# WA's Homelessness Crisis

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Motivation

- Homelessness in WA has increased dramatically in the last few years
- To gain insights into why people become homeless in WA
- Are homelessness services sufficiently addressing the problem?

Questions

1. Who is impacted by homelessness?
2. What are the biggest contributors to homelessness?
3. Is homelessness being effectively treated?

Homelessness clients from 2017 to 2021
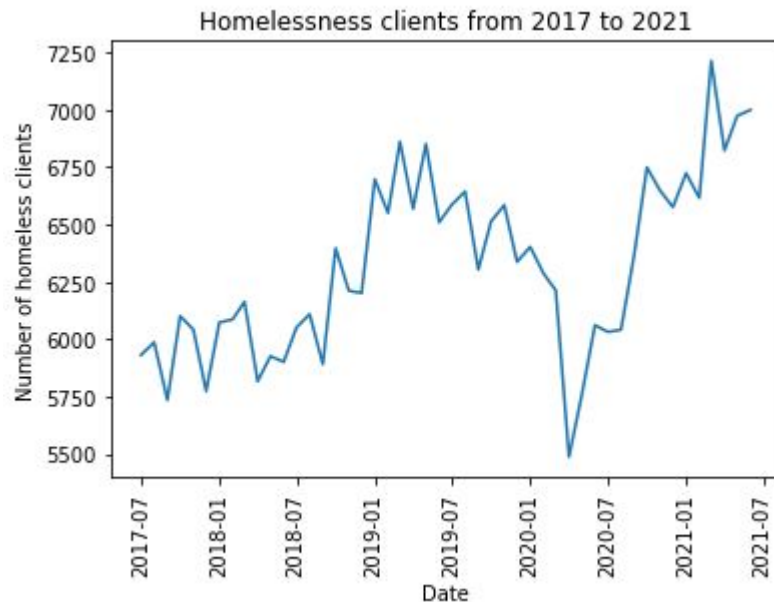
Questions & Data

1. **Who is impacted by homelessness?**
   - What is the age and sex of homelessness clients?
   - What percentage of homelessness clients are Indigenous?

Hypothesis 1

Based on observations Majority of homeless people are male and indigenous.

Questions & Data (cont.)

2. What are the biggest contributors to homelessness?

- Do the biggest contributors to homelessess affect men and women the same way?

Hypothesis 2

Alcohol and Substance abuse are the main contributing factors to homelessness.

Questions & Data (cont.)

3. Is homelessness being effectively treated?

- Are there enough homeless services per region?
- Where are government funds being allocated to across services?

Hypothesis 3

There are not enough homelessness services to cater for all homeless clients.

Data Resources

- AIHW (Australian Institute of Health and Welfare)
- API (nearby search request) and google maps
- Matthewproctor.com (postcodes)

Data Cleanup & Exploration - tables

- Data was obtained from Australian Institute of Health and Welfare
- Data files were in XLSX format, so converted relevant sheets into CSV
- Data was already categorised and aggregated, so data cleanup was minimal

Australian Government
Australian Institute of Health and Welfare

Specialist homelessness services 2019–20

Data tables

These tables supplement the report, Specialist homelessness services 2019–20 (AIHW 2020), and provide information homelessness
agencies in 2019–20, the assistance they received and their changes in housing and other circumstances. Data on th support are
also presented. The data are compiled from the Specialist Homelessness Services Collection which is conducted by t information about the
collection, and information that will help to interpret the data.

Please note that there is the potential for minor revisions of data in this report. Please check the online version at <ww

Contents

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Table CLIENTS.2: Clients, by new and returning client status, 2019–20

