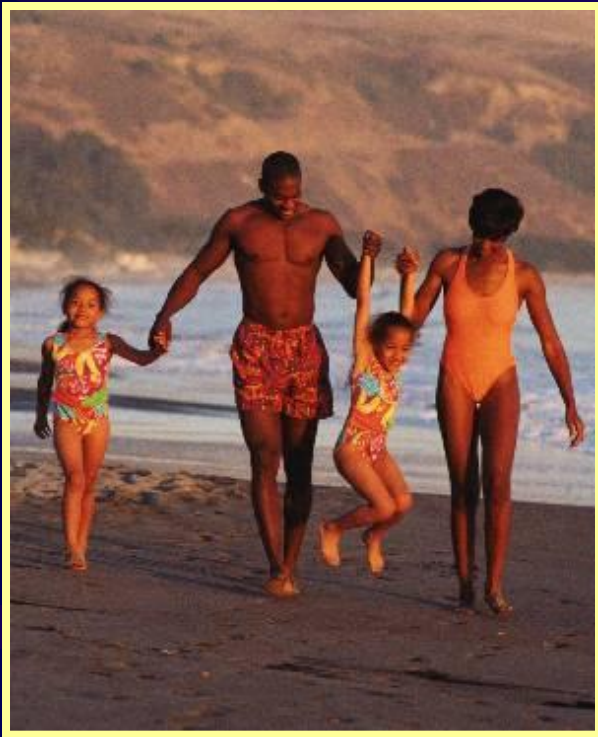


# Drowning in Injury Statistics



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Centers for Disease Control  
and Prevention

November, 2011



# Drowning Defined

- Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid
- Outcomes: fatal and nonfatal
- In line with other injury causes



A new definition of drowning: towards documentation and prevention of a global public health problem. *Bull World Health Organ.* 2005, vol. 83, no. 11. Available from: [http://www.scielosp.org/scielo.php?script=sci\\_arttext&pid=S0042-96862005001100015&lng=en&nrm=iso](http://www.scielosp.org/scielo.php?script=sci_arttext&pid=S0042-96862005001100015&lng=en&nrm=iso). ISSN 0042-9686.



# Drowning: the Problem

- 2<sup>nd</sup> leading cause of injury death in children 1-14 years
- 5<sup>th</sup> leading cause of unintentional injury deaths in all ages
  - 3850 deaths (including the 350 boating-related)
- One year of injuries in the US result in a total lifetime cost of \$5.3 Billion



National Vital Statistics System V90, V90, W65-W74;  
Finkelstein EA, et al. Oxford Univ Press, 2006



# Fatal Drowning Data

- National Vital Statistics System
- Death Certificate data
- Codes:
  - Bathtub (W65-W66)
  - Swimming pool (W67-W68)
  - Natural water (W69-W70)
  - Other/Unspecified (W73, W74)
  - Boating related (V90, V92)



# Nonfatal Drowning Data

- National Electronic Injury Surveillance System
  - All Injury Program
- Representative sample
- US hospital emergency departments
- All injuries treated in the EDs
- Numbers are weighted estimates

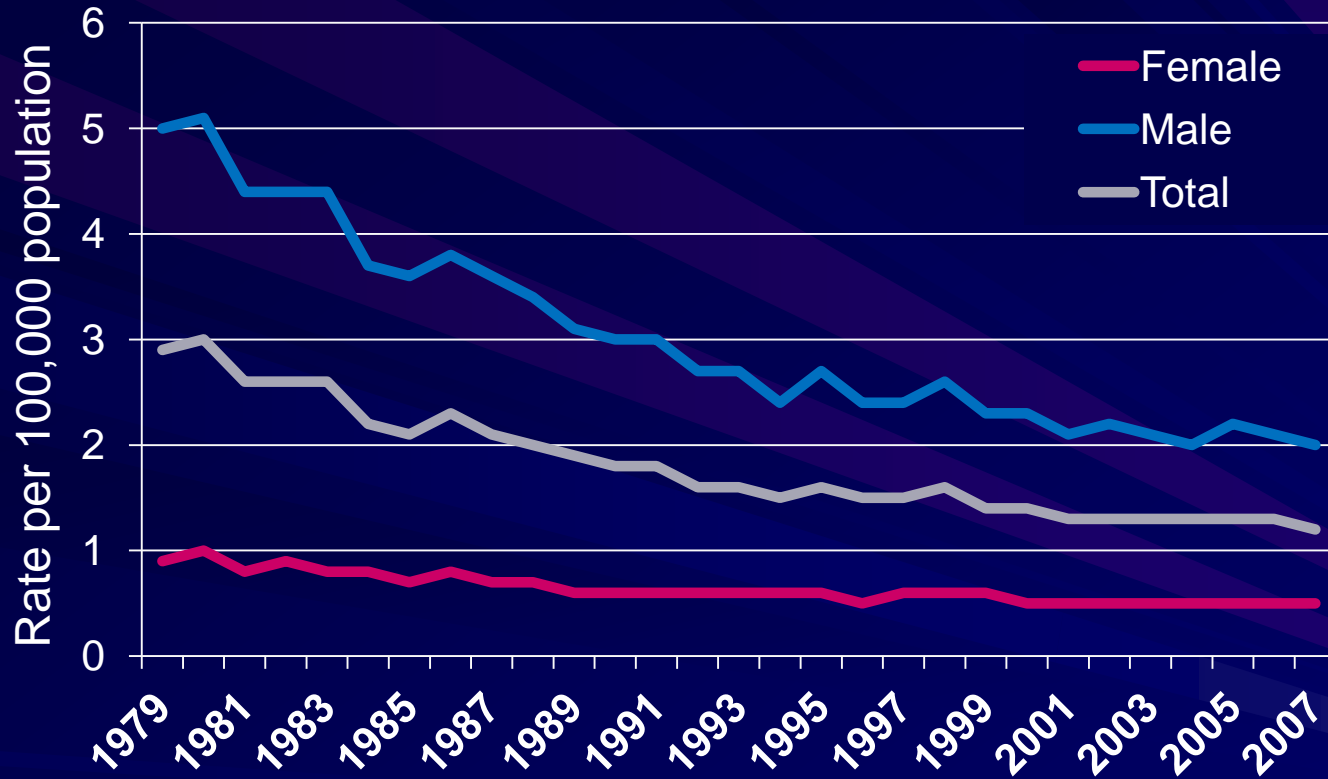


# Drowning Surveillance: the Problem

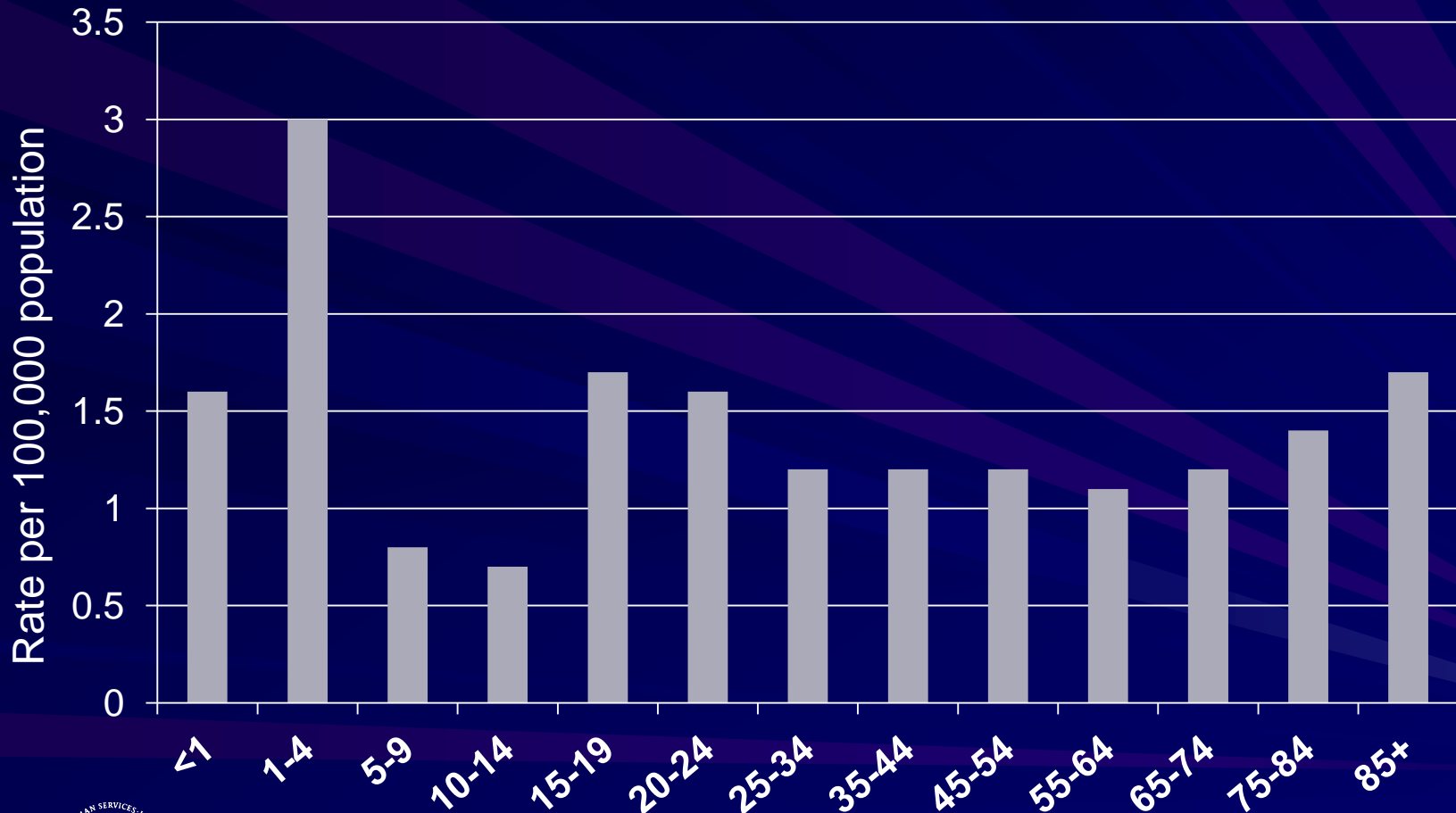
- Rates vary by age, location, gender, race/ethnicity, abilities & other factors
- Data systems often lack these details
- Current rates are population based rather than based on exposures



