



# 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:
  - people in police custody
  - fatal shootings by off-duty officers
  - non-shooting deaths





# Business Understanding

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



## Data Source

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

kaggle



data.world

# Data Understanding

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

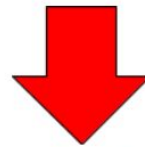
1	id	name	date	manner_of_death	armed	age	gender	race	city	state	signs_of_mental_illness	threat_level	flee	body_camera
2	3	Tim Elliot	2/1/2015	shot	gun	53	M	A	Shelton	WA	TRUE	attack	Not fleeing	FALSE
3	4	Lewis Lee Le	2/1/2015	shot	gun	47	M	W	Aloha	OR	FALSE	attack	Not fleeing	FALSE
4	5	John Paul Qu	3/1/2015	shot and Tasered	unarmed	23	M	H	Wichita	KS	FALSE	other	Not fleeing	FALSE
5	8	Matthew Ho	4/1/2015	shot	toy weapon	32	M	W	San Francisco	CA	TRUE	attack	Not fleeing	FALSE
6	9	Michael Rod	4/1/2015	shot	nail gun	39	M	H	Evans	CO	FALSE	attack	Not fleeing	FALSE
7	11	Kenneth Joe	4/1/2015	shot	gun	18	M	W	Guthrie	OK	FALSE	attack	Not fleeing	FALSE
8	13	Kenneth Arn	5/1/2015	shot	gun	22	M	H	Chandler	AZ	FALSE	attack	Car	FALSE
9	15	Brock Nichol	6/1/2015	shot	gun	35	M	W	Assaria	KS	FALSE	attack	Not fleeing	FALSE
10	16	Autumn Stee	6/1/2015	shot	unarmed	34	F	W	Burlington	IA	FALSE	other	Not fleeing	TRUE

1	UID	Name	Age	Gender	Race	Date	City	State	Manner_of_death	Armed	Mental_illness	Flee
2	133	Karen O. Chi	44	Female	Asian	5/4/2000	Alameda	CA	Shot		FALSE	FALSE
3	169	Chyraphone	26	Male	Asian	6/2/2000	Fresno	CA	Shot		FALSE	FALSE
4	257	Ming Chinh L	36	Male	Asian	8/13/2000	Rosemead	CA	Shot	Gun	FALSE	FALSE
5	483	Kinh Quoc D	29	Male	Asian	2/9/2001	Valley Glen	CA	Shot	Gun	FALSE	FALSE
6	655	Vanpaseuth	25	Male	Asian	6/10/2001	Riverside	CA	Shot	Knife	FALSE	FALSE
7	668	Bernardo An	55	Male	Asian	6/23/2001	Henderson	NV	Shot	Knife	FALSE	FALSE
8	677	Cuong Tran	33	Male	Asian	6/30/2001	Syracuse	NY	Shot		TRUE	FALSE
9	678	Sengsadaphe	29	Male	Asian	7/1/2001	Beaverton	OR	Shot	Knife	TRUE	FALSE
10	686	Nam Quoc N	21	Male	Asian	7/6/2001	Garden Grov	CA	Shot	Gun	FALSE	FALSE

# Data Preparation

- Harmonization
- Data cleansing
- Data quality

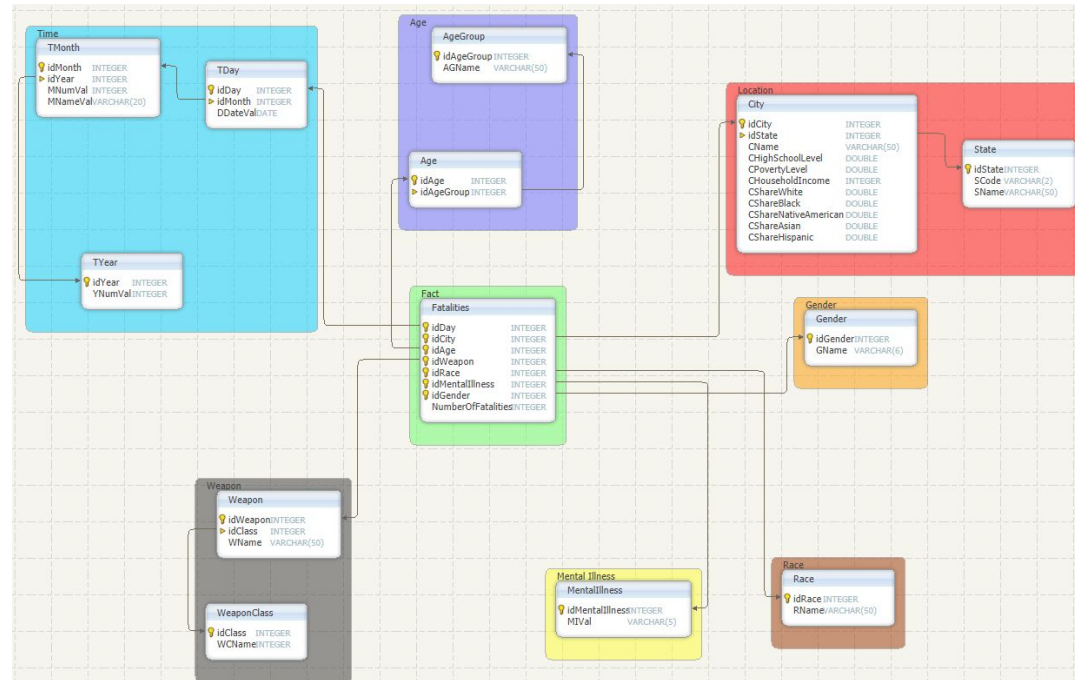
id	name	date	manner_of_death	armed	age	gender	race	city	state	signs_of_mental_illness	threat_level	flee
15	Brock Nichols	2015-01-06	shot	gun	35	M	W	Assaria	KS	FALSE	attack	Not fleeing
16	Autumn Steele	2015-01-06	shot	unarmed	34	F	W	Burlington	IA	FALSE	other	Not fleeing
17	Leslie Sapp III	2015-01-06	shot	toy weapon	47	M	B	Knoxville	PA	FALSE	attack	Not fleeing
19	Patrick Wetter	2015-01-06	shot and Tasered	knife	25	M	W	Stockton	CA	FALSE	attack	Not fleeing