Table of contents

State/territory	New or returning clients	Males Number	Males Per cent	Females Number	Females Per cent	All clients Number	All clients Per cent
National	New clients	50,228	43.4	71,839	41.1	122,067	42.0
National	Returning clients	65,561	56.6	102,834	58.9	168,395	58.0
National	**Total**	**115,789**	**100.0**	**174,673**	**100.0**	**290,462**	**100.0**
NSW	New clients	13,229	45.2	17,765	43.2	30,994	44.0
NSW	Returning clients	16,036	54.8	23,342	56.8	39,378	56.0
NSW	**Total**	**29,265**	**100.0**	**41,107**	**100.0**	**70,372**	**100.0**
Vic	New clients	18,456	41.0	27,671	39.3	46,127	40.0
Vic	Returning clients	26,509	59.0	42,670	60.7	69,179	60.0
Vic	**Total**	**44,965**	**100.0**	**70,341**	**100.0**	**115,306**	**100.0**
Qld	New clients	7,648	43.9	11,833	46.1	19,481	45.2
Qld	Returning clients	9,781	56.1	13,832	53.9	23,613	54.8
Qld	**Total**	**17,429**	**100.0**	**25,665**	**100.0**	**43,094**	**100.0**
WA	New clients	4,517	47.6	6,303	40.8	10,820	43.4
WA	Returning clients	4,973	52.4	9,163	59.2	14,136	56.6

Data Cleanup & Exploration - tables (cont.)

- Removed NAs
- Set column headers, or rename column headers
- Removed unwanted columns
- Converted number objects into floats
  - Removed comma from strings, before converting into floats
- Filtering for relevant data

```python
#Clean dataframe
#drop NA
age_gender_clean = age_gender.dropna(how = "any")
#Set column headers and reset index
age_gender_clean = age_gender_clean.rename(columns = {"Table of contents": "Region",
                                                      "Unnamed: 1": "Data type",
                                                      "Unnamed: 2": "Age group",
                                                      "Unnamed: 3": "Number Male",
                                                      "Unnamed: 4": "Per cent Male",
                                                      "Unnamed: 5": "Number Female",
                                                      "Unnamed: 6": "Per cent Female",
                                                      "Unnamed: 7": "Number Total",
                                                      "Unnamed: 8": "Per cent Total"}
                                              )
age_gender_clean = age_gender_clean.drop([3]).reset_index(drop = True)
#Remove unwanted columns
age_gender_clean = age_gender_clean[["Region","Data type", "Age group", "Number Male", "Number Female", "Number Total"]]
#Convert homeless clients to float
age_gender_clean["Number Male"] = (age_gender_clean["Number Male"].str.replace(",", ""))
age_gender_clean["Number Female"] = (age_gender_clean["Number Female"].str.replace(",", ""))
age_gender_clean["Number Total"] = (age_gender_clean["Number Total"].str.replace(",", ""))
age_gender_clean = age_gender_clean.astype({"Number Male": "float",
                                            "Number Female": "float",
                                            "Number Total": "float",})
#Only obtain relevant data
age_gender_clean = age_gender_clean.loc[(age_gender_clean["Region"]=="WA")
                                         & (age_gender_clean["Data type"]=="All clients")
                                         & (age_gender_clean["Age group"]!="Total")
                                         & (age_gender_clean["Age group"]!="Sex as % of total")]

age_gender_clean
```

Data Cleanup & Exploration - tables (cont.)

- Where data included groups and sub-groups, used 'groupby' to obtain the total per group

```
#Using Groupby

grouped_summary_df = clean_df.groupby(['Group']).sum()
grouped_summary_df
```

Group	Males	Females	Total clients (number)
Accommodation	9544.0	12424.0	21968.0
Financial	12137.0	15907.0	28044.0
Health	6590.0	9303.0	15893.0
Interpersonal relationships	9625.0	24816.0	34441.0
Not stated	10.0	22.0	32.0
Other	10408.0	13794.0	24202.0

