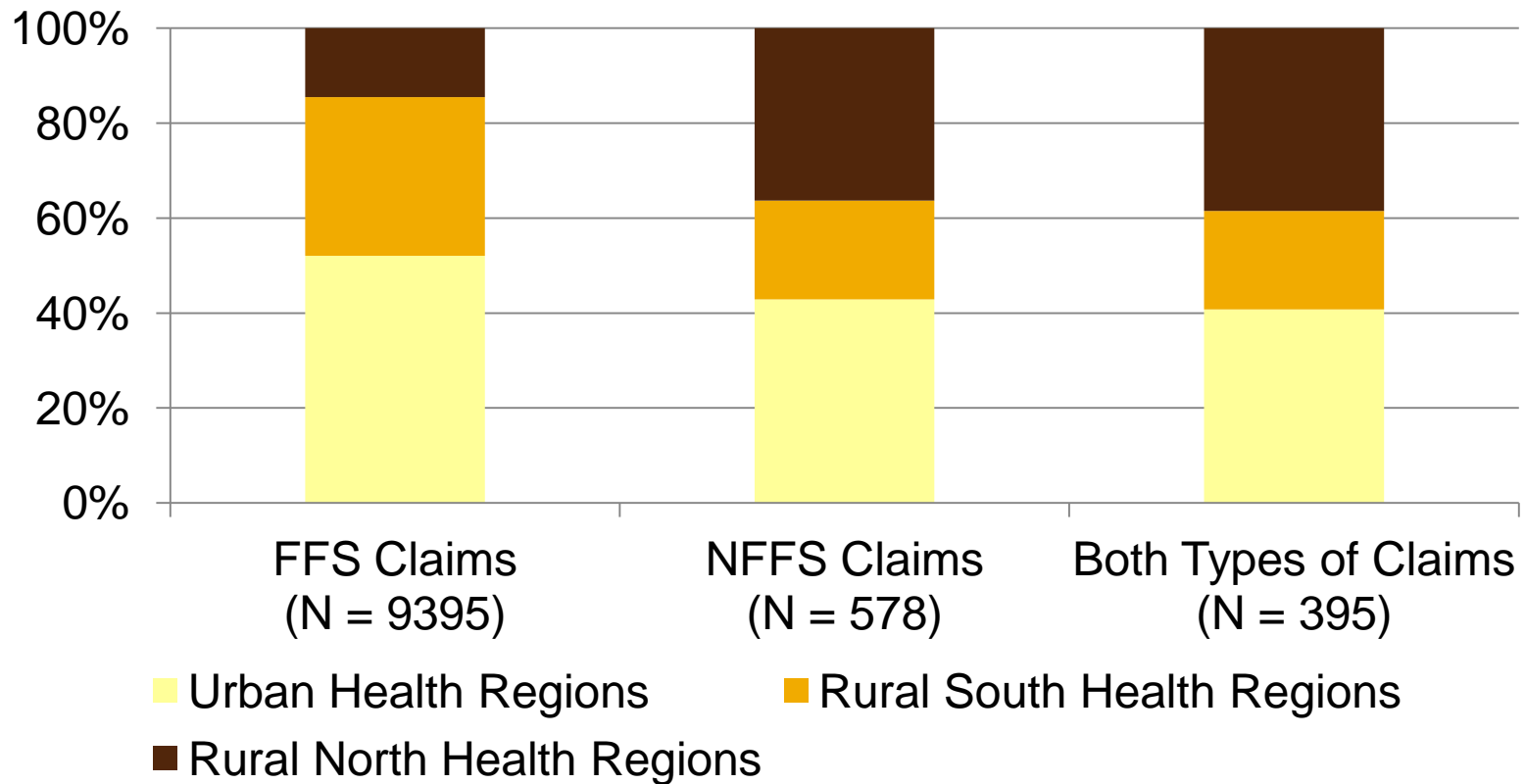




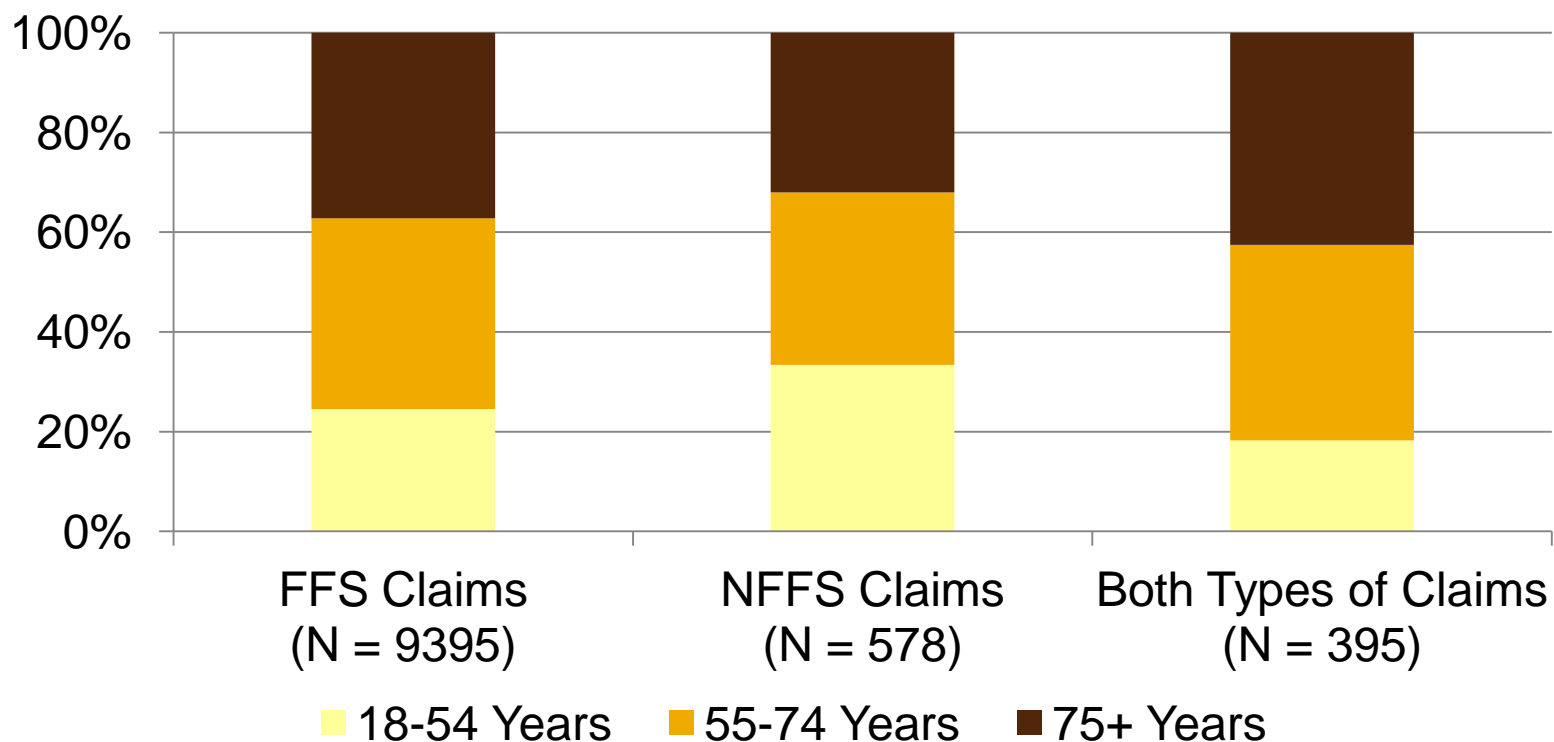
## Distribution of PD Cases in Physician Claims