idFatality	FName	FDate	FCity	idState	FAge	FWeapon	FRace	FMentalIllness	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:
  - Time
  - Location
  - Race
  - Gender
  - Weapon
  - Age
  - Mental illness



# Fact Table

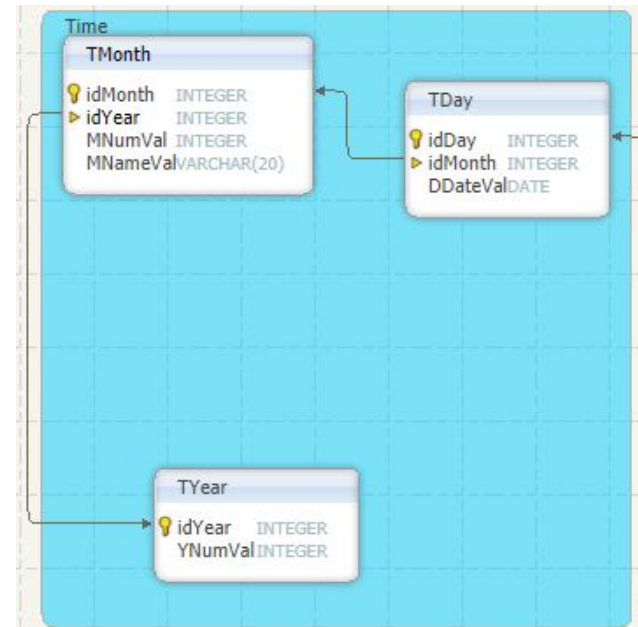
- Foreign keys to 7 dimensions
- Number of fatalities happened on a particular:
  - Day
  - City
  - etc.





