



Maximizing Housing Resources for the Vancouver Homeless

A Brief Introduction to Homelessness in Vancouver

Homelessness: one of the biggest problems the city of Vancouver has been facing for the past few decades.

Generally attributed to

- The lack of income
- The increasing cost of housing
- The federal government cutting down funding for national affordable housing programs during the 1980s

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The rate of homelessness in Vancouver has skyrocketed since 1999.



Its effects are most widely seen in **Eastside Vancouver**, an area now notorious for poverty and crime.

The Definition of Homelessness

A crisis caused by the absence of proper shelter.

Also a cause of several significant health concerns such as mental health issues, alcohol and drug abuse, sexually transmitted diseases, malnutrition, etc.

The street homeless, as per the 2011 Metro Vancouver Homeless Count, have much more of a problem securing access to food.

Into Perspective

Homeless women have a **31** times higher death rate over the average Canadian mortality rates

Homeless men have a **9** times higher death rate over the average Canadian mortality rates.

172 out of 196 (or **88%** of the sampled homeless population) reported that they were victimized.

Over **50%** of the people surveyed felt that the judicial system and law enforcement in Vancouver often disregarded or remained unbothered by their situations.

From a 2010 report from Mario Berti, 'Handcuffed Access: Homelessness and the Justice System'

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Rationale

To reduce indifference towards the plight of the homeless in Vancouver.

To utilize the knowledge we gained from our linear programming course.

To find the best solution for the homelessness crisis, as students, but more importantly, as concerned citizens that care.

To help homeless people currently without any shelters to find a place in a shelter catering to their needs.

Our Project

To demonstrate how to maximize the number of people that can be in a Vancouver homeless shelter at one point.

As of March 2020, there are at least **2095** people who are currently homeless in Vancouver.

It is estimated that there are **1570** homeless men, **546** homeless women, and **54** homeless youth.

This is significantly more than there are beds available across all of the 19 homeless shelters.

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Our Project

01

Limitations

Dependent on the number of beds in each shelter and the type of shelter (men only, female only, youth, all genders, or females and youth only).

02

Hypothesis

There will be a maximum number of homeless people that can be housed for a night and some will have to be left without a place

03

Applications

The homeless of Vancouver require more shelters thus a better handling of the situation on a municipal level.

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m	f	y	m+f
35			22
35	28		
36			20
			75
28			
60			
32	4		20
			72
		12	
40	20		

The Data

The primary dataset was found from Open Data Portal by the City of Vancouver, which provides the names of the shelters, the general area for the homeless shelter locations as well as their geographic coordinates, the type of shelter, and the phone number for the shelter.

As the capacity of a shelter may be confidential, we got permission from the managers and supervisors of the shelters. We also combined information from other online sources about capacity numbers to our dataset to have more accurate maximums.

Decision Variables

We have 59 decision variables.

Each variable is associated with a particular homeless shelter.

- variables for the number of beds for males m_i , where $i = 1, 2, \dots, 28$
- variables for the number of beds for females f_j , where $j = 1, 2, \dots, 25$
- variables for the number of beds for youths y_k , where $k = 1, 2, \dots, 6$

Objective Function

The objective function is the sum of all the decision variables mentioned above.

$$\begin{aligned} z = & m1 + m2 + m3 + m4 + m5 + m6 + m7 + m8 + m9 + m10 + m11 + \\ & m12 + m13 + m14 + m15 + m16 + m17 + m18 + m19 + m20 + m21 + \\ & m22 + m23 + m24 + m25 + m26 + m27 + m28 + f1 + f2 + f3 + f4 + f5 + f6 + f7 \\ & + f8 + f9 + f10 + f11 + f12 + f13 + f14 + f15 + f16 + f17 + f18 + f19 + f20 + \\ & f21 + f22 + f23 + f24 + f25 + y1 + y2 + y3 + y4 + y5 + y6 \end{aligned}$$

We chose this as our objective function because we want **to maximize the number of beds in all shelters.**

