European hospitalisation data

Forecasting healthcare data

Public data sources

1. **European Centre for Disease Control** (ECDC)
   - Aggregates national datasets
   - Adds TESSy – EU reporting system
   - Published weekly with lag
2. **Our World in Data** (OWID)
   - ECDC data + United Kingdom
3. **Joint Research Centre** (JRC), European Commission
   - Aggregates national datasets
   - Published daily

Healthcare data

- Healthcare settings
  - **General hospital** patients
  - **Intensive care unit** (ICU) patients
- **Admissions**
  - New patients admitted
  - Only published by ECDC
- **Occupancy**
  - Total occupied beds
  - Published by ECDC and JRC

Data availability over 2021

- All sources have some missing data by location and date
- One hub location not covered at all (Lichtenstein)
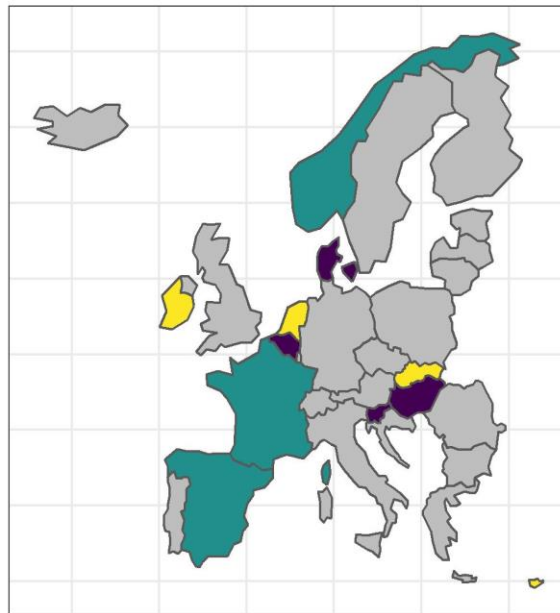- Several rarely covered (Iceland, Finland, Switzerland)
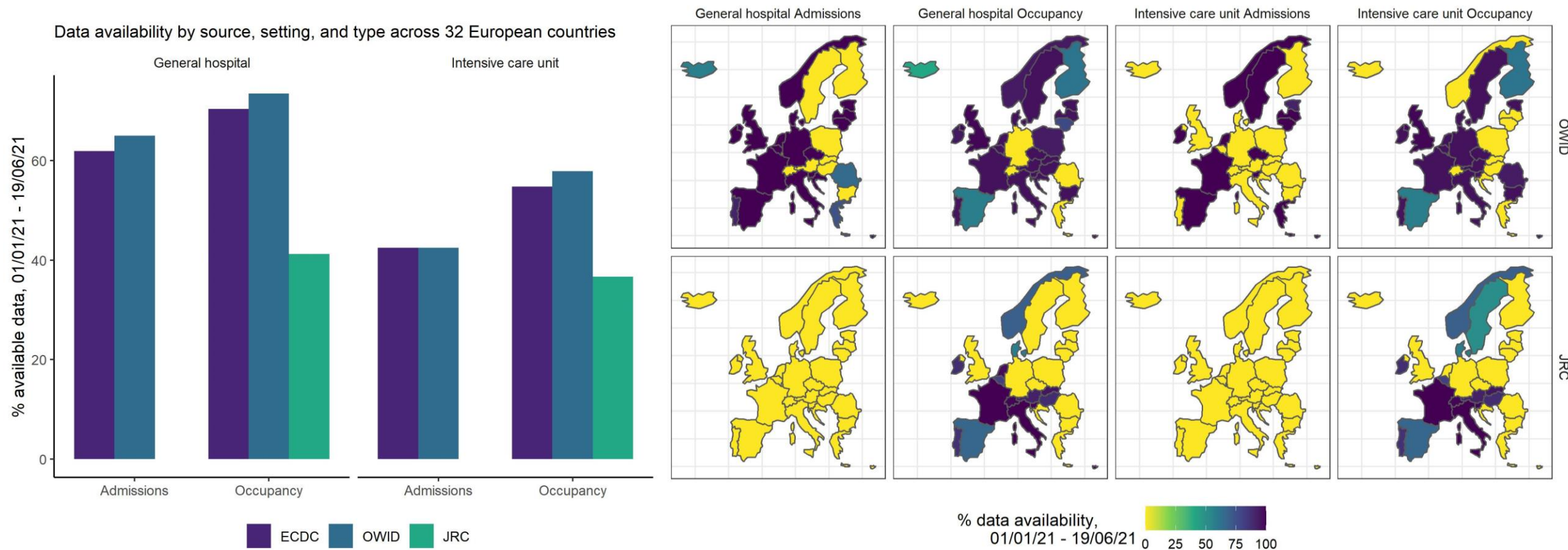
JRC v ECDC data differences