State/territory	Group	Reason for seeking assistance	Males	Females	Total clients (number)	Total clients (per cent)
WA	Financial	Financial	4445.0	6109.0	10554.0	42.3
WA	Financial	Financial difficulties	3585.0	5026.0	8611.0	34.5
WA	Financial	Housing affordability stress	2081.0	2749.0	4830.0	19.4
WA	Financial	Employment difficulties	470.0	408.0	878.0	3.5
WA	Financial	Unemployment	1543.0	1603.0	3146.0	12.6
WA	Financial	Problematic gambling	13.0	12.0	25.0	0.1
WA	Accommodation	Accommodation	3905.0	5174.0	9079.0	36.4
WA	Accommodation	Housing crisis	2135.0	2954.0	5089.0	20.4
WA	Accommodation	Inadequate or inappropriate dwelling conditions	2002.0	2550.0	4552.0	18.3
WA	Accommodation	Previous accommodation ended	1502.0	1746.0	3248.0	13.0
WA	Interpersonal relationships	Interpersonal relationships	3889.0	9496.0	13385.0	53.7
WA	Interpersonal relationships	Time out from family/other situation	1391.0	2645.0	4036.0	16.2
WA	Interpersonal relationships	Relationship/family breakdown	1818.0	3991.0	5809.0	23.3
WA	Interpersonal relationships	Sexual abuse	58.0	582.0	640.0	2.6
WA	Interpersonal relationships	Family and domestic violence	2208.0	7587.0	9795.0	39.3
WA	Interpersonal relationships	Non-family violence	261.0	515.0	776.0	3.1
WA	Health	Health	2708.0	3933.0	6641.0	26.6
WA	Health	Mental health issues	1308.0	2010.0	3318.0	13.3
WA	Health	Medical issues	1229.0	1626.0	2855.0	11.5
WA	Health	Problematic drug or substance use	890.0	1088.0	1978.0	7.9
WA	Health	Problematic alcohol use	455.0	646.0	1101.0	4.4
WA	Other	Other	4631.0	6212.0	10843.0	43.5

Data Cleanup & Exploration - Jupyter Gmaps

- Determine whether there are sufficient homelessness services in WA

Steps:

1. Obtain coordinates and radius for each region
2. Perform Nearby Search API search to identify homelessness services in each region
3. Create heatmap, weighted by number of clients, with markers for homelessness services

3	State/territory	Region Code	Region Name	Number
0	WA	501.0	Bunbury	1598
1	WA	502.0	Mandurah	1266
2	WA	503.0	Perth - Inner	1527
3	WA	504.0	Perth - North East	1244
4	WA	505.0	Perth - North West	1772
5	WA	506.0	Perth - South East	2607
6	WA	507.0	Perth - South West	3083
7	WA	509.0	Western Australia - Wheat Belt	1308
8	WA	510.0	Western Australia - Outback (North)	5712
9	WA	511.0	Western Australia - Outback (South)	2184

Data Cleanup & Exploration - Jupyter Gmaps (cont.)

- Found table detailing postcodes within each region
- Cleaned data to only state postcodes within WA
- Use coordinates of each postcode, to calculate a midpoint and radius of each region

	long	lat	SA4_CODE_2016	postcode	locality
331	131.298809	-21.949513	510.0	872	GIBSON DESERT NORTH
332	125.984184	-24.947259	511.0	872	GIBSON DESERT SOUTH
352	126.954107	-23.280767	510.0	872	KIWIRRKURRA
355	129.836553	-22.567705	510.0	872	LAKE MACKAY
368	128.115080	-25.270732	511.0	872	NGAANYATJARRA-GILES
...	...	...	...	...	...
17591	116.009575	-32.039597	506.0	6989	MADDINGTON
17592	116.008461	-32.060407	506.0	6990	GOSNELLS
17593	116.095955	-32.097880	506.0	6991	KELMSCOTT
17594	115.920395	-31.964503	506.0	6992	ARMADALE
17595	116.095955	-32.097880	506.0	6997	KELMSCOTT DC

1921 rows × 5 columns

Data Cleanup & Exploration - Jupyter Gmaps (cont.)

- Solution was to use average latitude and longitude
- Used haversine formula to calculate the radius of each area

```python
#Loop through region codes, obtaining max, min and average latitude and longitude, and radius of the region
#Assume each region is a circle
for index, row in clean_places_df.iterrows():
    #Obtain max, min and average coordinates for each region
    region_code = row[1]
    max_lat = wa_postcodes["lat"].loc[wa_postcodes["SA4_CODE_2016"] == region_code].max()
    min_lat = wa_postcodes["lat"].loc[wa_postcodes["SA4_CODE_2016"] == region_code].min()
    max_long = wa_postcodes["long"].loc[wa_postcodes["SA4_CODE_2016"] == region_code].max()
    min_long = wa_postcodes["long"].loc[wa_postcodes["SA4_CODE_2016"] == region_code].min()
    mid_lat = wa_postcodes["lat"].loc[wa_postcodes["SA4_CODE_2016"] == region_code].mean()
    mid_long = wa_postcodes["long"].loc[wa_postcodes["SA4_CODE_2016"] == region_code].mean()
    clean_places_df.loc[index, "Mid Latitude"] = mid_lat
    clean_places_df.loc[index, "Mid Longitude"] = mid_long

    #Calculate radius of each region
    max_lat, min_lat, max_long, min_long = map(radians,[max_lat, min_lat, max_long, min_long])
    dlat = max_lat - min_lat
    dlong = max_long - min_long
    a = sin(dlat/2)**2 + cos(min_lat) * cos(max_lat) * sin(dlong/2)**2
    c = 2 * asin(sqrt(a))
    r = 6371 # Radius of earth in kilometers. Determines return value units.
    radius = c * r *1000
    clean_places_df.loc[index, "Radius (m)"] = radius
clean_places_df
```