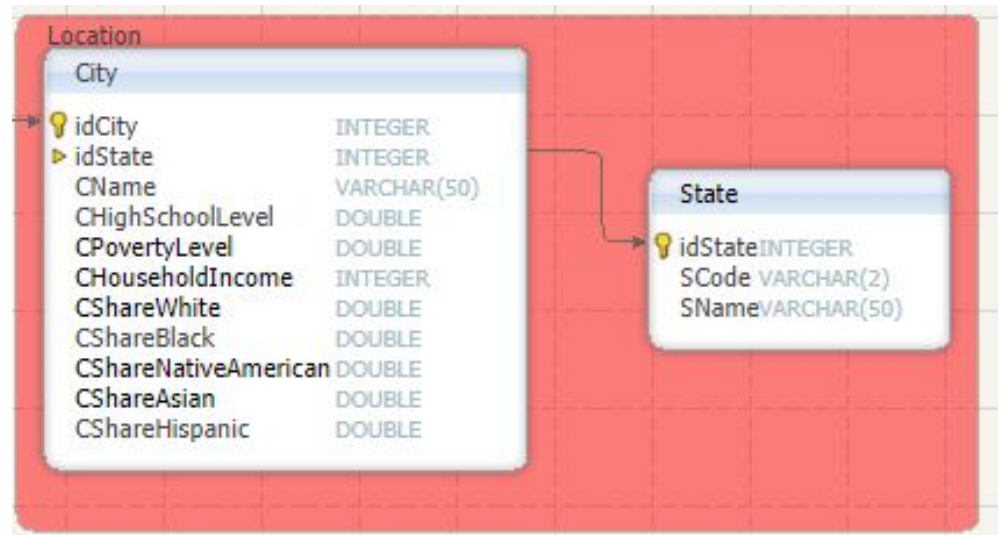
# Time Dimension

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



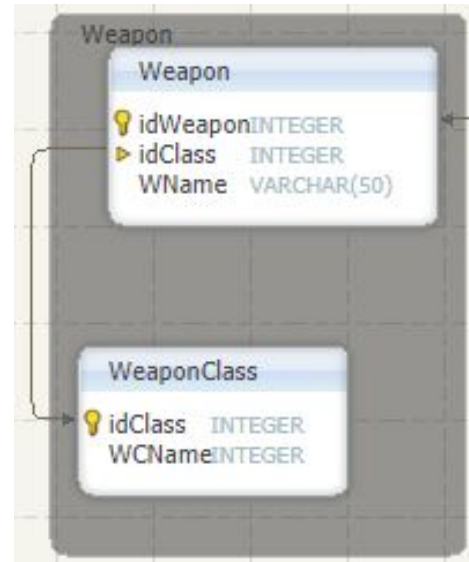
# Location Dimension

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



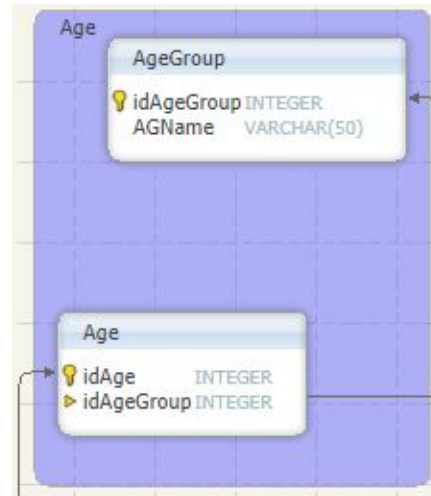
# Weapon Dimension

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



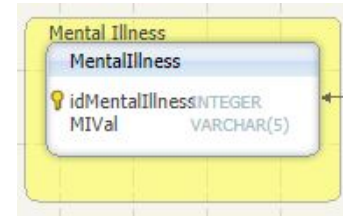
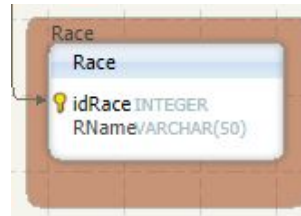
# Age Dimension

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



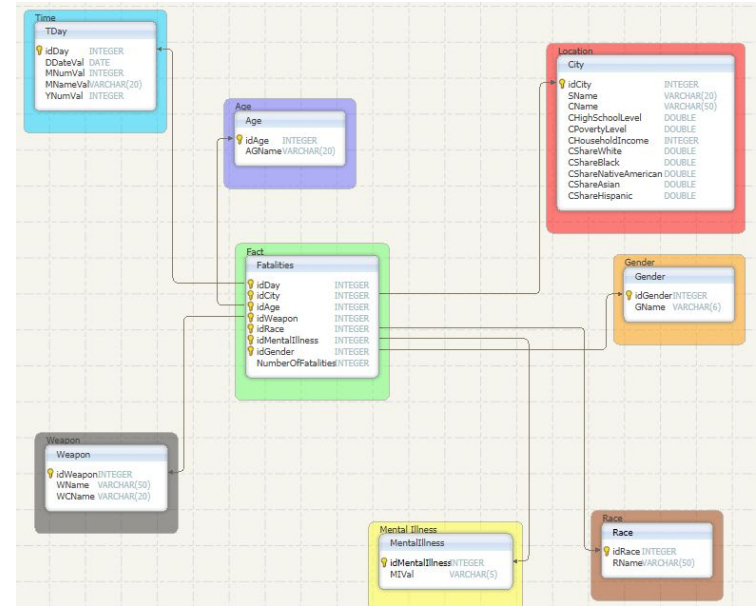
# Further Dimensions

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



# Modeling of DM

- Fact table:
  - Fatalities
- Dimension tables:
  - Time Dimension: TDay, TMonth, TYear  $\Rightarrow$  TDay
  - Location Dimension: City, State  $\Rightarrow$  City
  - Weapon Dimension: Weapon, WeaponClass  $\Rightarrow$  Weapon
  - Age Dimension: Age, AgeGroup  $\Rightarrow$  Age
  - Gender, Race and MentalIllness  $\Rightarrow$  kept the same