# Trends in Fatal Drowning



# Fatal Drowning Rates by Age Group, 1999-2007

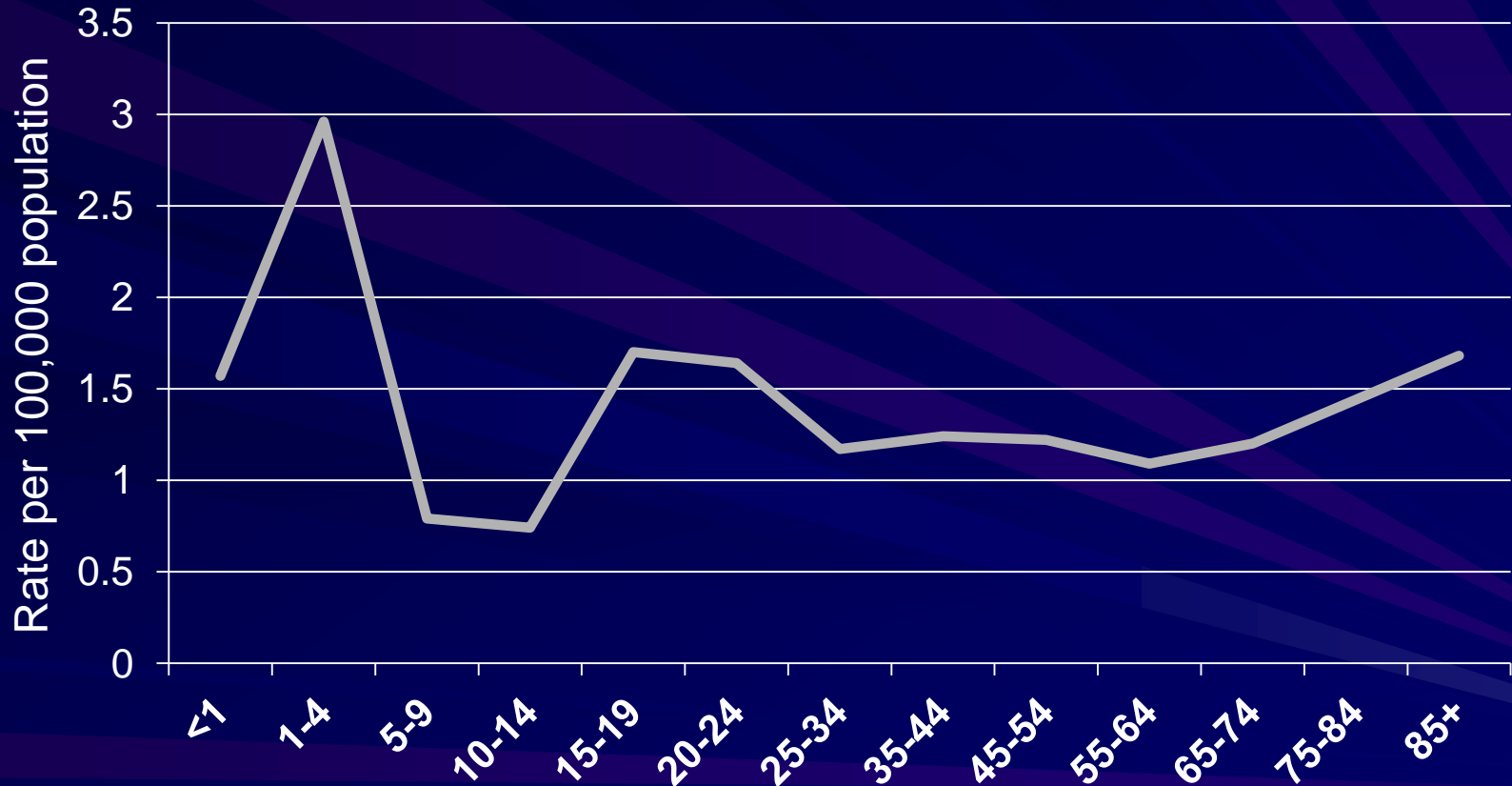


National Vital Statistics System V90, V92, W65-W74





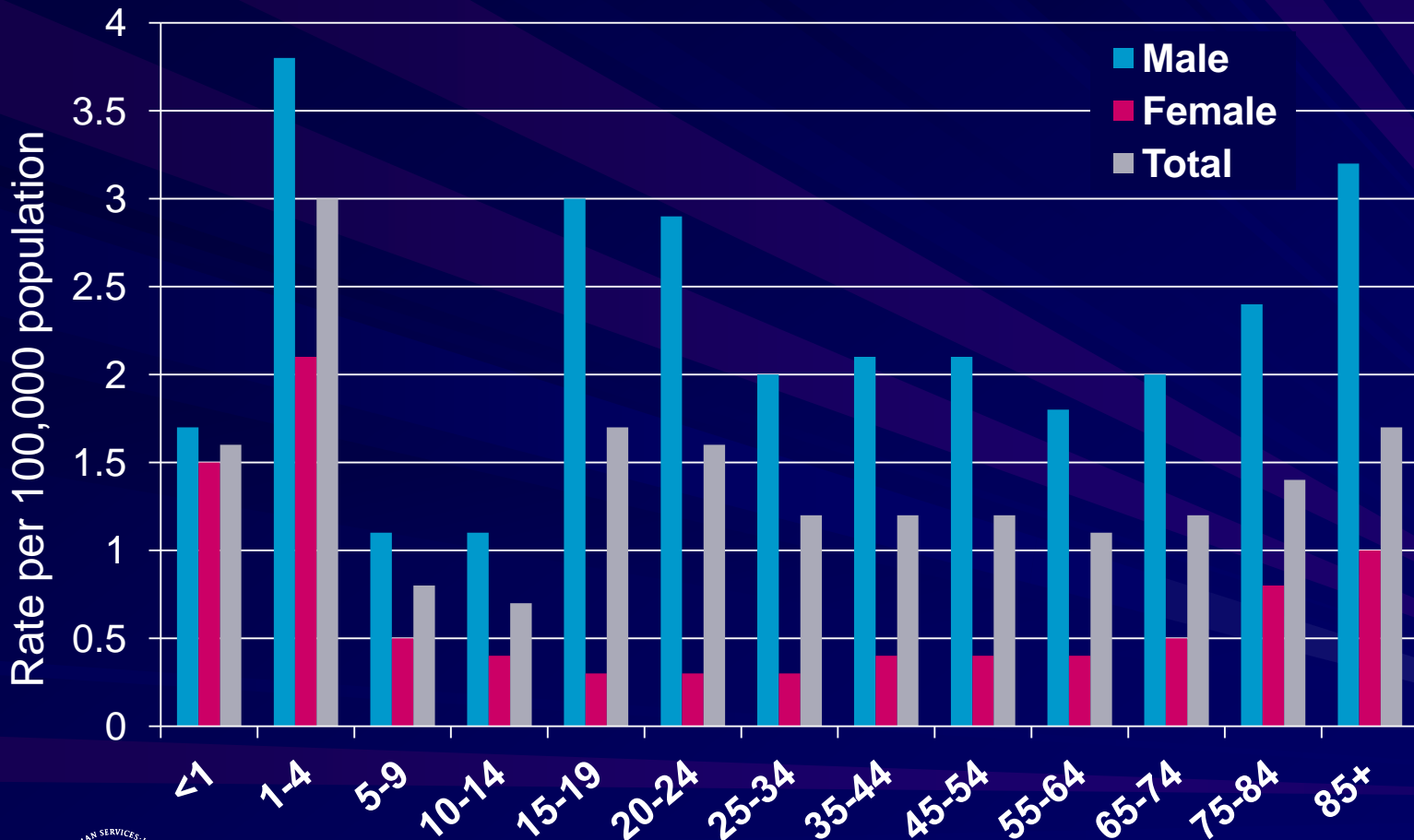
# Fatal Drowning Rates by Age Group, 1999-2007



