# Fatal Police Shootings in the USA

Andrei Martins Daniel Dedoukh Hidayat Rzayev Ivaylo Gatev Spyridon Ntokos

#### INTRODUCTION

- Data provided by Washington Post
- Cases filed between 2000 and 2017
- Deaths tracked:
  - shootings in which a police officer, in the line of duty,
     shot and killed a civilian
- Deaths not tracked:
  - o people in police custody
  - fatal shootings by off-duty officers
  - non-shooting deaths



### **Business Understanding**

- What affects the fatal outcome of police shootings?
  - o Race
  - Gender
  - Age
  - Mental illness

#### **Data Source**

- Fatal Police Shootings in the US
  - <a href="https://www.kaggle.com/kwullum/fatal-police-shootings-in-the-us">https://www.kaggle.com/kwullum/fatal-police-shootings-in-the-us</a>
- US Police Involved Fatalities
  - <a href="https://data.world/awram/us-police-involved-fatalities">https://data.world/awram/us-police-involved-fatalities</a>
- Datasets are in CSV format





#### **Data Understanding**

686 Nam Quoc N

21 Male

Asian

- 12.306 rows of data
- Unnecessary columns
  - manner\_of\_death
    - threat\_level
    - o flee
    - body\_camera

id	name	date	manner_/	of_death	armed	age	gender	race	city	state	signs_of_men	tal_illness	threat_level	l flee	body_camera
	3 Tim Elliot	2/1/2015	5 shot		gun	53	M	Α	Shelton	WA	TRUE		attack	Not fleeing	FALSE
	4 Lewis Lee Le	2/1/201	5 shot		gun	47	M	W	Aloha	OR	FALSE		attack	Not fleeing	FALSE
	5 John Paul Qu	3/1/201	5 shot and	Tasered	unarmed	23	M	Н	Wichita	KS	FALSE		other	Not fleeing	FALSE
	8 Matthew Ho	4/1/201	5 shot		toy weapon	1 32	M	W	San Francisco	CA	TRUE		attack	Not fleeing	FALSE
	9 Michael Rod	4/1/2015	5 shot		nail gun	39	M	Н	Evans	CO	FALSE		attack	Not fleeing	FALSE
7	11 Kenneth Joe	4/1/201	5 shot		gun	18	M	W	Guthrie	OK	FALSE		attack	Not fleeing	FALSE
,	13 Kenneth Arn	5/1/2015	5 shot		gun	22	M	Н	Chandler	AZ	FALSE		attack	Car	FALSE
,	15 Brock Nichol	6/1/201	5 shot		gun	35	M	W	Assaria	KS	FALSE		attack	Not fleeing	FALSE
1	16 Autumn Stee	6/1/2015	5 shot		unarmed	34	F	W	Burlington	IA	FALSE		other	Not fleeing	TRUE
UID	Name	Age		Gender	r Race	Dat	ie	City	State	M	lanner_of_death	Armed	Ment	al_illness	Flee
	133 Karen (	J. Chi	44	Female	Asiar	n	5/4/2000	Alameda	CA	Sh	not		FALSE	Ē	FALSE
	169 Chyrap	hone	26	Male	Asiar	n	6/2/2000	Fresno	CA	Sh	not		FALSE	Ē	FALSE
	257 Ming C	hinh L	36	Male	Asiar	n 8	/13/2000	Rosemead	CA	Sh	not	Gun	FALSE	<i>.</i>	FALSE
	483 Kinh Q	uoc Di	29	Male	Asiar	n	2/9/2001	Valley Gler	CA	Sh	not	Gun	FALSE	2	FALSE
	655 Vanpas	seuth	25	Male	Asiar	n 6	/10/2001	Riverside	CA	Sh	not	Knife	FALSE	į.	FALSE
	668 Bernar	do An	55	Male	Asiar	n 6	/23/2001	Henderson	NV	Sh	not	Knife	FALSE	Ē	FALSE
	677 Cuong	Tran	33	Male	Asiar	n 6	/30/2001	Syracuse	NY	Sh	not		TRUE		FALSE
							7/1/2001		OR	Sh		Knife	TRUE		FALSE