# Analytics



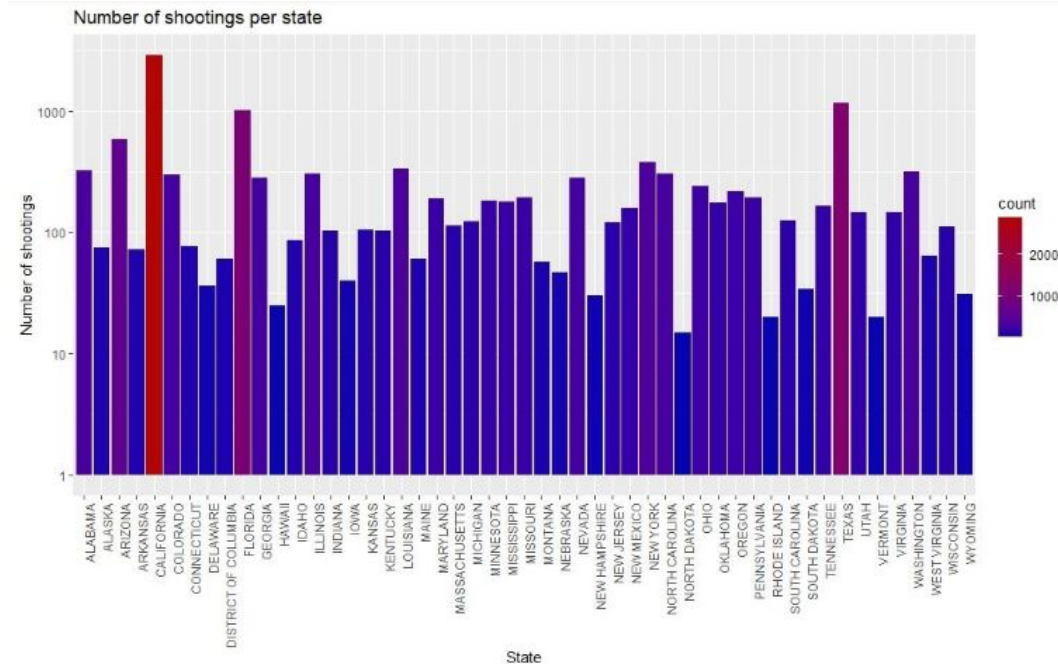
# Basic summary statistics

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



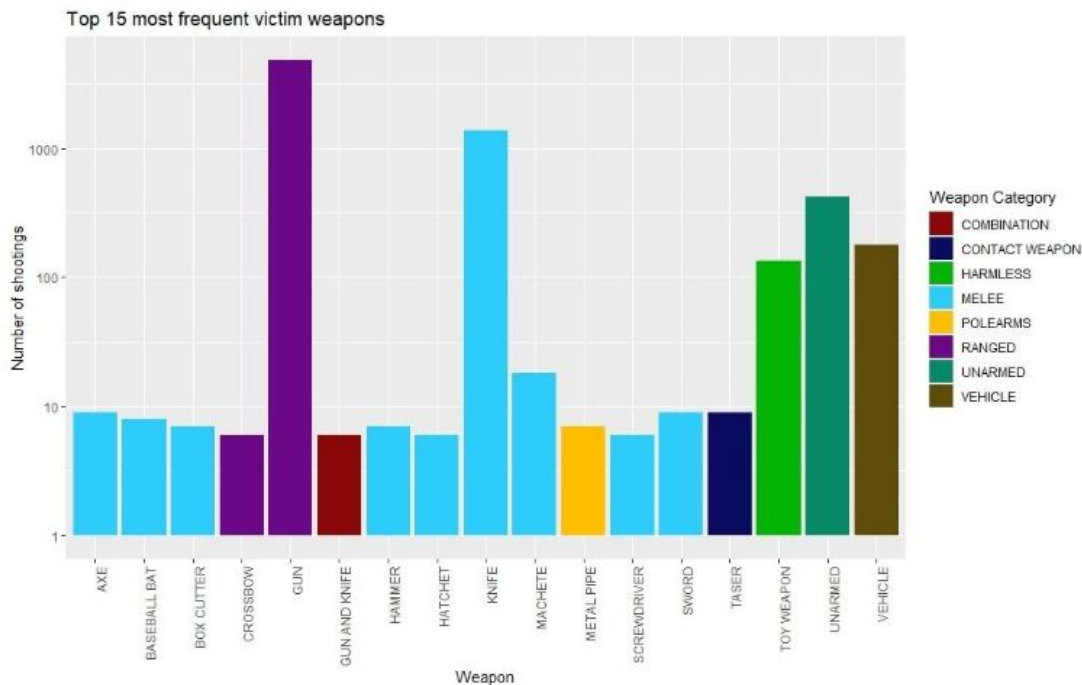