National Vital Statistics System V90, V92, W65-W74



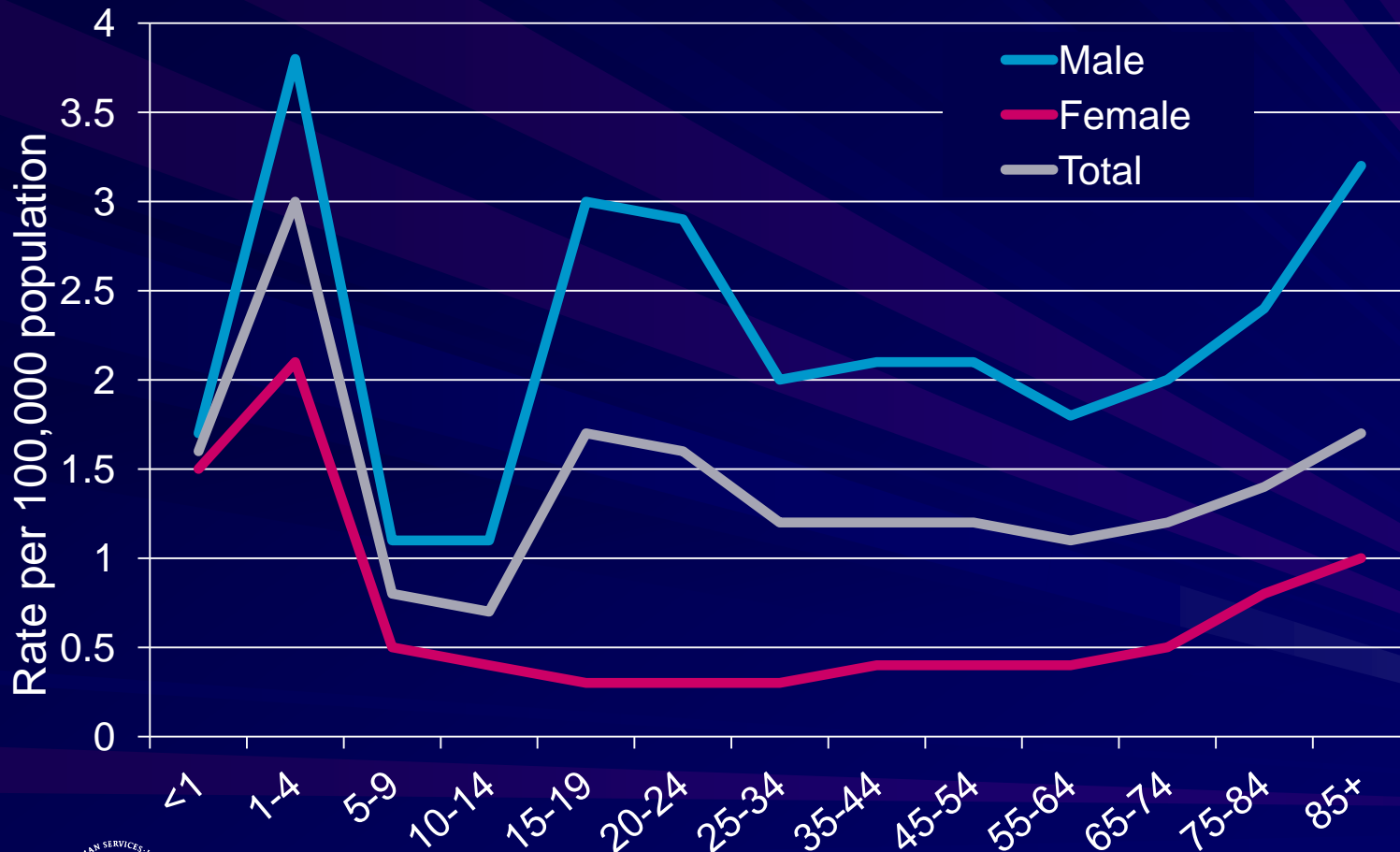
# Fatal Drowning Rates by Gender, 1999-2007



National Vital Statistics System V90, V92, W65-W74



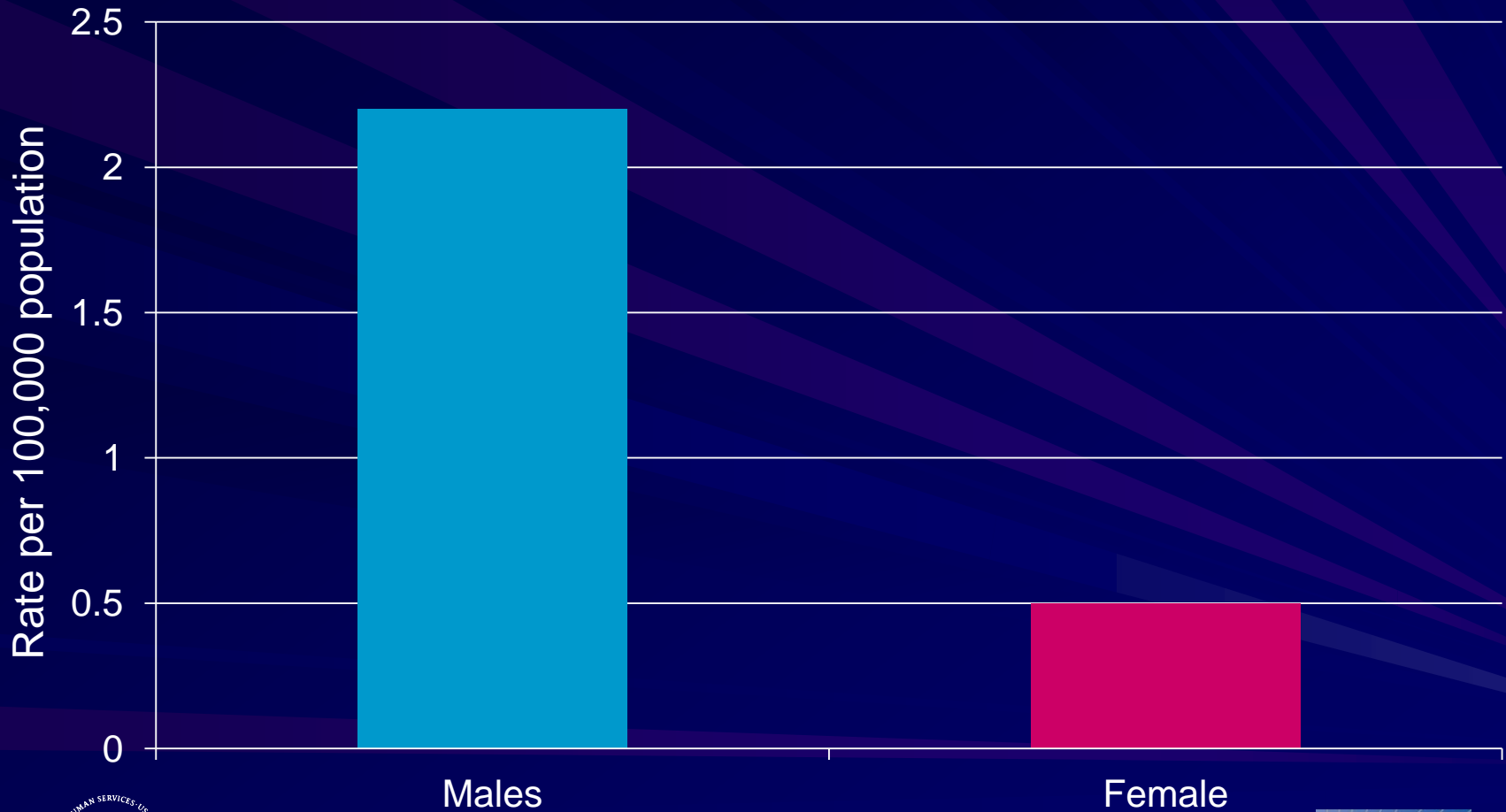
# Fatal Drowning Rates by Gender, 1999-2007