Data Cleanup & Exploration - Jupyter Gmaps (cont.)

- Use midpoints and radius obtained in previous step
- Iterated through dataframe, using Nearby Search API to identify homelessness services in WA

```python
#Perform search of homeless shelters using Nearby Places Google API
service_name = []
service_latitude = []
service_longitude = []


for index, rows in clean_places_df.iterrows():

    url = "https://maps.googleapis.com/maps/api/place/nearbysearch/json"
    params = {
        "location":(f'{rows["Mid Latitude"]},{rows["Mid Longitude"]}'),
        "keyword":"homeless service",
        "radius":{rows["Radius (m)"]},
        "key":{gkey}
    }

    response = requests.get(url, params = params).json()

    if response['status'] == "ZERO_RESULTS":
        print(f"No data could be retrieved for region: {rows['Region Name']}")

    else:
        print(f"Retrieving results for region: {rows['Region Name']}")
        for record in response["results"]:
            service_name.append(record["name"])
            service_latitude.append(record["geometry"]["location"]["lat"])
            service_longitude.append(record["geometry"]["location"]["lng"])
```

Data Cleanup & Exploration - Jupyter Gmaps (cont.)

- Use midpoints and radius obtained in previous step
- Iterated through dataframe, using Nearby Search API to identify homelessness services in WA
- Nearby Search API did not return results for remote areas

```
No data could be retrieved for region: Bunbury
Retrieving results for region: Mandurah
Retrieving results for region: Perth - Inner
Retrieving results for region: Perth - North East
Retrieving results for region: Perth - North West
Retrieving results for region: Perth - South East
Retrieving results for region: Perth - South West
No data could be retrieved for region: Western Australia - Wheat Belt
No data could be retrieved for region: Western Australia - Outback (North)
No data could be retrieved for region: Western Australia - Outback (South)
```

Data Cleanup & Exploration - Jupyter Gmaps (cont.)

- Manually created list of homelessness services in regional WA, with service name and address, using Google Maps
- Used Geocoding API to obtain coordinates of each service address
- Changed column headers to match services dataframe, for concatenation

	homeless_service_name	address	latitude	longitude
0	Old Theda	Theda Station Airport, Drysdale River WA 6740		
1	Garl Garl Walbu Sobering Up Shelter	23 Stanley Street, Derby WA 6728		
2	Ngnowar-Aerwah Aboriginal Corporation	471 Great Northern Highway, Wyndham WA 6740		
3	Centacare Kimberley	23 Robinson Street, Broome WA 6725		
4	Australian Red Cross	2/38 Frederick Street, Broome WA 6725		

```python
#Use Geocoding API to obtain coordinates for each service
for index, rows in regional_services.iterrows():

    url = "https://maps.googleapis.com/maps/api/geocode/json?"

    params = {
        "address": (f"{rows['address']}"),
        "key":{gkey}
    }

    response = requests.get(url,params = params).json()
    try:
        lat = response["results"][0]["geometry"]["location"]["lat"]
        long = response["results"][0]["geometry"]["location"]["lng"]
        regional_services.loc[index, "latitude"] = lat
        regional_services.loc[index, "longitude"] = long
        print(f"Retrieving coordinates of service: {rows['homeless_service_name']}")
    except:
        print(f"Could not retrieve coordinates of service: {rows['homeless_service_name']}")
```

Data Cleanup & Exploration - Jupyter Gmaps (cont.)