	1 1 1 1	3 Tim Elliot 4 Lewis Lee Le 5 John Paul Qu 8 Matthew Ho 9 Michael Rod 11 Kenneth Joe 13 Kenneth Arn 15 Brock Nichol 16 Autumn Stee UID Name 133 Karen C 169 Chyraph 257 Ming Ch 483 Kinh Qu 655 Vanpass 668 Bernard	3 Tim Elliot 2/1/2015 4 Lewis Lee Le 2/1/2015 5 John Paul QL 3/1/2015 8 Matthew Ho 4/1/2015 9 Michael Rod 4/1/2015 11 Kenneth Joe 4/1/2015 13 Kenneth Arn 5/1/2015 15 Brock Nichol 6/1/2015 16 Autumn Stee 6/1/2015	3 Tim Elliot 2/1/2015 shot 4 Lewis Lee Le 2/1/2015 shot 5 John Paul Qt 3/1/2015 shot and 8 Matthew Ho 4/1/2015 shot 9 Michael Rod 4/1/2015 shot 11 Kenneth Joe 4/1/2015 shot 13 Kenneth Arn 5/1/2015 shot 15 Brock Nichol 6/1/2015 shot 16 Autumn Stee 6/1/2015 shot  UID Name Age  133 Karen O. Chi 44 169 Chyraphone 26 257 Ming Chinh L 36 483 Kinh Quoc Di 29 655 Vanpaseuth 25 668 Bernardo An 55	3 Tim Elliot 2/1/2015 shot  4 Lewis Lee Le 2/1/2015 shot  5 John Paul Qu 3/1/2015 shot and Tasered  8 Matthew Ho 4/1/2015 shot  9 Michael Rod 4/1/2015 shot  11 Kenneth Joe 4/1/2015 shot  13 Kenneth Arn 5/1/2015 shot  15 Brock Nichol 6/1/2015 shot  16 Autumn Stee 6/1/2015 shot  UID Name Age Gender  133 Karen O. Chi 44 Female  169 Chyraphone 26 Male  257 Ming Chinh L 36 Male  483 Kinh Quoc D: 29 Male  655 Vanpaseuth 25 Male  668 Bernardo An 55 Male	3 Tim Elliot 2/1/2015 shot gun 4 Lewis Lee Le 2/1/2015 shot gun 5 John Paul Ql 3/1/2015 shot and Tasered unarmed 8 Matthew Ho 4/1/2015 shot toy weapon 9 Michael Rod 4/1/2015 shot nail gun 11 Kenneth Joe 4/1/2015 shot gun 13 Kenneth Arn 5/1/2015 shot gun 15 Brock Nichol 6/1/2015 shot gun 16 Autumn Stee 6/1/2015 shot gun 17 Mame Age Gender Race 133 Karen O. Chi 44 Female Asiar 169 Chyraphone 26 Male Asiar 169 Chyraphone 26 Male Asiar 483 Kinh Quoc Di 29 Male Asiar 655 Vanpaseuth 25 Male Asiar 668 Bernardo An 55 Male Asiar	3 Tim Elliot 2/1/2015 shot gun 53 4 Lewis Lee Le 2/1/2015 shot gun 47 5 John Paul Qt 3/1/2015 shot and Tasered unarmed 23 8 Matthew Ho 4/1/2015 shot toy weapon 32 9 Michael Rod 4/1/2015 shot nail gun 39 11 Kenneth Joe 4/1/2015 shot gun 18 13 Kenneth Arn 5/1/2015 shot gun 22 15 Brock Nichol 6/1/2015 shot gun 35 16 Autumn Stee 6/1/2015 shot unarmed 34  UID Name Age Gender Race Dat 133 Karen O. Chi 44 Female Asian 169 Chyraphone 26 Male Asian 8 169 Chyraphone 26 Male Asian 8 483 Kinh Quoc Di 29 Male Asian 6 655 Vanpaseuth 25 Male Asian 6	3 Tim Elliot 2/1/2015 shot gun 53 M 4 Lewis Lee Le 2/1/2015 shot gun 47 M 5 John Paul Qt 3/1/2015 shot and Tasered unarmed 23 M 8 Matthew Ho 4/1/2015 shot toy weapon 32 M 9 Michael Rod 4/1/2015 shot nail gun 39 M 11 Kenneth Joe 4/1/2015 shot gun 18 M 13 Kenneth Arn 5/1/2015 shot gun 22 M 15 Brock Nichol 6/1/2015 shot gun 35 M 16 Autumn Stee 6/1/2015 shot unarmed 34 F  UID Name Age Gender Race Date 133 Karen O. Chi 44 Female Asian 5/4/2000 169 Chyraphone 26 Male Asian 6/2/2000 257 Ming Chinh L 36 Male Asian 8/13/2000 483 Kinh Quoc D: 29 Male Asian 6/10/2001 655 Vanpaseuth 25 Male Asian 6/10/2001 668 Bernardo An 55 Male Asian 6/23/2001	3 Tim Elliot         2/1/2015 shot         gun         53 M         A           4 Lewis Lee Le         2/1/2015 shot         gun         47 M         W           5 John Paul Qt         3/1/2015 shot and Tasered         unarmed         23 