National Vital Statistics System V90, V92, W65-W74



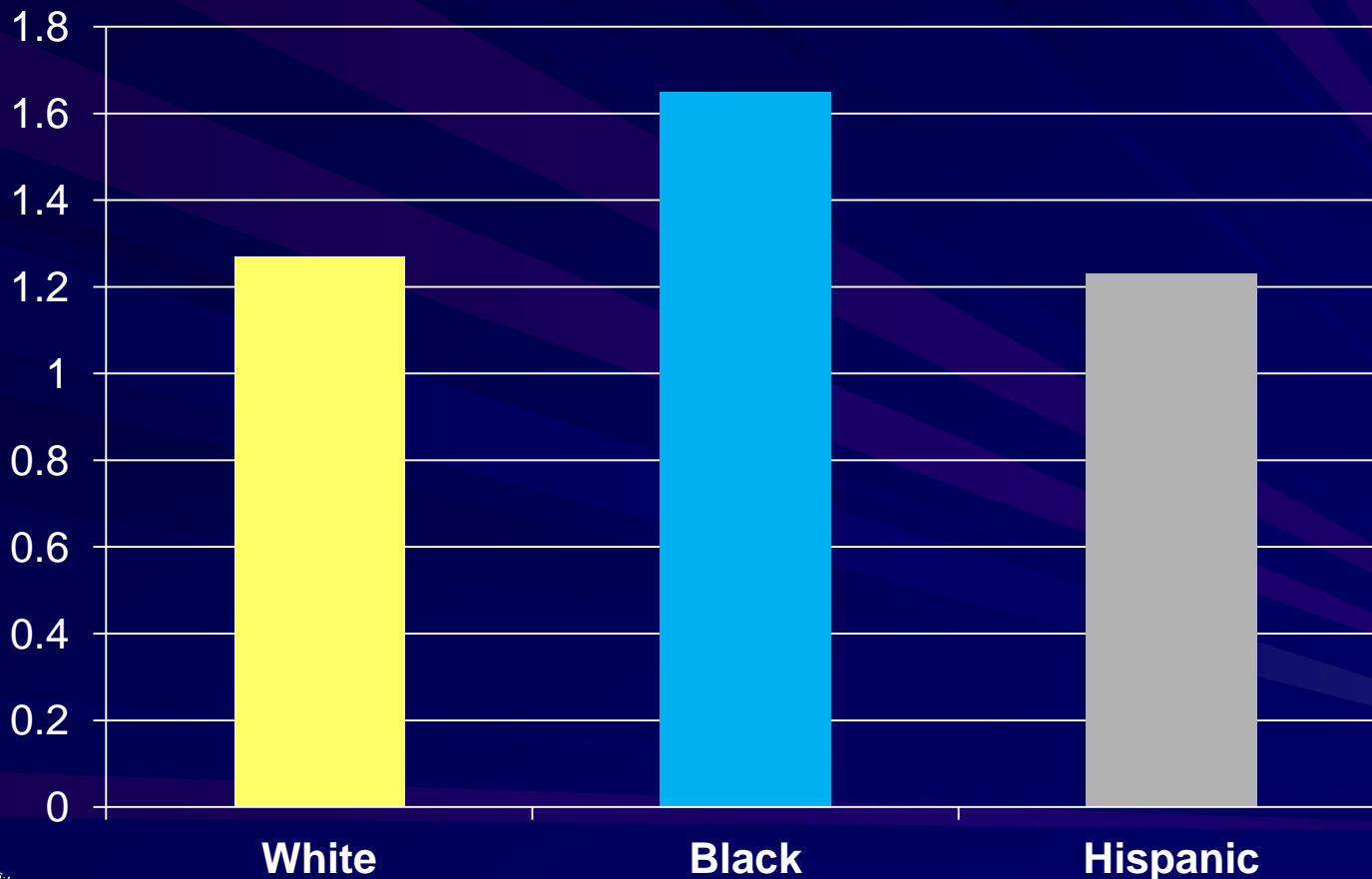
# Fatal Drowning Rates by Gender, 1999-2007



National Vital Statistics System V90, V92, W65-W74



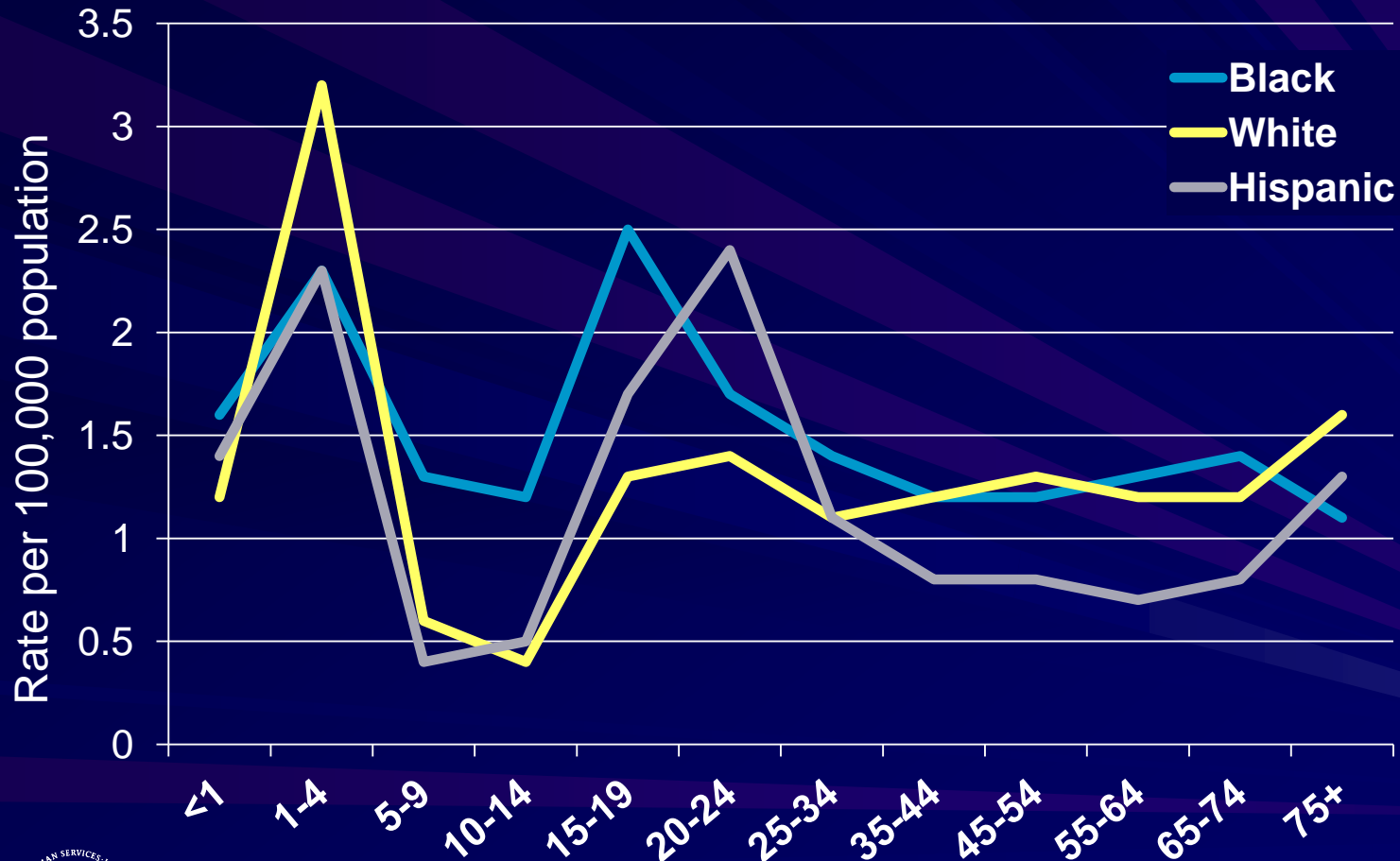
# Drowning Rates by Race/Ethnicity, 1999-2007