- Use jupyter gmaps to create visual representation of services in Australia, compared to the number of clients per region
- Added marker locations for each homelessness service
- Added heatmap layer for clients within each region


```
#Configure API key
gmaps.configure(api_key = gkey)

#Set marker locations
marker_locations = joined_services[["Services Latitudes", "Services Longitudes"]]
locations = clean_places_df[["Mid Latitude", "Mid Longitude"]]
client_numbers = clean_places_df["Number"].astype(float)

# Plot Heatmap
fig = gmaps.figure()

#Add marker layer
markers = gmaps.marker_layer(marker_locations, info_box_content = services_info)
fig.add_layer(markers)

#Add heat layer
heat_layer = gmaps.heatmap_layer(locations, weights=client_numbers,
                                 dissipating=False, max_intensity=4000,
                                 point_radius=1)
fig.add_layer(heat_layer)

# Display figure
fig
```

Data analysis - demographic

- Pie charts and bar charts used to visualise demographic, as we analysing categories of people
  - Age
  - Gender
  - Cultural background
- Pie charts and bar charts allow us to compare descriptors of people, to visualise the 'typical homeless client'
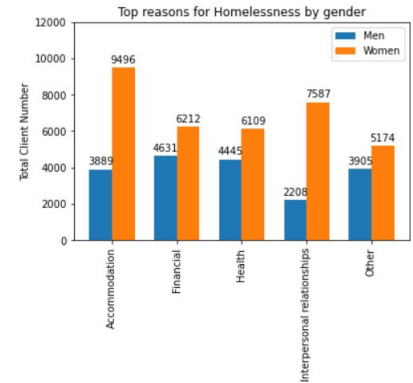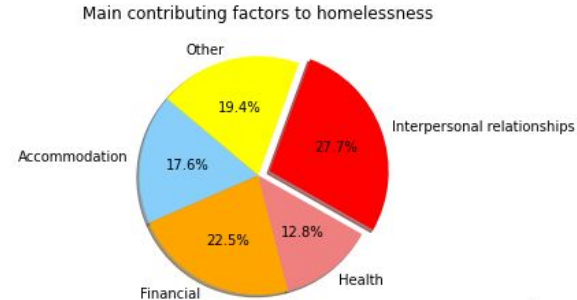

Number of clients by age group and gender 2019-20
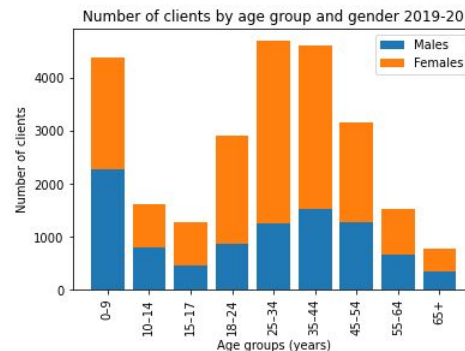
Ratio of indigenous and non-indigenous clients 2019-2020

Data analysis - contributors

- Pie chart used to visualise contributors to homelessness, as we are identifying the biggest reasons for homelessness
- Dissected reasons for homelessness by gender, to determine whether males and females are impacted by these contributors in the same way
- Dissected largest contributor to homelessness by sub-categories, to paint a more concise picture of how people are affected by homelessness

Main contributing factors to homelessness

Other
19.4%
Interpersonal relationships
27.7%
Accommodation
17.6%
Financial
22.5%
Health
12.8%

Top reasons for Homelessness by gender

Men / Women

	Men	Women
Accommodation	3889	9496
Financial	4631	6212
Health	4445	6109
Interpersonal relationships	2208	7587
Other	3905	5174