# Number of shootings per state

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



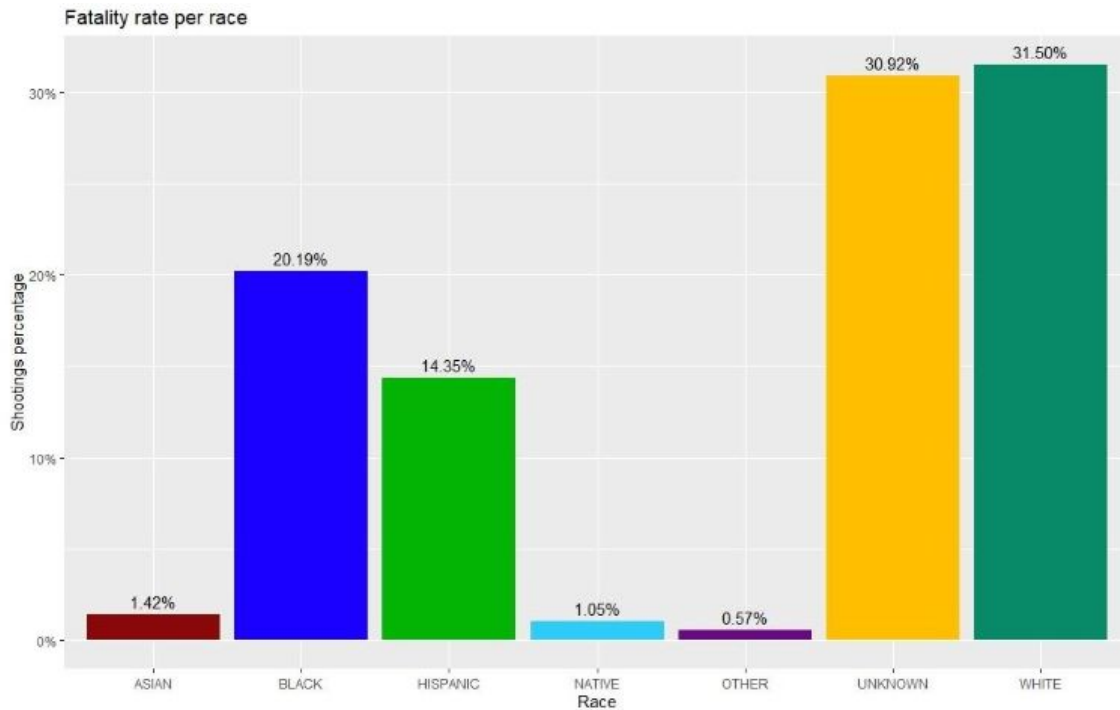
# Top 15 most frequent victim weapons

- Most used weapons
  - Gun
  - Knife
  - Unarmed