M         H           8 Matthew Ho         4/1/2015 shot         toy weapon         32 M         W           9 Michael Rod         4/1/2015 shot         nail gun         39 M         H           11 Kenneth Joe         4/1/2015 shot         gun         18 M         W           13 Kenneth Arn         5/1/2015 shot         gun         22 M         H           15 Brock Nichol         6/1/2015 shot         gun         35 M         W           16 Autumn Ster         6/1/2015 shot         unarmed         34 F         W           UID         Name         Age         Gender         Race         Date         City           133 Karen O. Chi         44 Female         Asian         5/4/2000         Alameda           169 Chyraphone         26 Male         Asian         6/2/2000         Fresno           257 Ming Chinh L         36 Male         Asian         8/13/2000         Valley Glen           483 Kinh Quoc D:         29 Male         Asian </td <td>  3 Tim Elliot   2/1/2015   shot   gun   53 M   A   Shelton    </td> <td>  3 Tim Elliot   2/1/2015   shot   gun   53 M</td> <td>  3 Tim Elliot   2/1/2015   shot   gun   53 M</td> <td>  3 Tim Elliot   2/1/2015   shot   gun   53 M</td> <td>3 Tim Elliot 2/1/2015 shot gun 53 M A Shelton WA TRUE attack 4 Lewis Lee Le 2/1/2015 shot gun 47 M W Aloha OR FALSE attack 5 John Paul Qu 3/1/2015 shot and Tasered unarmed 23 M H Wichita KS FALSE other 8 Matthew Ho 4/1/2015 shot toy weapon 32 M W San Francisco CA TRUE attack 9 Michael Rod 4/1/2015 shot nail gun 39 M H Evans CO FALSE attack 11 Kenneth Joe 4/1/2015 shot gun 18 M W Guthrie OK FALSE attack 13 Kenneth Arn 5/1/2015 shot gun 22 M H Chandler AZ FALSE attack 15 Brock Nichol 6/1/2015 shot gun 35 M W Assaria KS FALSE attack 16 Autumn Stee 6/1/2015 shot unarmed 34 F W Burlington IA FALSE other  133 Karen O. 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Chi 44 Female Asian 5/4/2000 Alameda CA Shot FALSE 169 Chyraphone 26 Male Asian 6/2/2000 Fresno CA Shot Gun FALSE 165 Vanpaseuth 25 Male Asian 6/10/2011 Riverside CA Shot Gun FALSE 668 Bernardo An 55 Male Asian 6/23/2001 Henderson NV Shot Knife FALSE</td>	3 Tim Elliot   2/1/2015   shot   gun   53 M   A   Shelton	3 Tim Elliot   2/1/2015   shot   gun   53 M	3 Tim Elliot   2/1/2015   shot   gun   53 M	3 Tim Elliot   2/1/2015   shot   gun   53 M	3 Tim Elliot 2/1/2015 shot gun 53 M A Shelton WA TRUE attack 4 Lewis Lee Le 2/1/2015 shot gun 47 M W Aloha OR FALSE attack 5 John Paul Qu 3/1/2015 shot and Tasered unarmed 23 M H Wichita KS FALSE other 8 Matthew Ho 4/1/2015 shot toy weapon 32 M W San Francisco CA TRUE attack 9 Michael Rod 4/1/2015 shot nail gun 39 M H Evans CO FALSE attack 11 Kenneth Joe 4/1/2015 shot gun 18 M W Guthrie OK FALSE attack 13 Kenneth Arn 5/1/2015 shot gun 22 M H Chandler AZ FALSE attack 15 Brock Nichol 6/1/2015 shot gun 35 M W Assaria KS FALSE attack 16 Autumn Stee 6/1/2015 shot unarmed 34 F W Burlington IA FALSE other  133 Karen O. 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7/6/2001 Garden Grov CA