Data analysis - services

- Used bar chart to compare average WA funding per client for different services against average National funding per client per service
- Used bar chart to quantify and compare the capacity of homelessness agencies
- Used pie chart to visualise types of unmet needs, with bar chart to breakdown the largest unmet need by gender
- Used gmaps visualisation, comparing the number of clients per region, with the number of services per region. Able to assess remoteness of reach region
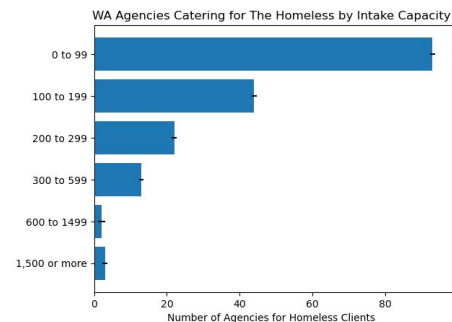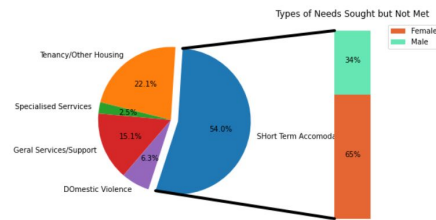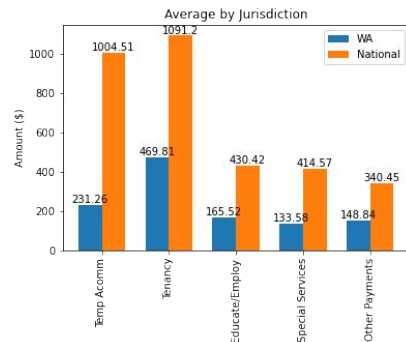
Conclusions - demographic

Female aged between 18 and 44, followed by both genders aged 0-9.

58.7% -Lone Adult

31.3%- Single parent with children

14.6% Receiving no income

71.6% on Government Benefits, 5.9% awaiting support.

1 in 10 Employed, 68% in part-time positions, predominantly female

Referred by agencies such as Outreach workers, Centrelink, Hospitals,
Child Protection agencies and Police.

2 in 5 will experience some form of mental health issue

1 in 10 will have substance abuse issues

Number of clients by age group and gender 2019-20
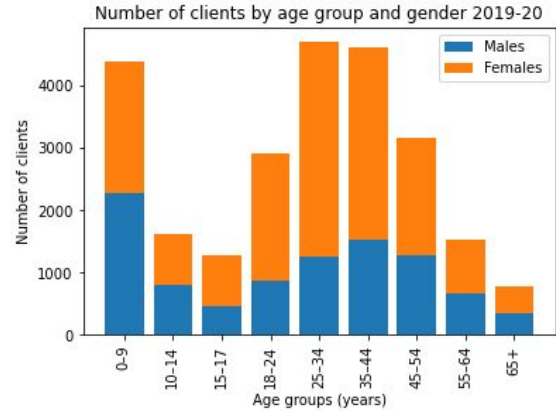
House/townhouse/flat	118	0.5
Caravan	3,138	12.6
Tent	1,346	5.4
Cabin	1,126	4.5
Boat	38	0.2
Improvised building/dwelling	2,008	8
No dwelling/street/park/in the open	11,692	46.8
Motor vehicle	5,487	21.9
Emergency accommodation	30	0.1
Other	20	0.1
Not stated	8	..
Total	25,011	100

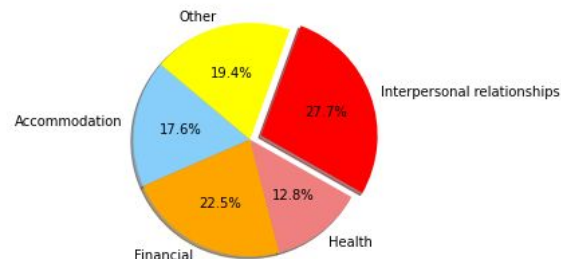Ratio of indigenous and non-indigenous clients 2019-202
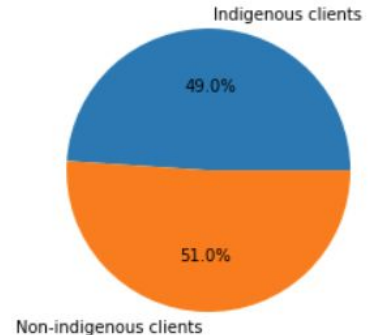
Indigenous clients