- Counts of occupancy data (hospital and ICU) can vary
- JRC and ECDC reported different data for the same date in 12 locations in 2021
- JRC less likely to be updated after missing data or data reporting effects
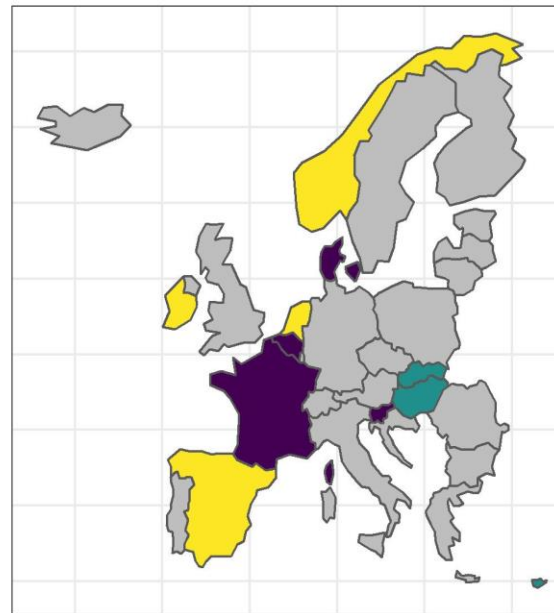

Daily hospital occupancy

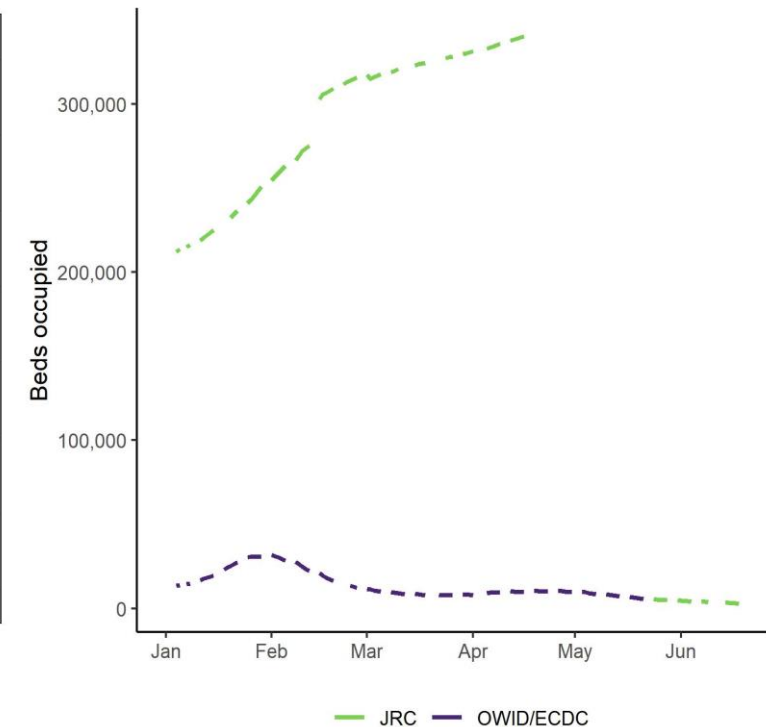% dates with differing counts

1<25% >25% >75% NA

Median difference in count

1<50 50<2,000 >2,000 NA

JRC - ECDC data (OWID count conversion), 01/01/21 - 19/06/21

Spain, general hospital bed occupancy

Beds occupied

300,000

200,000

100,000

0

Jan Feb Mar Apr May Jun

JRC OWID/ECDC

Hub decisions:
Adapting for healthcare targets

Data types

- All other hub targets are weekly sums of daily counts of incidence
- Healthcare data do not fit this pattern:

New admissions

Raw data (ECDC):

- Incidence rate per 100,000
- OWID convert to count

Options:

- Forecast the rate
- Use OWID conversion

Beds occupied

Raw data:

- Count of prevalence

Options:

- Forecast weekly mean occupancy
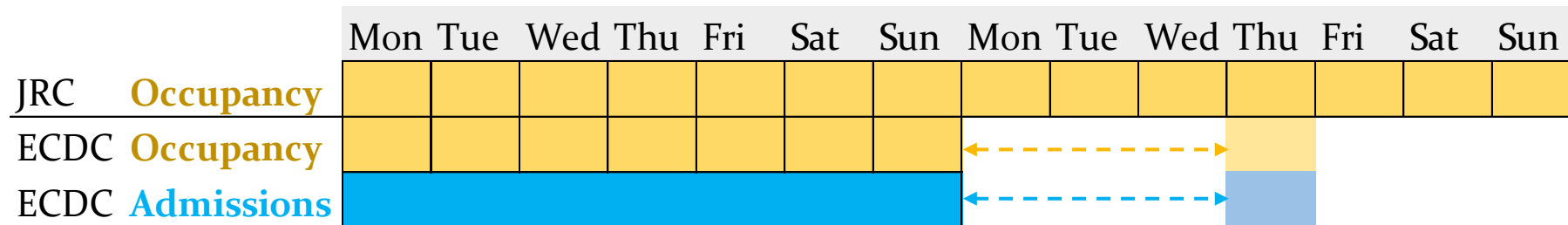- Forecast end of week occupancy

Forecasting vs. data publication timeline

ECDC/OWID

- Data: occupancy & admissions
- Collected: **Monday – Sunday**
- Published: **following Thursday**

JRC

- Data: occupancy only
- Collected: **daily**
- Published: **following day**

|		Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
JRC	**Occupancy**														
ECDC	**Occupancy**														
ECDC	**Admissions**														

Implications for forecasting

- Most recent 4-10 days: missing in ECDC/OWID data, present in JRC data
- ECDC/OWID data = forecasting from 2 weeks ahead from last data publication
- Admissions: week definitions Monday-Sunday, with Sunday target end date

JRC

- Need a weekly summary measure for occupancy

- Data are daily, so weeks would match current hub definition (Sun-Sat)

- Higher % missing across locations

- No admissions data

Daily

JRC
ECDC/OWID

Admissions ←-------→ **Occupancy**

ECDC/OWID

summary measure

Weekly
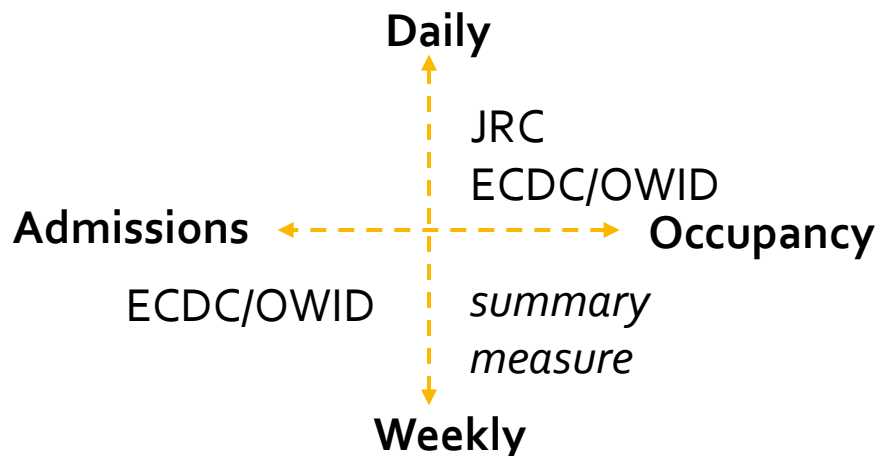
ECDC/OWID

- More complete across locations/dates; OWID adds UK

- Occupancy data continuously lags JRC data by 4-10 days

- Forecasting 2 weeks ahead from data to match the hub 1 week ahead target end date

- Weeks defined Mon-Sun; target end date (week end) = Sunday

New forecast target

	Recommendation	Rationale
Truth data	OWID	• Converts ECDC data to count • Includes UK data
Target setting	General hospital	• Most reliable data availability
Target count	Admissions	• Avoids lag between occupancy data sources • Matches other hub targets for incidence

Issues

• Horizon: should 6 days after forecast date be 2 week ahead horizon?