Shot

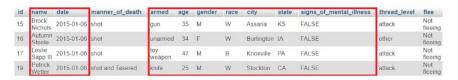
Gun

FALSE

FALSE

#### **Data Preparation**

- Harmonization
- Data cleansing
- Data quality

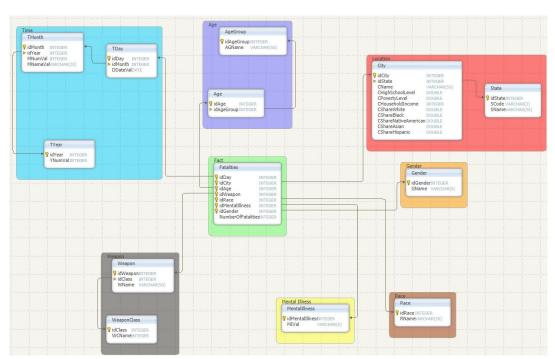




idFatality	FName	FDate	FCity	idState	FAge	FWeapon	FRace	FMentallilness	FGender
9071	BROCK NICHOLS	2015-01-06	ASSARIA	17	35	GUN	WHITE	FALSE	MALE
9072	AUTUMN STEELE	2015-01-06	BURLINGTON	16	34	UNARMED	WHITE	FALSE	FEMALE
9073	LESLIE SAPP III	2015-01-06	KNOXVILLE	39	47	TOY WEAPON	BLACK	FALSE	MALE
9074	PATRICK WETTER	2015-01-06	STOCKTON	5	25	KNIFE	WHITE	FALSE	MALE

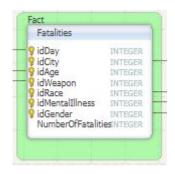
## **Modeling of CDWH**

- Fact table:
  - Fatalities
- Dimension tables:
  - o Time
  - Location
  - o Race
  - Gender
  - Weapon
  - Age
  - Mentalillnes



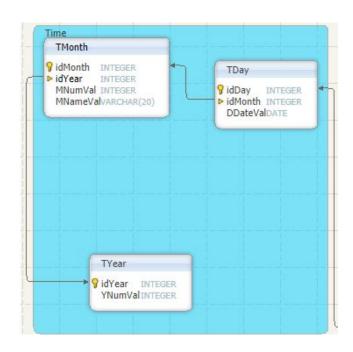
#### **Fact Table**

- Foreign keys to 7 dimensions
- Number of fatalities happened on a particular:
  - o Day
  - City
  - o etc.