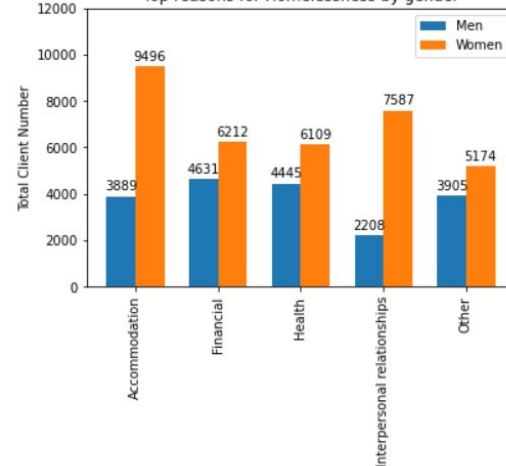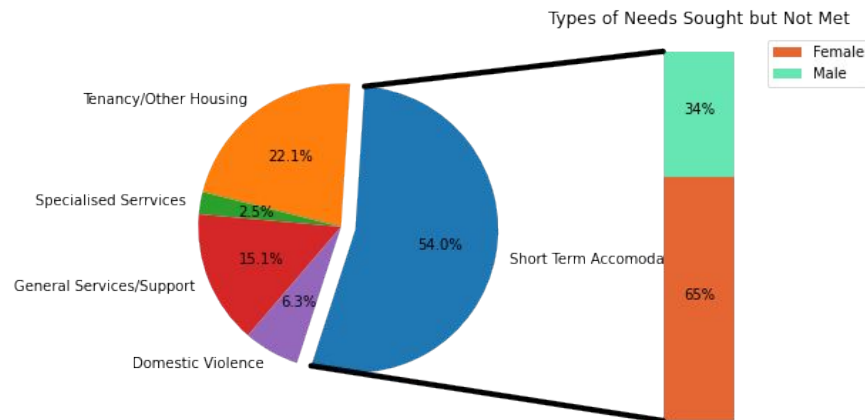49.0%

51.0%

Non-indigenous clients

Conclusions - contributors

- There are 5 main contributing factors to homelessness.
- Interpersonal Relationships issues, Health issues, Financial, housing crisis and other issues.
- Interpersonal Relationship issues are the main contributing factors which represents 27.7%
- 17.6% are reporting the housing crisis, tenancy evictions and affordability as a main reason for homelessness
- 1.8% population growth in 2019-2020

Main contributing factors to homelessness

Other

Interpersonal relationships

19.4%

27.7%

Accommodation

17.6%

12.8%

22.5%

Health

Financial

Top reasons for Homelessness by gender

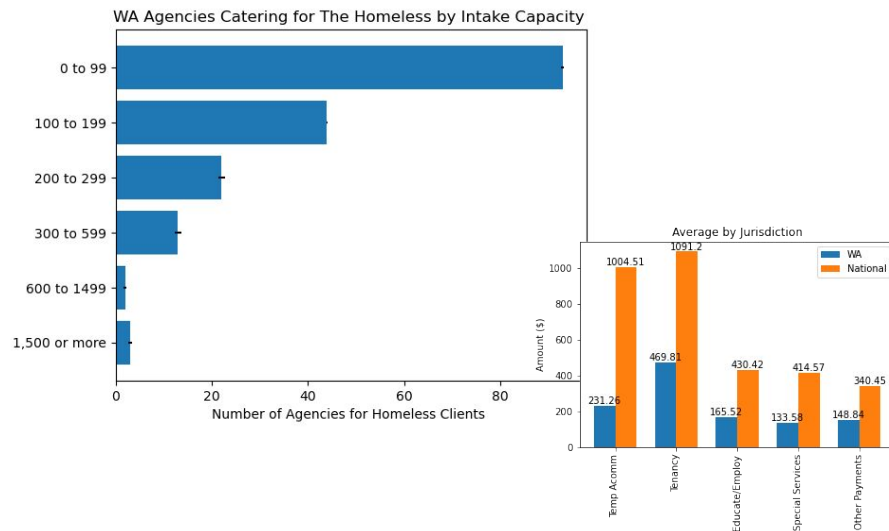|	Men	Women
Accommodation	3889	9496
Financial	4631	6212
Health	4445	6109
Interpersonal relationships	2208	7587
Other	3905	5174

Conclusions - contributors

- There are 5 main contributing factors to homelessness.
- Interpersonal Relationships issues, Health issues, Financial, the housing crisis and other issues.
- Alcohol and substance abuse are not the main reasons for homelessness but interpersonal relationships is the main factor.
- One of the main source of interpersonal relationship issues is domestic violence, where women age 25-34 are the most affected.