## Distribution of PD Cases in Physician Claims



## Distribution of PD Cases in Physician Claims

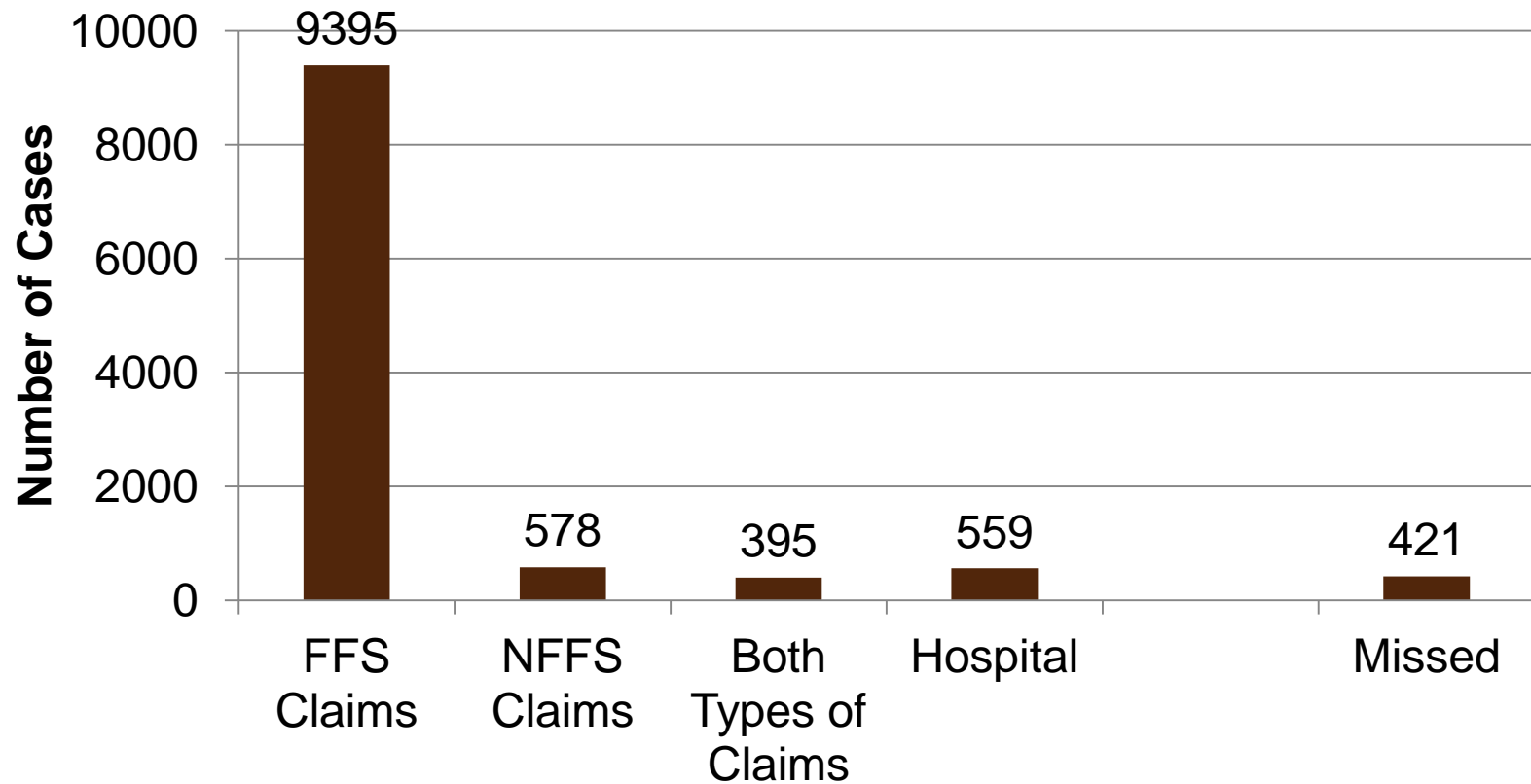


## Multinomial Logistic Regression Results (Reference = Both Data Sources)

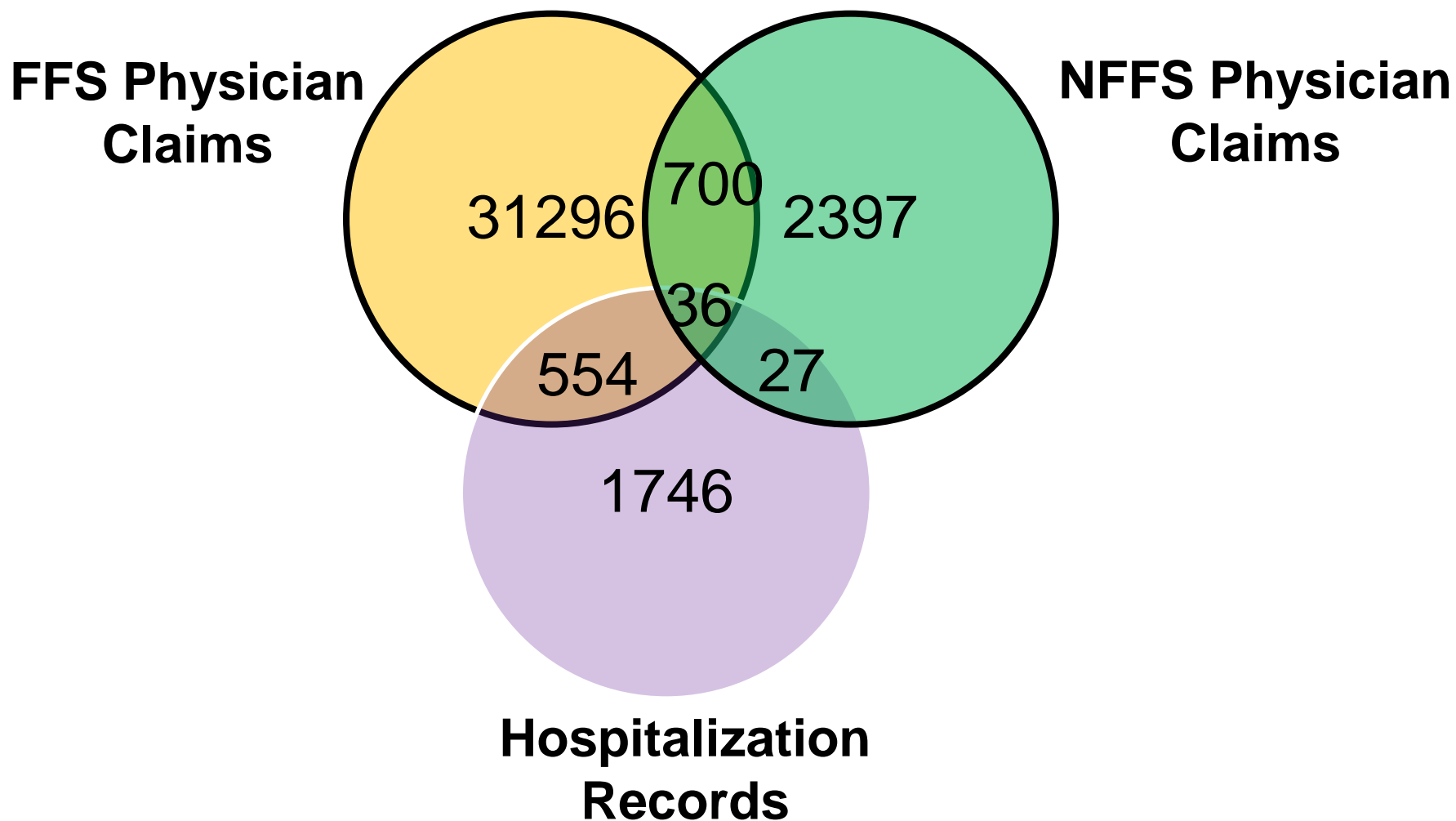
Covariate	FFS Claims Only OR (95% CI)	NFFS Claims Only OR (95% CI)
Age Group: 75+ years	<b>0.67 (0.49, 0.91)</b>	<b>0.48 (0.33, 0.70)</b>
Age Group: 55-74 years	0.77 (0.57, 1.03)	<b>0.52 (0.37, 0.74)</b>
Age Group: 18-54 years	Reference	Reference
Health Region: Urban	0.77 (0.59, 1.01)	0.99 (0.70, 1.39)
Health Region: Rural north	<b>0.23 (0.17, 0.30)</b>	0.91 (0.64, 1.30)
Health Region: Rural south	Reference	Reference
Sex: Female	1.08 (0.88, 1.33)	1.17 (0.90, 1.52)
Sex: Male	Reference	Reference