National Vital Statistics System V90, V92, W65-W74



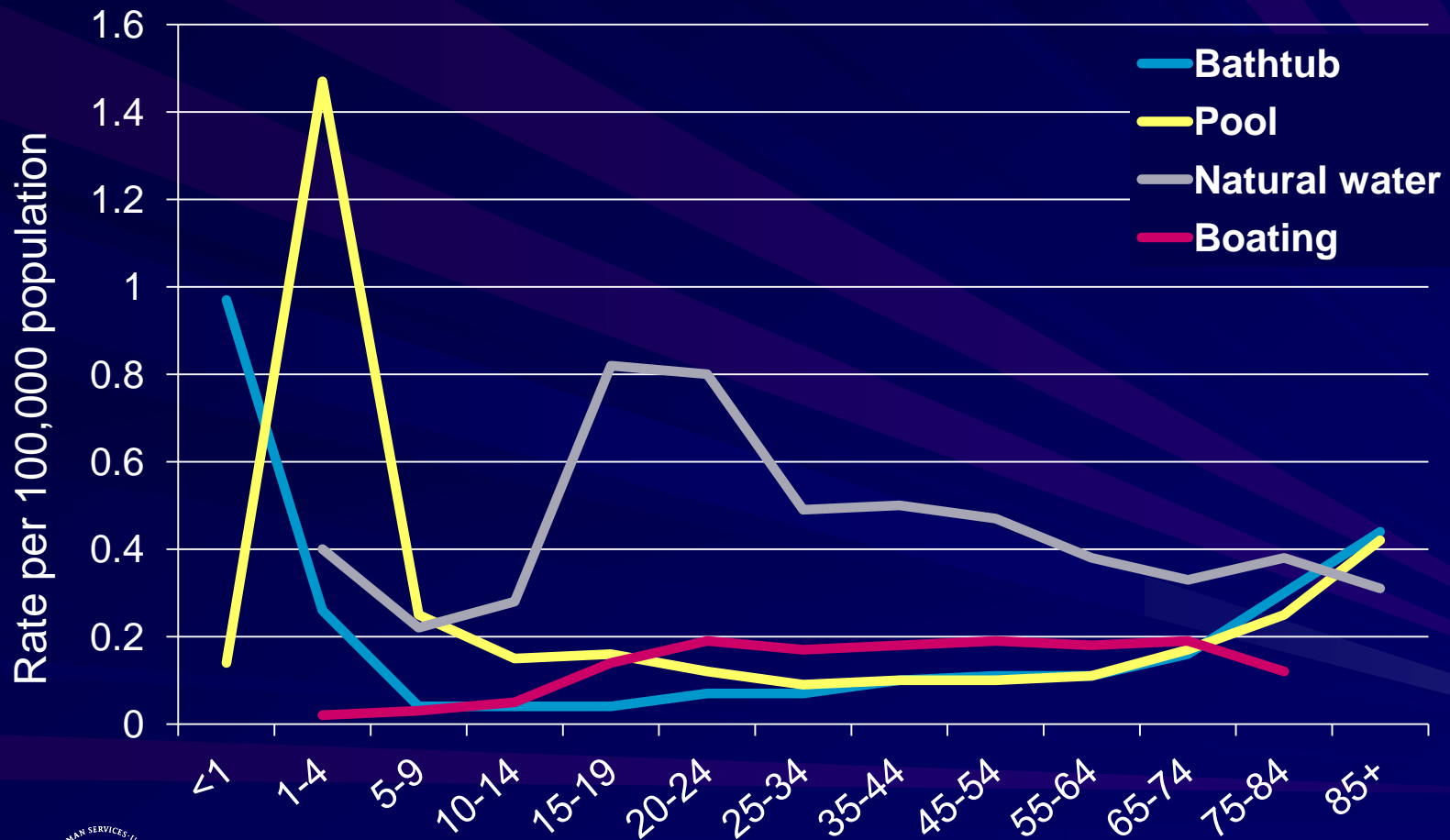
# Fatal Drowning Rates by Race/Ethnicity, 2006-2007



National Vital Statistics System V90, V92, W65-W74



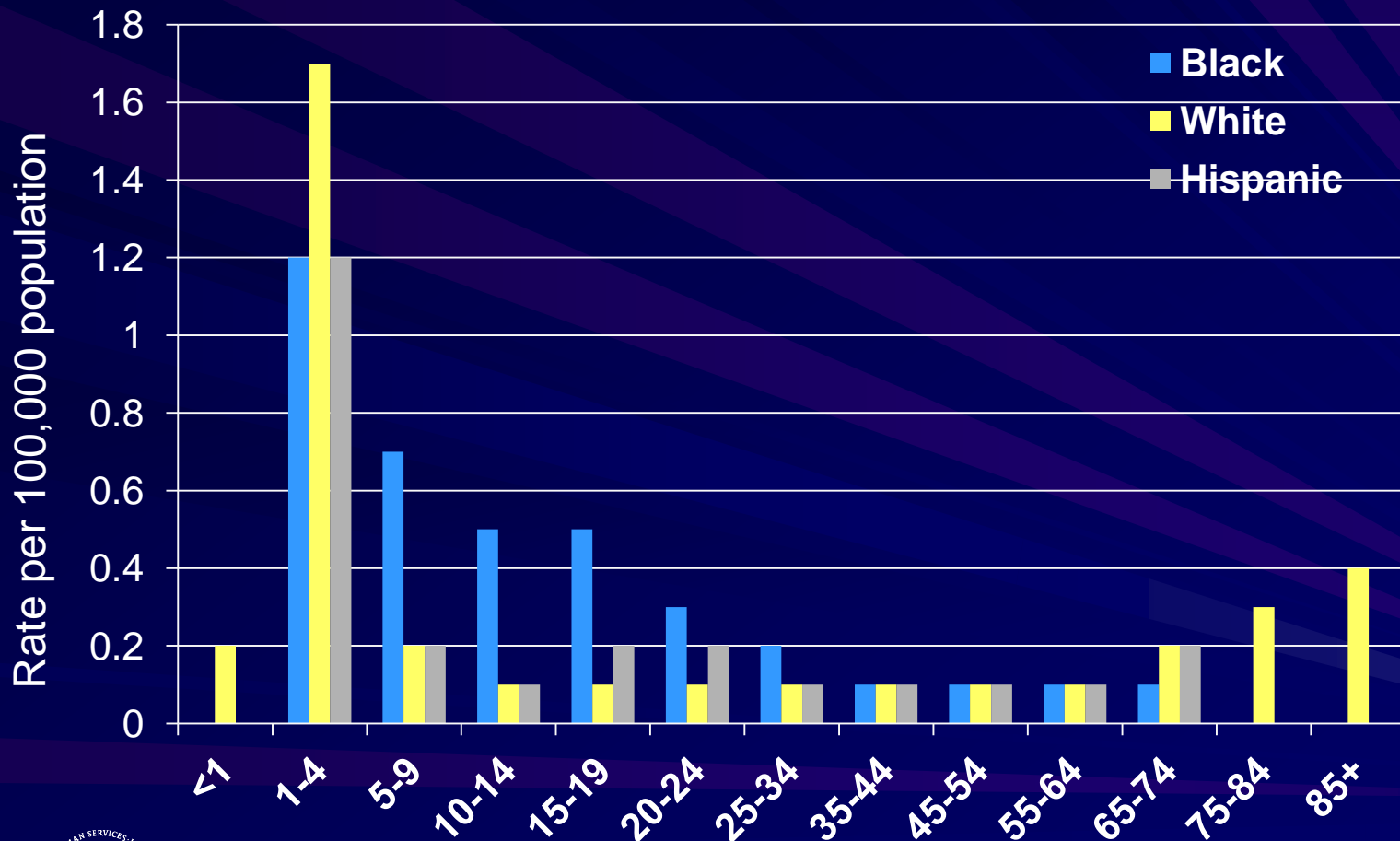
# Fatal Drowning Rates Location, 1999-2007