• Target end date validation: change to Sundays

Extra detail:
Missing data

	Locations covered
Hospital occupancy	26
ICU occupancy	20
Hospital admissions	22
ICU admissions	14

		Austria	Belgium	Bulgaria	Switzerlan	Cyprus	Czechia	Germany	Denmark	Estonia	Spain	Finland	France	United Kin	Greece	Croatia	Hungary
Occupancy	Hospital	0.96	0.96	0.96	-	0.96	0.96	-	0.96	0.96	0.57	0.61	0.96	0.99	-	0.96	0.96
	ICU	0.96	0.96	0.96	-	0.96	0.96	0.96	0.96	0.96	0.57	0.61	0.96	0.99	-	-	-
Admissions	Hospital	-	1.00	-	-	0.96	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	0.74	1.00	-
	ICU	-	-	-	-	0.96	1.00	-	-	0.91	1.00	-	1.00	-	1.00	-	-

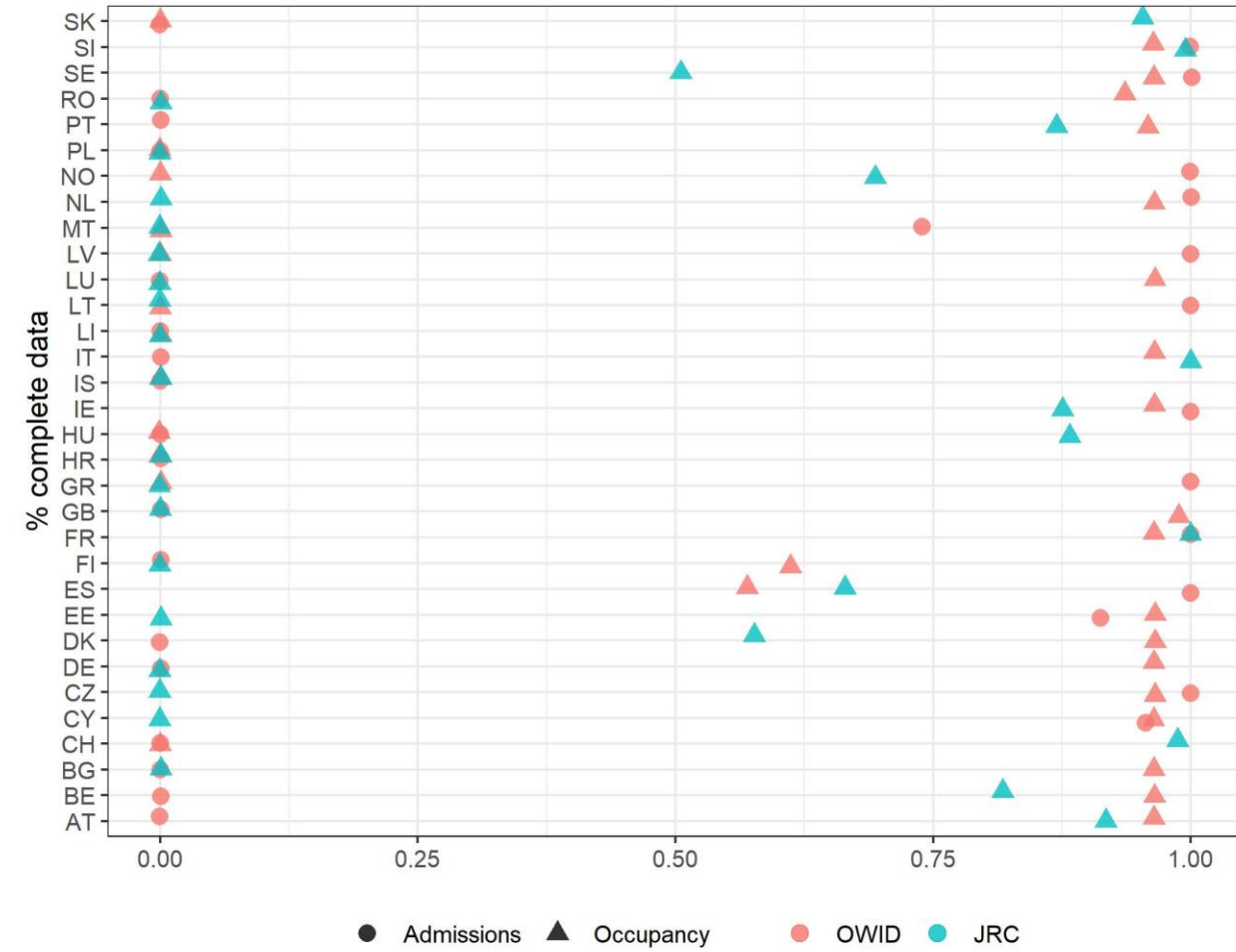|		Ireland	Iceland	Italy	Liechtenst	Lithuania	Luxembou	Latvia	Malta	Netherlan	Norway	Poland	Portugal	Romania	Sweden	Slovenia	Slovakia
Occupancy	Hospital	0.95	0.41	0.96	-	0.78	0.96	0.96	-	0.96	0.94	0.94	0.96	-	0.96	0.96	0.96
	ICU	0.96	-	0.96	-	-	0.96	-	-	0.96	-	-	0.96	0.94	0.96	0.96	-
Admissions	Hospital	1.00	0.57	1.00	-	1.00	-	1.00	1.00	1.00	1.00	-	0.91	0.65	-	1.00	-
	ICU	1.00	-	-	-	1.00	-	1.00	0.74	1.00	1.00	-	-	-	1.00	1.00	-