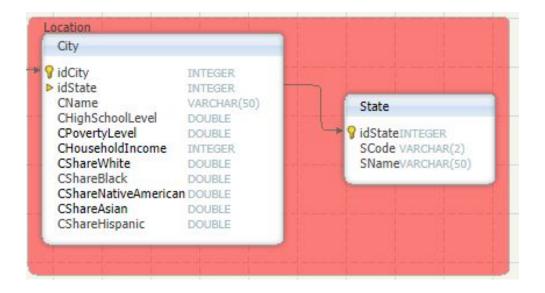
#### **Time Dimension**

- When did an accident take place?
  - Day
  - Month
  - Year



#### **Location Dimension**

- City
- State
- Each city belongs to a single state



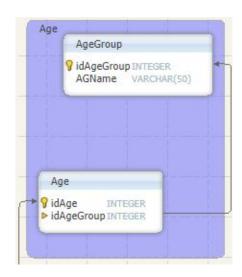
#### **Weapon Dimension**

- Weapon
  - 67 distinct weapons
- Grouped by WeaponClass
  - o 10 distinct weapon categories, such as
    - Ranged
    - Melee
    - Explosives
    - Vehicle
    - etc.



### **Age Dimension**

- Age
  - Age value as primary key
- Grouped by AgeGroup
  - Children
  - Teenagers
  - Adults
  - Elderly
  - Unknown



#### **Further Dimensions**

- Race
  - White
  - Black
  - Hispanic
  - Native American
  - Asian
  - Other
  - Unknown
- Gender
  - Male
  - Female
  - Unknown
- Mental Illness
  - o True
  - > False

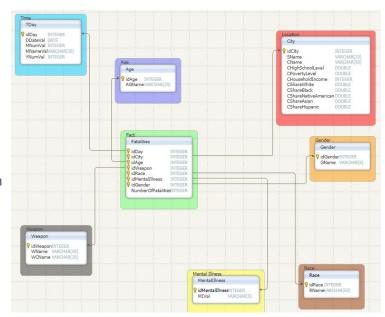






## **Modeling of DM**

- Fact table:
  - Fatalities
- Dimension tables:
  - Time Dimension: TDay, TMonth, TYear ⇒ TDay
  - Location Dimension: City, State ⇒ City
  - Weapon Dimension: Weapon, WeaponClass ⇒ Weapon
  - Age Dimension: Age, AgeGroup ⇒ Age
  - o Gender, Race and MentalllInes ⇒ kept the same



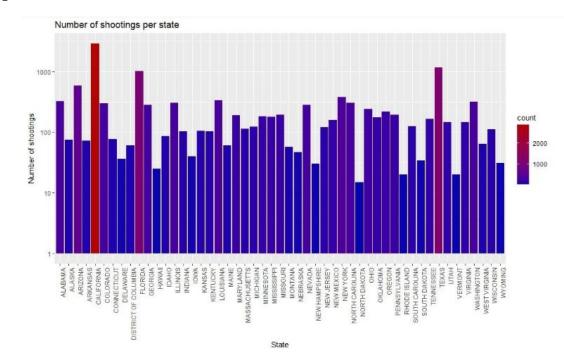
# **Analytics**

## **Basic summary statistics**

•	Data	set shape:	12.306 entries	21 different columns				
•	City 9	Share:						
	0	White:	min = 0%,	max = 100%,	average = 63,54%			
	o Black:		min = 0%,	max = 98,6%,	average = 16,4%			
	0	Native American:	min = 0%,	max = 99,7%,	average = 1,39%			
	0	Asian:	min = 0%,	max = 67,1%,	average = 5,25%			
	0	Hispanic:	min = 0%,	max = 98,2%,	average = 24,07%			
•	Age:		min = 1,	max = 107,	average = 34			
•	City I	Household income:	min = 12.083\$.	max = 194.336\$,	average = 49.746\$			
•	City I	High-School grads:	min =25.5%,	max = 100%,	average = 83,4%			
•	Belo	w Poverty level cities:	min = 0,6%,	max = 76,4%,	average = 19,68%			