National Vital Statistics System V90, V92, W65-W74

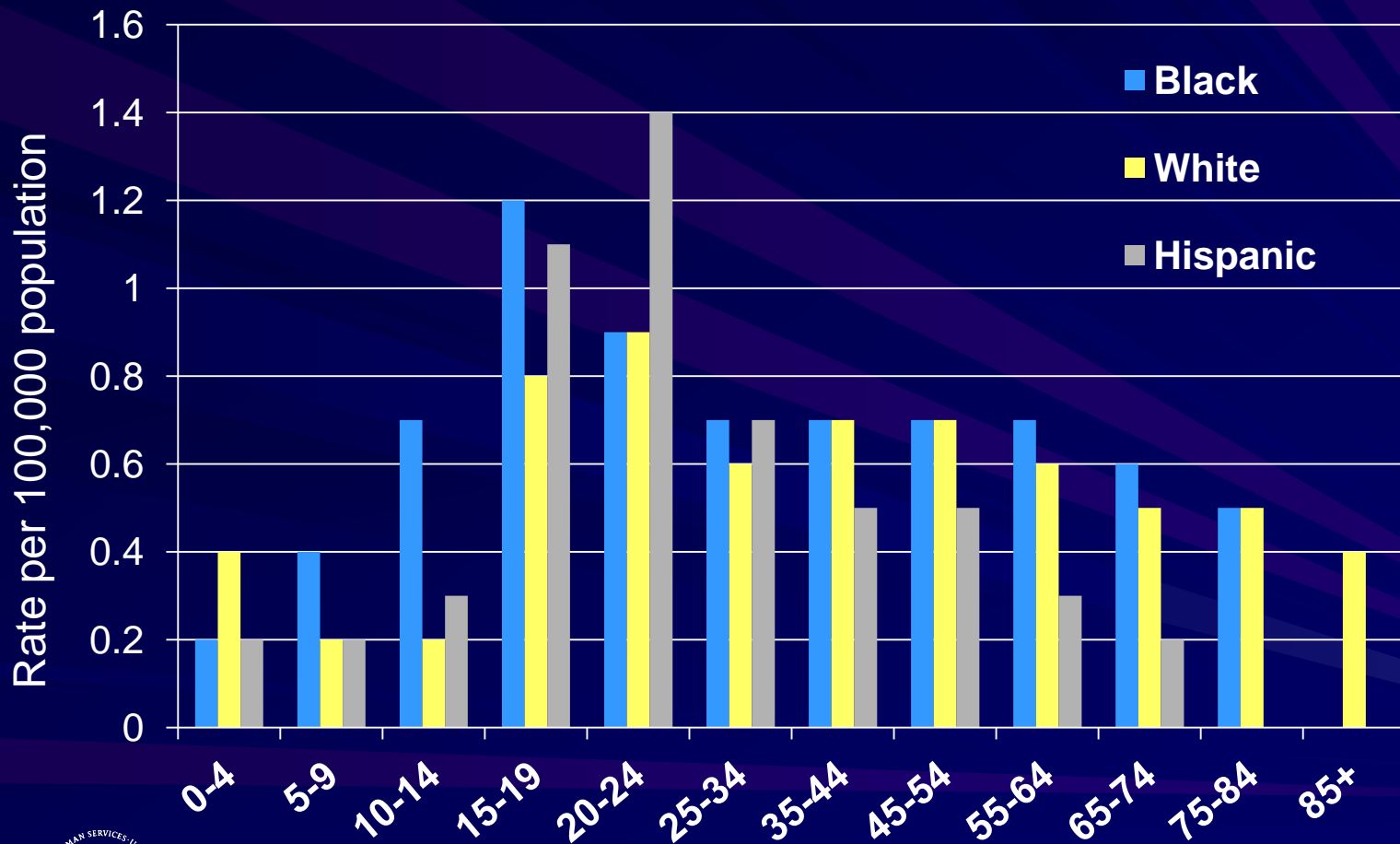


# Fatal Drowning in Pools by Race/Ethnicity, 2003-2007





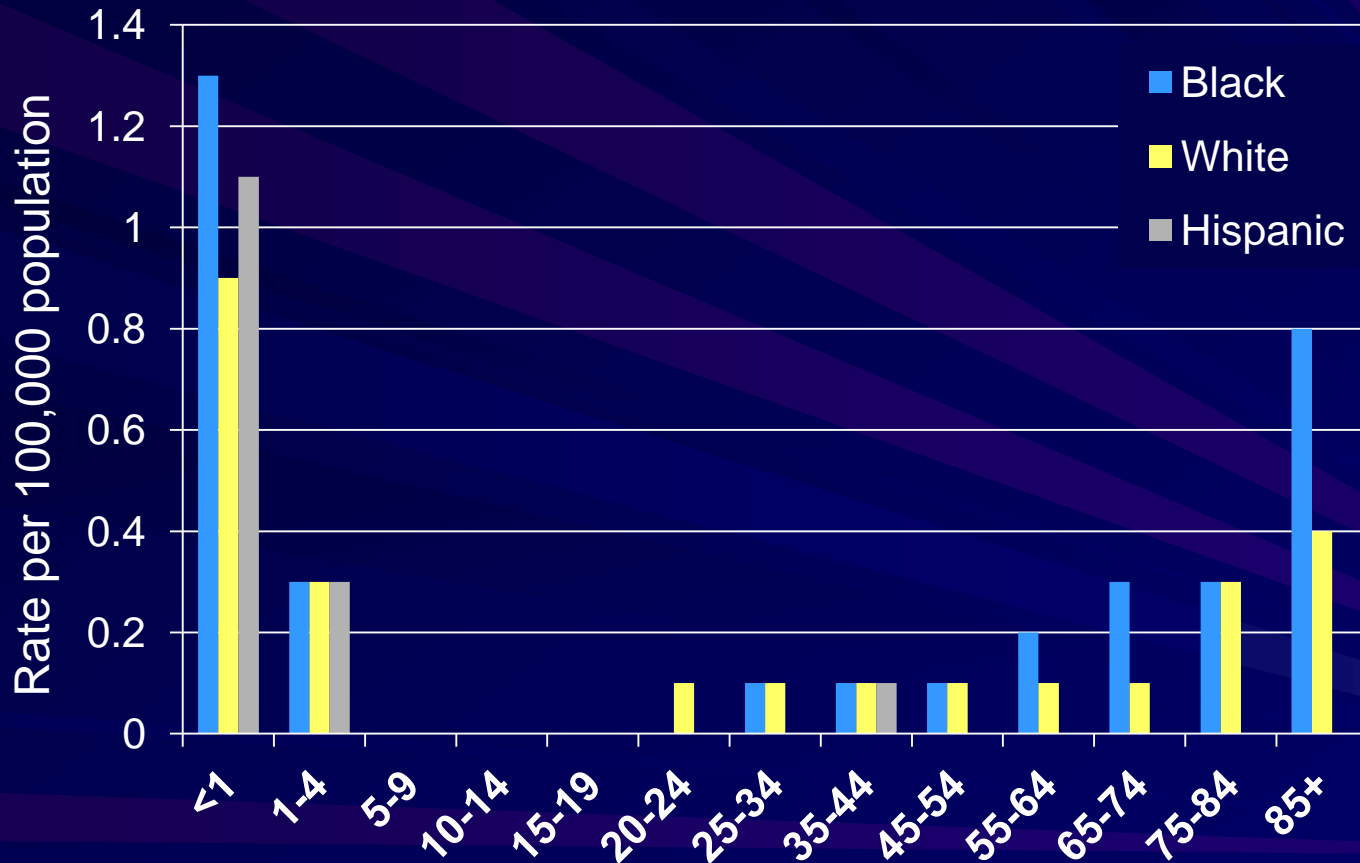
# Fatal Drowning in Natural Water by Race/Ethnicity, 2003-2007



National Vital Statistics System W69-W70



# Fatal Drowning in Bathtubs by Race/Ethnicity, 2003-2007



# Fatal Drowning by Urbanization, 1999-2007

- For all drowning:
  - Rates significantly lower in large metro areas
- For swimming pool drowning:
  - Rates significantly higher in large metro areas