Missing data lookup by location

General hospital data: completeness for hub countries by source and type

ICU data: completeness for hub countries by source and type

● Admissions ▲ Occupancy ● OWID ● JRC
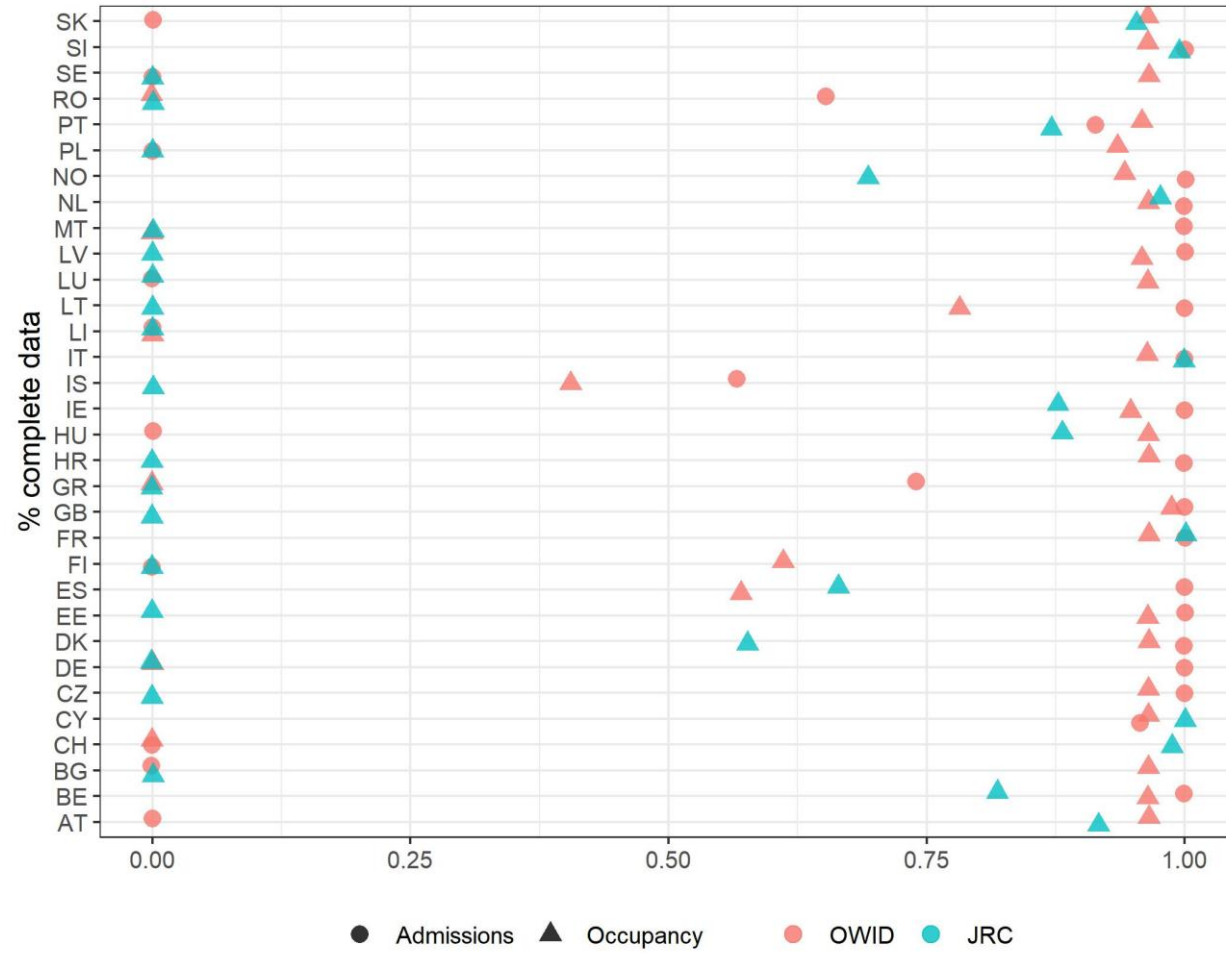
Note: JRC does not publish admissions data