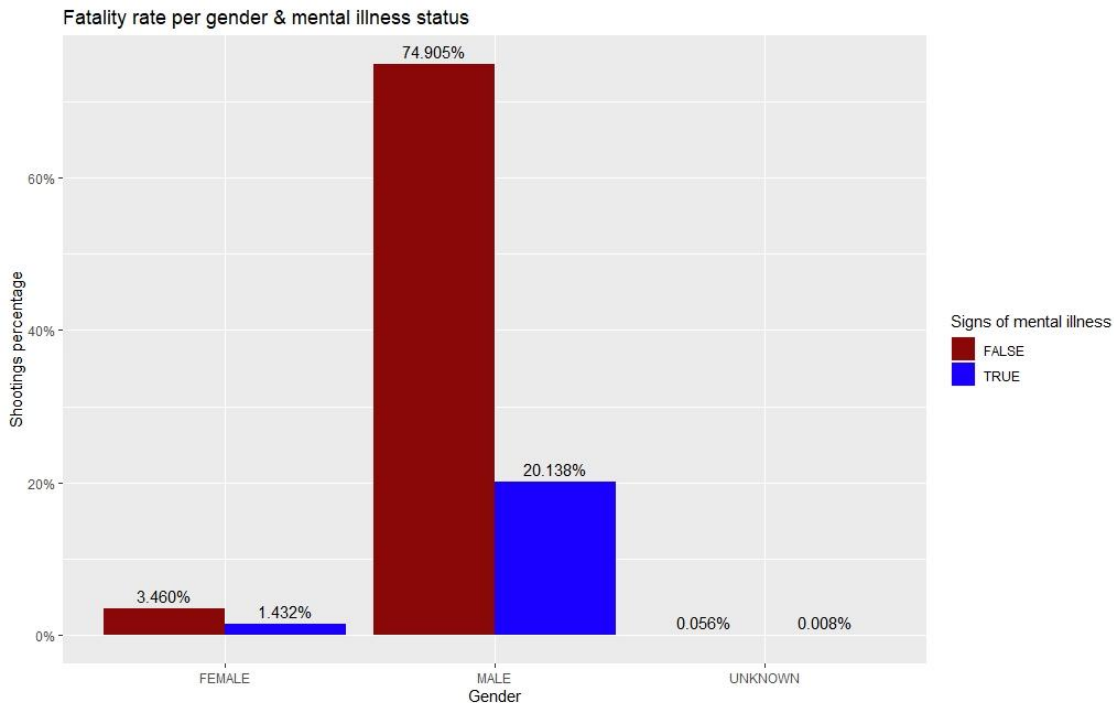
# Fatality rate per race

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



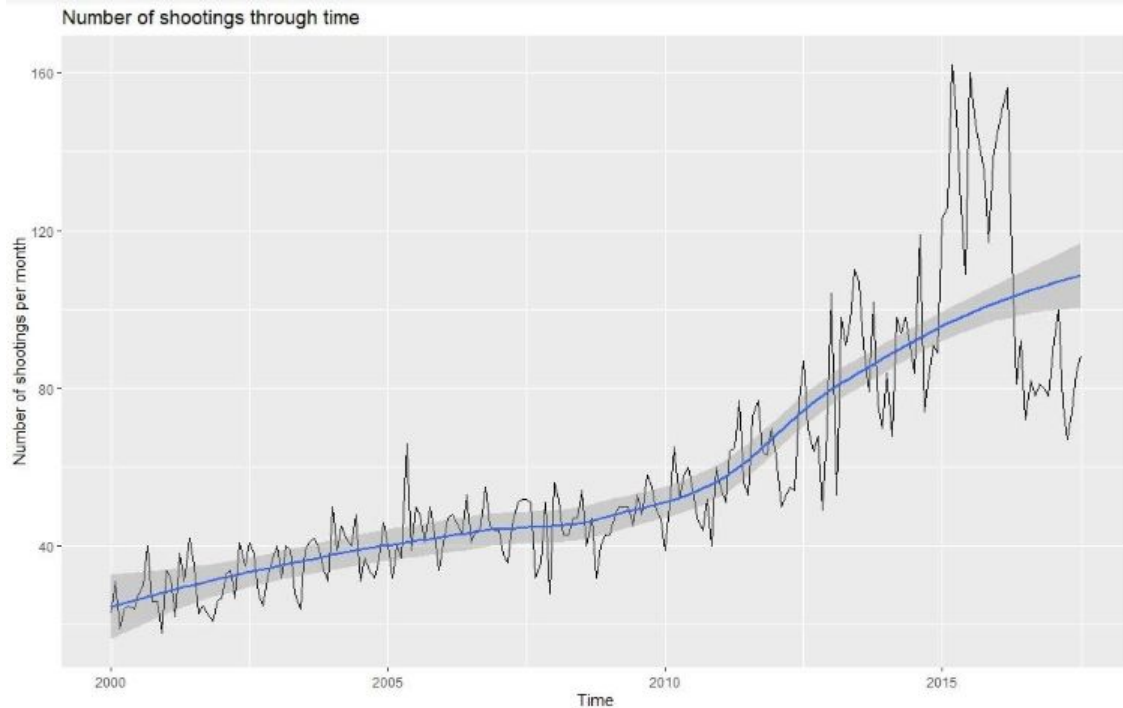
# Fatality rate per gender & mental illness state