# Fatal Drowning by Region, 1999-2007

## ■ For all drowning:

- Northeast 0.7
- Midwest 1.0
- West 1.3
- South 1.5

## ■ For pool drowning:

- Northeast 0.1
- Midwest 0.1
- West 0.3
- South 0.3

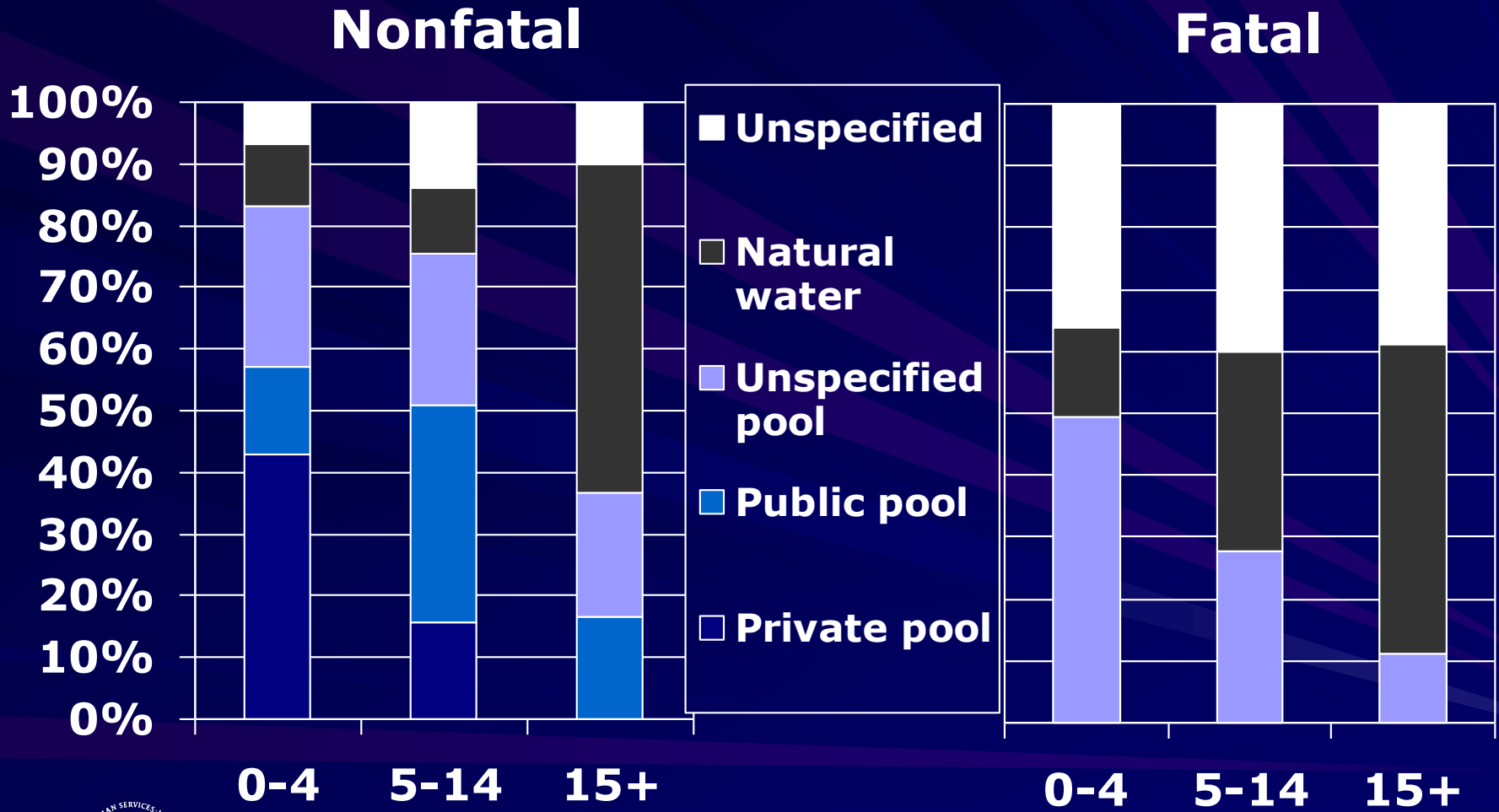


# Characteristics of Drowning

- Commonly occur:
  - Weekends: Friday-Sunday: 56% of nonfatal
  - Summer: Jun-Aug: 56% of nonfatal, 51% of fatal



# Drowning: Location by Age



Gilchrist J, et al. MMWR 2004; only in recreational water settings

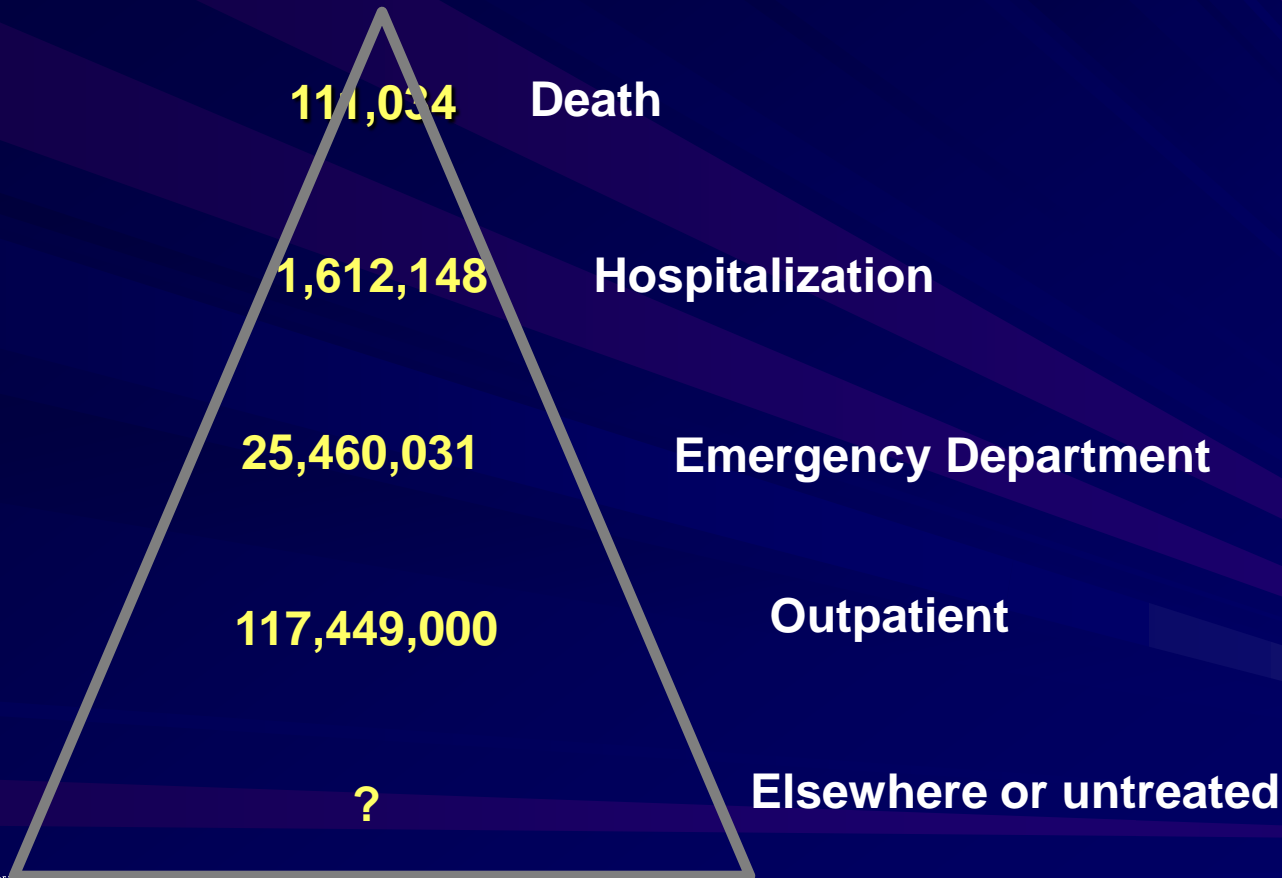
# Nonfatal Drowning by Disposition, 2001-2009

Disposition	Nonfatal		
	Annual Estimate	Percent	Rate
Treated and Released	2114	42.7	0.73
Hospitalized or Transferred	2622	53.0	0.89
Other/Unknown	213	4.3	--



# Injury Pyramid

## All Unintentional Injuries

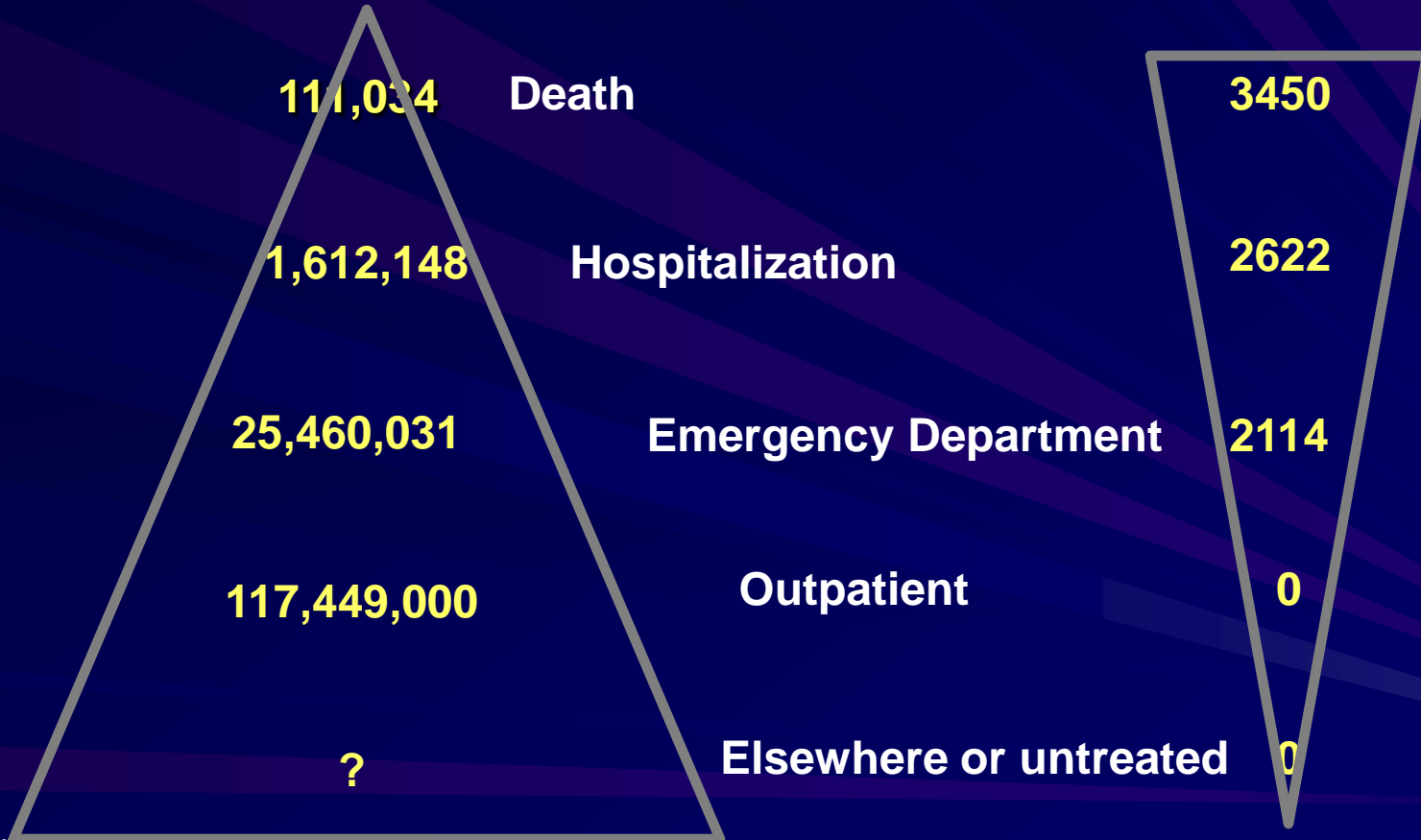




# Injury Pyramid

## All Unintentional Injuries

## Drowning



# Summary

- Leading cause of injury death
- Small children at greatest risk – pools
- Men at higher risk than women
  - Choices of activities
  - Increased use of alcohol
- Severe nature of injury
  - Dramatic hospitalization rate
  - Inverted injury pyramid