Conclusions - services

- **46.8%- Sleep in the street/park/open areas**
- 65% of recipients were Females.
- Of the 49.4% of Clients with Case Management plans, 78.3% had some goals met.
- All goals met 15.4%, No goals met 6.3%
- **50.6% had No Case Management**
- Domestic Violence surpassing specialised services such as drug use and mental health.
- **Perth has 177 agencies, catering for under 99 people. Only 5 can cater for than 600 people.**
- 57.1 requests are unable to be met daily, mainly due to lack of accommodation.
- **Perth has 177 agencies, catering for under 99 people. Only 5 can cater for than 600 people.**

WA Agencies Catering for The Homeless by Intake Capacity

Average by Jurisdiction
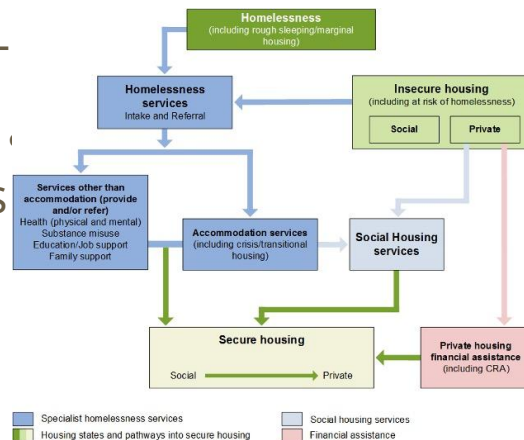

Types of Needs Sought but Not Met

Conclusions - services (cont.)

- 1. Perth has the greatest number of clients (10,223), followed by the WA Outback (North) (5,712).
- 2. Based on the visual, Perth has a lot more services for the number of clients, in comparison to WA Outback (North). This indicates that WA Outback (North) have a smaller capacity to service their clients.
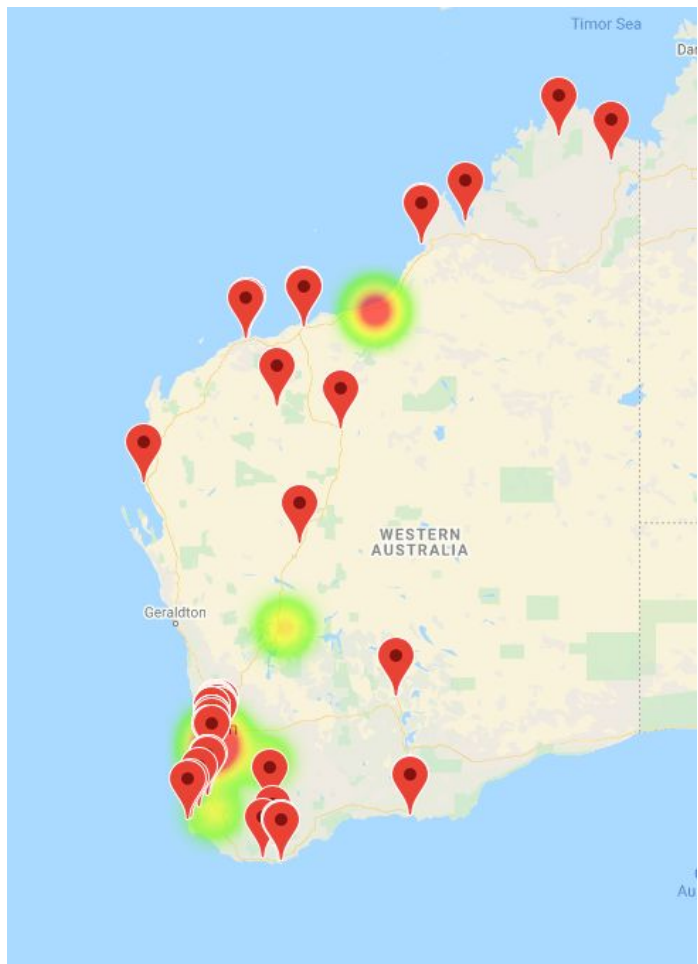
Post Mortem

- Initially wanted to identify five main factors affecting homelessness, however we discovered there was a multitude of significant reasons
- Data was not up to date, we were only able to obtain information from 2019/20 period
- 2021 Census won't be released until 2022/23. T
  is only representative of homelessness clients,
  not represent the total population of homeless

Questions?