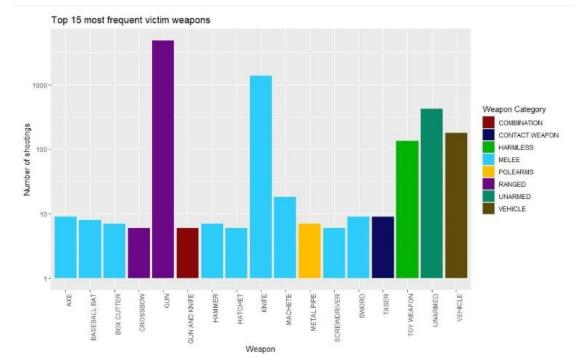
#### Number of shootings per state

- Highest rated states:
  - California
  - Texas
  - Florida
- Lowest rated states:
  - North Dakota
  - Vermont
  - Rhode Island



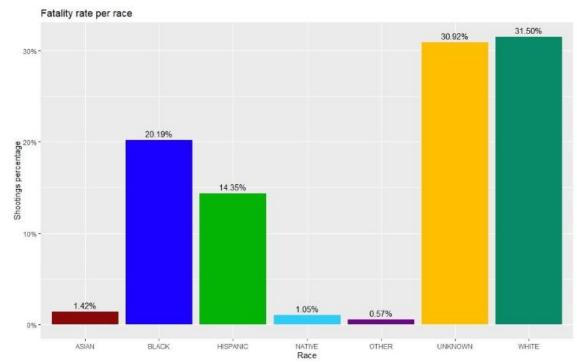
### Top 15 most frequent victim weapons

- Most used weapons
  - o Gun
  - Knife
  - Unarmed



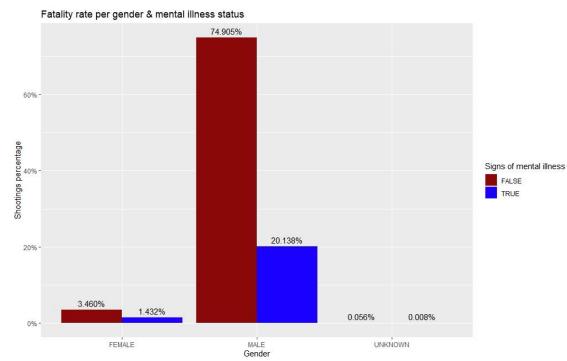
### Fatality rate per race

- Most involved races
  - o White
  - o Black
  - Hispanic
- High unknown rate
  - No final conclusion



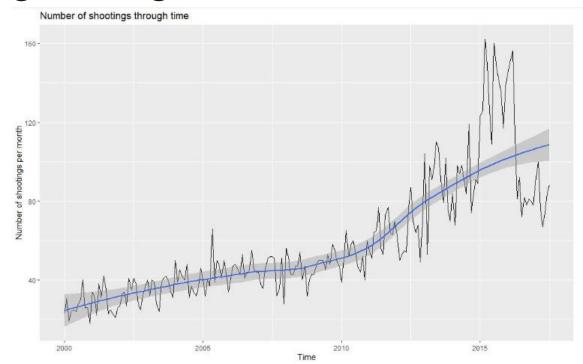
#### Fatality rate per gender & mental illness state

- Males
  - Most involved gender
  - o Relatively low mental illness rate
- Females
  - Least involved gender
  - Relatively high mental illness rate