# Importance of Prevention

- **Advanced in-hospital care does not improve outcomes**
- **Half of victims in ED are hospitalized**
- **Severe, disabling injuries**



# Prevention of Drowning

- **Primary prevention: prevent water entry**
  - Four sided isolation pool fencing
  - Other adjunctive barriers



# Prevention of Drowning

- **Secondary prevention: prevent harm**
  - Lifejackets
  - Avoiding alcohol use
  - Improve swimming ability
  - Water safety training (e.g. rip currents)
  - Lake front slope gradients



# Improving Swimming Ability

## ■ Adults' self-reported inability to swim

	% Men	%Women	%Total
Caucasian	17	45	32
African Am.	44	77	62
Asian	26	63	47
Hispanic	31	57	44
Total	21	51	37

## ■ 58% of AA children “at-risk swimmer”; related to parental swimming ability and fear of drowning



Gilchrist et al. PHR 2000; Irwin et al. USA Swimming 2008.



# Improving Swimming Ability

- Creating opportunities
  - Access to appropriate supervised aquatic environments
  - Access to training/lessons



# Improving Swimming Ability

- Increasing participation
  - Desirability compared to other activities
  - Understanding that it is a life-saving skill
  - Role models





# Prevention of Drowning

- **Tertiary prevention: improve outcomes**
  - Lifeguards
  - Bystander CPR
  - Rapid Emergency Service Response



# Prevention Strategies

- Commonly referred to as the 3 E's
  - Education
  - Environmental Modification/Engineering
  - Enact/Enforce Legislation/Policy
  - Economic Incentives
  - Evaluation/Evidence
    - Effectiveness
    - Epidemiologic
    - Economic
  - Experience, Engagement, Empowerment



# Education

- Necessary but often not sufficient
- Many potential audiences:
  - Parents
  - Children
  - Care givers
  - Policy makers
  - Law enforcement
  - Engineers



# Education

- Knowledge for decision making
  - Dangers of aquatic settings
  - How to minimize risk
- Skills for action
  - Swimming skills
  - Supervision skills
  - Rescue skills
- CPR & basic first aid training



# Environmental Modification

- Often most effective
- Passive
  - Pool fencing/Barriers
  - Slope gradient change
- Active (behavior change)
  - Weight-bearing pool covers
  - Supervision/lifeguarding
  - Lifejacket loaner programs



# Enacting Legislation To affect individual behavior

- Boating and alcohol laws
- Lifejacket use laws
- Only effective with **ENFORCEMENT**



# Enacting Legislation

## To modify products or environment

- Local ordinances/Building codes
  - Pool fencing
  - Suction entrapment prevention systems
- Manufacturing standards
  - Consumer Product Safety Commission
  - US Coast Guard



# Enacting/Enforcing Laws

- Time consuming and difficult
- Policy-makers must be educated first
- Enforcement resources must be included
- Laws/policies most effective
  - If population is educated and accepting
  - If enforced or perceived to be enforced





# Policies

## ■ Swimming skill

- Training through school
- Pediatricians “prescribing” lessons
- Lessons arranged/supported by apt. complex
- Lessons supported by industry

## ■ CPR skills

- Hospital policies about training
- School based training
- Faith-based organizations supporting training



# Policies

- Water safety education
  - Checklists or education through service co.
  - Inspection/education by child protective services agencies
- Fences/safety devices
  - Adopt-a-fence program through EMS
  - Discounts through pool builders/industry



# Economic Burden: Drowning

- Total lifetime medical costs:
  - \$95 Million (\$22M in 0-4 year olds)
  - 82% related to in-hospital care
  - More than \$9,400 per event
- Total lifetime productivity losses:
  - \$5.2 Billion
  - 88% due to fatalities
  - More than \$517,000 per event
- Total lifetime costs from 1 year: \$5.3 Billion

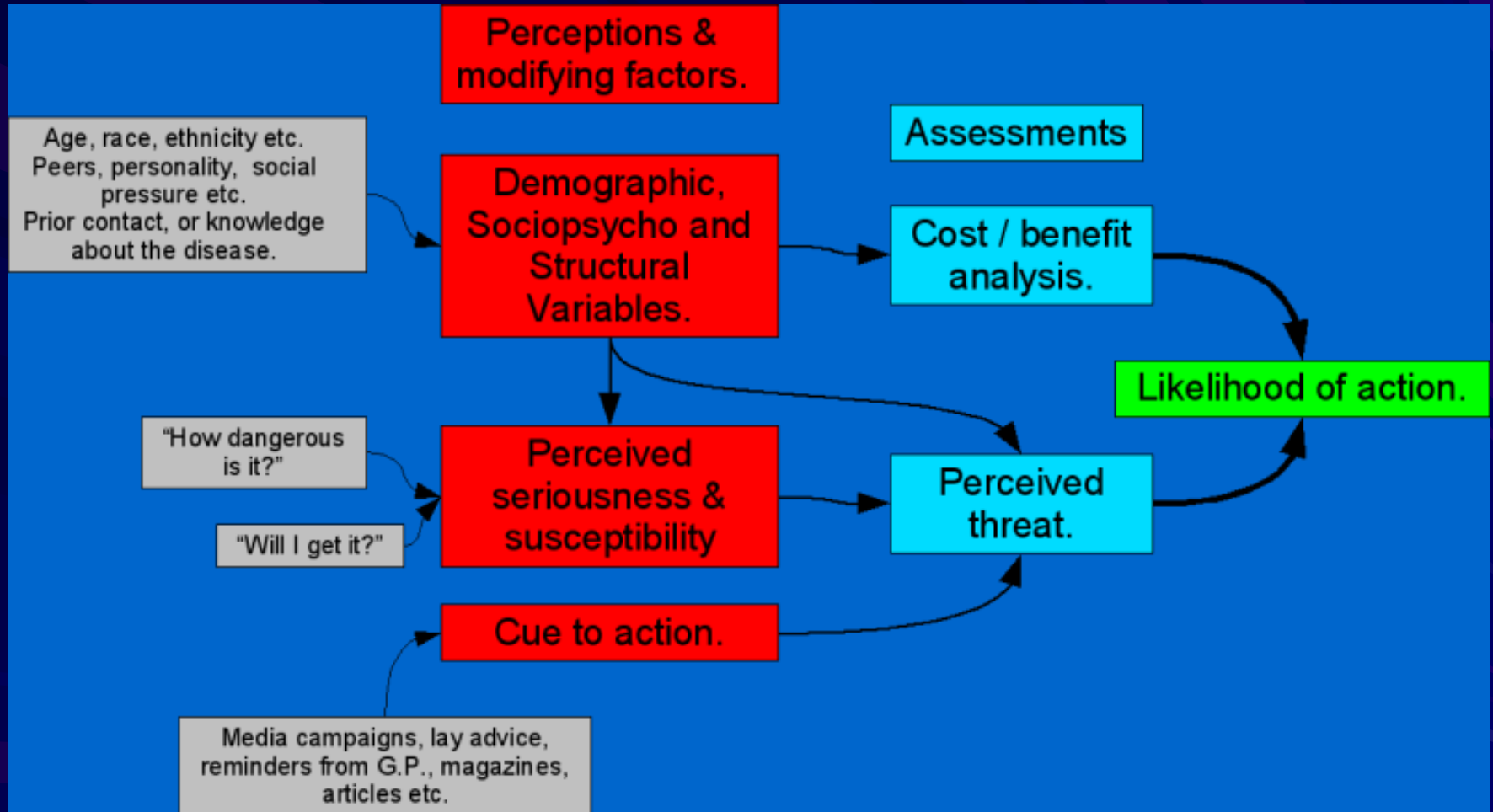


# Difficulties

- Drowning is a rare event
- Poor behavior is often reinforced
- Different groups at risk in different ways
- Prevent efforts - differ by age/location



# Health Belief Model



# Call to Action

- Work together
- Consider groups who can influence high risk populations
  - Aim for policy change
- Consider focusing on early aquatics
  - Engage industry
- Learn from each other
  - Use existing tools and resources



# Thanks



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“The findings and conclusions in this presentation are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention.”