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Constraints

We had constraints corresponding to:

- shelters that provide beds for only adults who self-identify as male
- shelters that provide beds for only adults who self-identify as female
- shelters that provide beds for only youths
- shelters that provide beds for adults
- shelters that provide beds for youths and adults who self-identify as female
- the total number of homeless people in Vancouver
 - the total number of homeless adults who self-identify as male
 - the total number of homeless adults who self-identify as female
 - the Total number of homeless youth (under the age of 19)

Results

The total number of homeless people who self-identify as male

$$\begin{aligned} &= m1 + m2 + m3 + m4 + m5 + m6 + m7 + \\ &m8 + m9 + m10 + m11 + m12 + m13 + m14 \\ &+ m15 + m16 + m17 + m18 + m19 + m20 + \\ &m21 + m22 + m23 + m24 + m25 + m26 + \\ &m27 + m28 \\ &= 85 + 35 + 36 + 28 + 60 + 32 + 40 + 40 + \\ &100 + 50 + 30 + 72 + 22 + 20 + 75 + 20 + 72 \\ &+ 29 + 75 + 10 + 40 + 40 + 40 + 18 + 20 + \\ &20 + 12 + 55 \\ &= 1176 \end{aligned}$$

The total number of homeless people who self-identify as female

$$\begin{aligned} &= f1 + f2 + f3 + f4 + f5 + f6 + f7 + f8 + f9 + \\ &f10 + f11 + f12 + f13 + f14 + f15 + f16 + f17 \\ &+ f18 + f19 + f20 + f21 + f22 + f23 + f24 + \\ &f25 \\ &= 28 + 4 + 20 + 57 + 21 + 52 + 16 + 0 + 0 + \\ &0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 \\ &+ 0 + 0 + 0 + 27 \\ &= 225 \end{aligned}$$

The total number of homeless people who are youths

$$\begin{aligned} &= y1 + y2 + y3 + y4 + y5 + y6 \\ &= 12 + 2 + 1 + 3 + 29 + 7 \\ &= 54 \end{aligned}$$

Results, Analyzed.

The total number of homeless people who self-identify as male

As there is a total of 1570 homeless people who self-identify as male in total in Vancouver, only 1176/1570 or 74.90% can get access to a bed for a night.

The total number of homeless people who self-identify as female

As the total of 546 homeless people who self-identify as female in total in Vancouver, only 225/546 or 41.21% can get access to a bed for a night.

The total number of homeless people who are youths

We expected this value to be 54 as we have set the number of youth that should be provided with a bed equal to the total number (54) of youth in total in Vancouver.

Discussion

While there are currently enough resources and shelters to house the 1176 homeless men, 225 homeless women, and 54 homeless youth in Vancouver, there are still (at least) 546 homeless men and 321 homeless women without access to such facilities.

COVID 19

The data we used was pre-COVID, as the current 2021 values are much more limited in their accuracy and the total number of homeless in Vancouver has probably increased due to the pandemic.

Conclusion

With already a lack of affordable housing, a lack of needed services, and unemployment, among many other factors that lead to homelessness, Vancouver's homeless shelters are currently providing not enough beds and services to the homeless.

Future Scope

Future research on this topic should look more into the effects of COVID-19 on homelessness in Vancouver. It would better predict the city of Vancouver's responses to other extreme or disaster situations.

In a nutshell

With this project, we ultimately wanted to demonstrate how the current measures in place to deal with the homelessness crisis in Vancouver are severely insufficient.

The maximum number of homeless people in Vancouver that can get access to a roof over their head for the night still does not provide for the **867** (546 men + 321 women) we have calculated, let alone the probable increase seen in homelessness since March 2020.

To suggest **future solutions**, donations are always welcome at any of the shelters listed in the dataset. Accepted donations come in several forms, money being one, used clothing, and items such as non-perishable t also support shelters. To contact local representatives directly, their information can also be found on the City of Vancouver website.

THE END