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



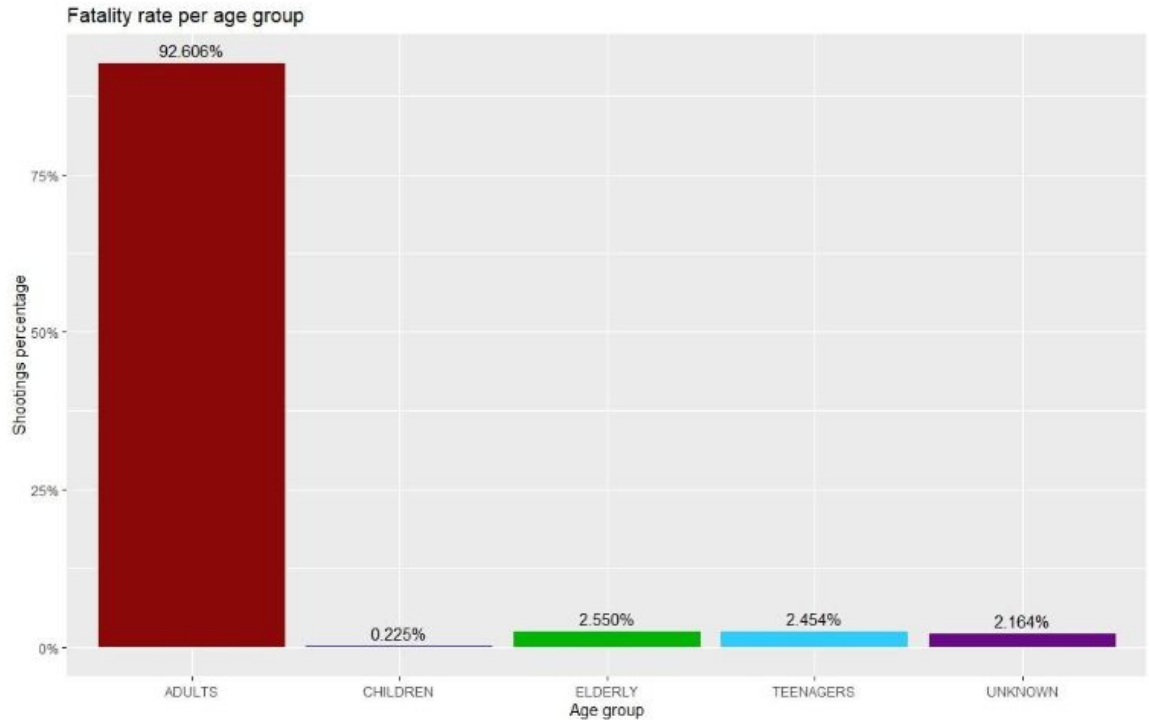
# Number of shootings through time

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



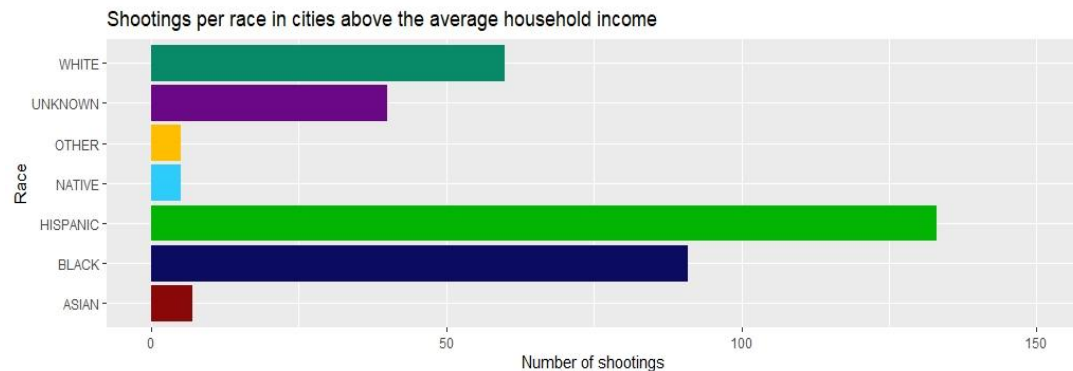
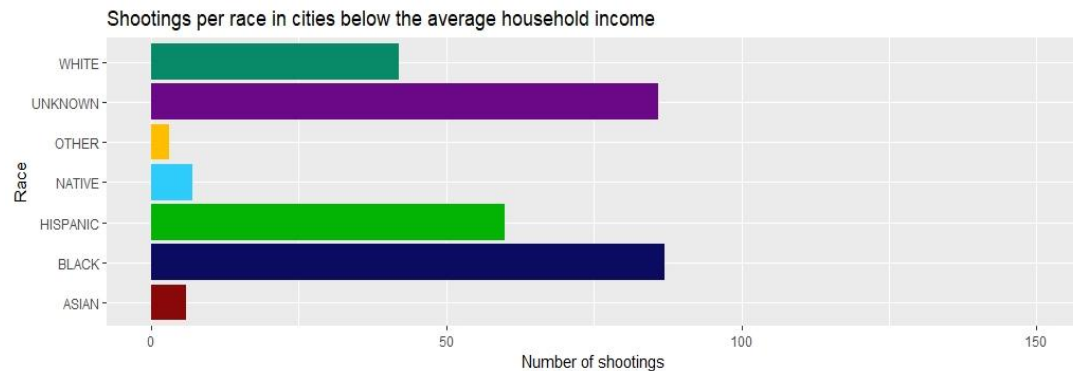
# Fatality rate per age group