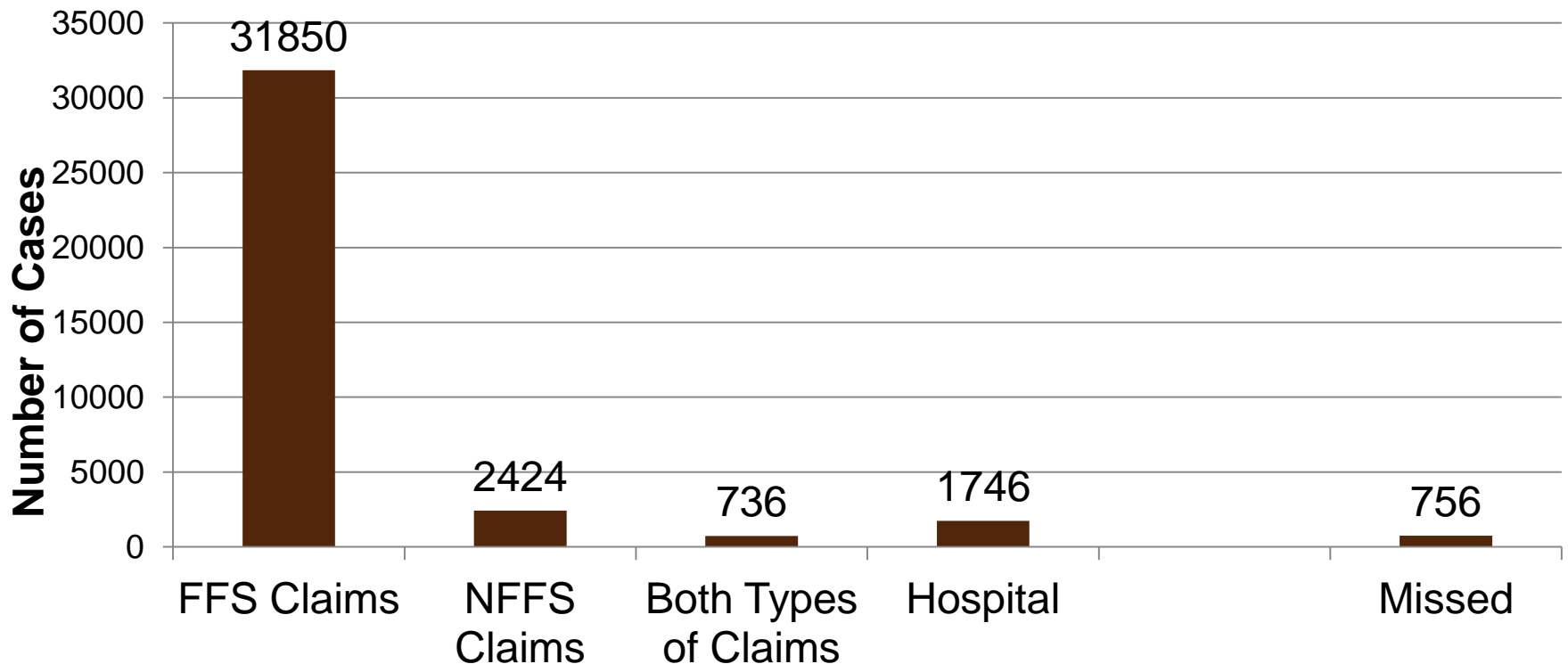
# Observed PD Cases and Estimated Number of Missed Cases



# Distribution of OP Cases in Administrative Data, 2004/05 – 2008/09



# Observed OP Cases and Estimated Number of Missed Cases



## Conclusions

- The capture-recapture method revealed minimal bias in physician billing claims in Saskatchewan during the study period due to incomplete capture of disease cases.
- This finding is consistent with those from a study currently underway in Manitoba, which has a similar proportion of physicians remunerated by NFFS methods.





## Summary

- Capture-recapture models provide a feasible method to estimate potential bias in disease prevalence because databases are incomplete.
- These models can be applied to physician claims in jurisdictions where shadow billing occurs.
- If bias is substantial, then additional administrative data sources might be used to fill gaps in the data.



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