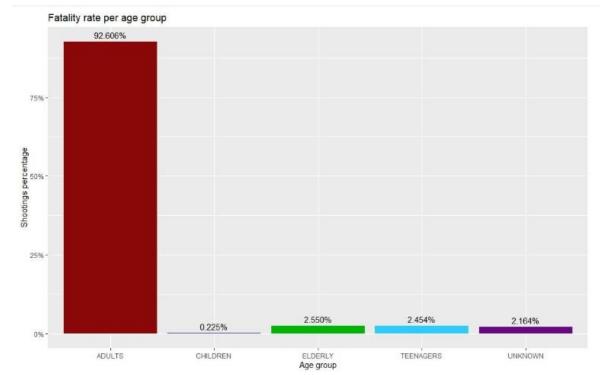
#### Number of shootings through time

- Gradual growth over time.
- Significant growth in 2015/16.
- 4x growth rate in 2017 compared to 2000.



# Fatality rate per age group

- Most involved age group
  - Adults
- Least involved age group
  - Children
- 1-year old children involved
- 107-year old elderly involved

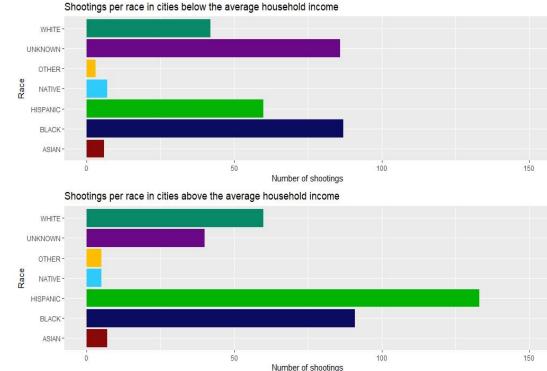


Shootings based on city's average household

income

 Most involved races in low household income cities:

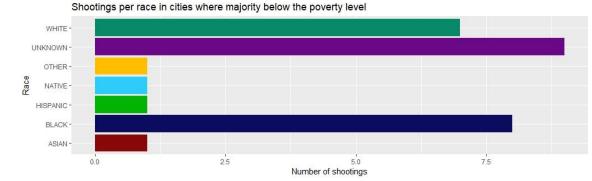
- Black
- Hispanic (excluding "Unknown")
- White
- Most involved races in high household income cities:
  - Hispanic
  - Black
  - White



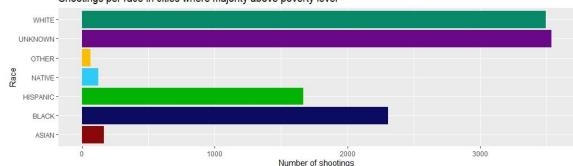
# Shootings based on city's

poverty level

- Only 28 cities with majority below poverty level
- Most involved races below poverty level:
  - Black (excluding "Unknown")
  - White
- Most involved races above poverty level:
  - White (excluding "Unknown")
  - Black
  - Hispanic

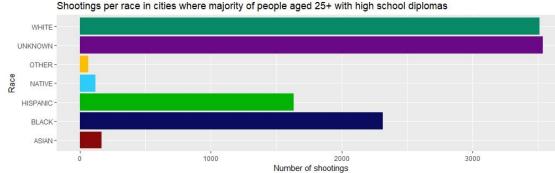


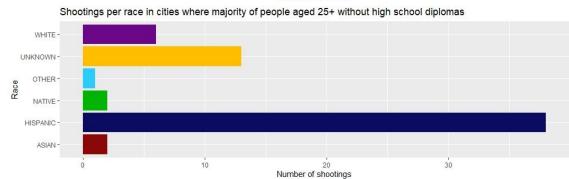




# Shootings based on city's high school level

- Only 46 cities with low graduation rate and no shooting involved Black people reported
- Most involved races in high graduation rate cities:
  - White (excluding "Unknown")
  - o Black
  - Hispanic
- Most involved races in low graduation race cities:
  - Hispanic
  - White (excluding "Unknown")





# Thank you for the attention!

Any questions?