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



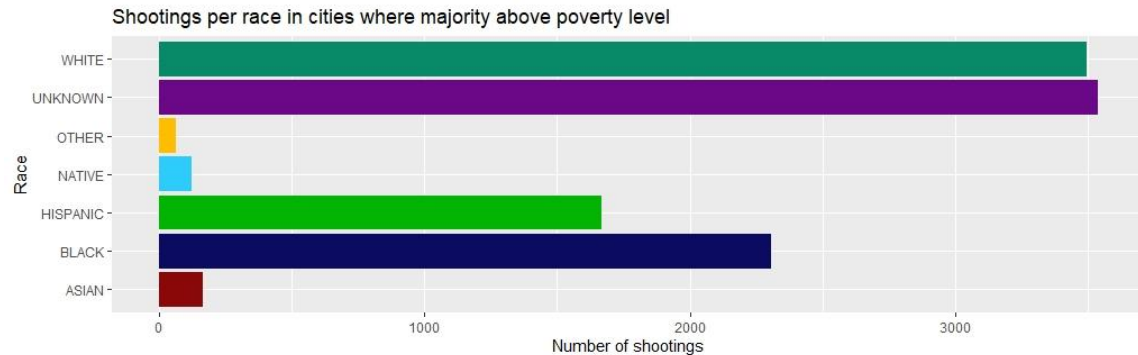
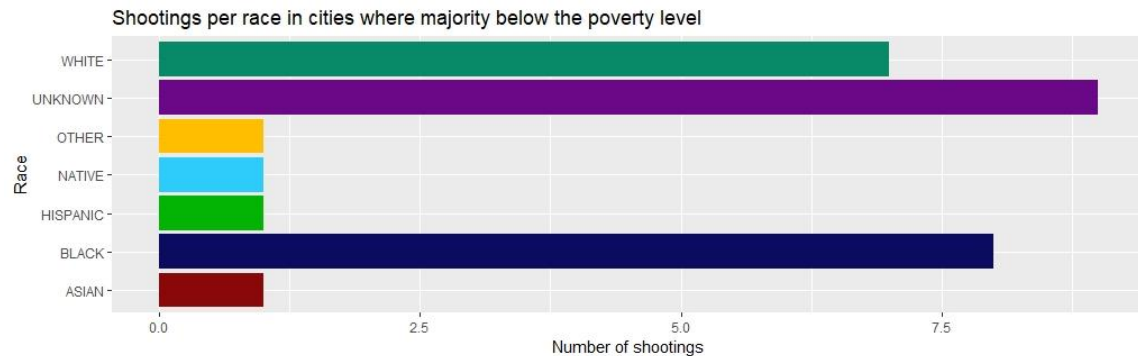
# Shootings based on city's average household income

- 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

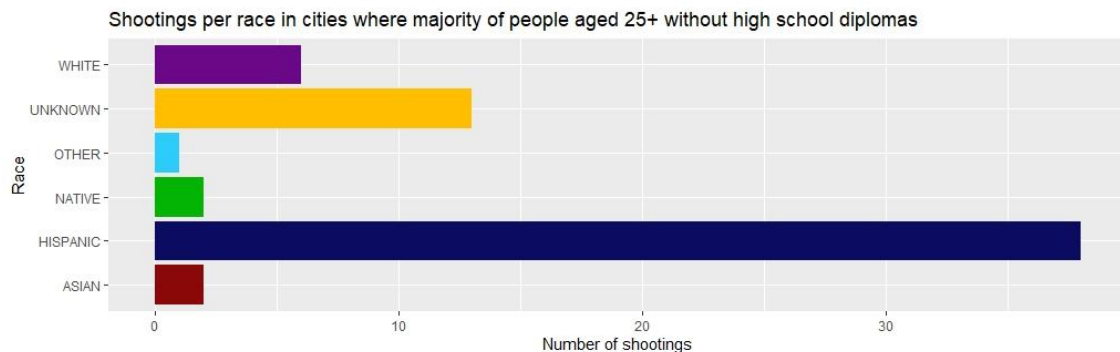
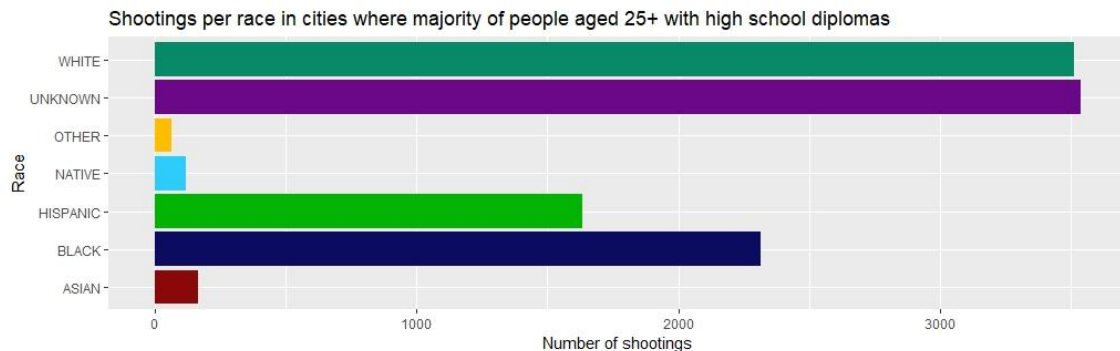
- Only 28 cities with majority below poverty level
- Most involved races below poverty level:
  - Black (excluding "Unknown")
  - White
- Most involved races above poverty level:
  - White (excluding "Unknown")
  - Black
  - Hispanic





# 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")
  - Black
  - Hispanic
- Most involved races in low graduation rate cities:
  - Hispanic
  - White (excluding "Unknown")





# Thank you for the attention!

Any questions?