

WATER-RELATED INCIDENTS IN MARICOPA COUNTY, 2009

Annual Report for the Drowning Prevention Coalition of Arizona



**Arizona Department of Health Services
Bureau of Public Health Statistics**

December 1, 2010



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This report is prepared in support of the activities of the Drowning Prevention Coalition of Arizona.

Suggested citation: Flood TJ. *Water-related incidents in Maricopa County, AZ, 2009*. Arizona Department of Health Services, Bureau of Public Health Statistics. Phoenix, AZ. December 2010.

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WATER-RELATED INCIDENTS IN MARICOPA COUNTY, 2009

SUMMARY

This report describes water-related incidents that have activated the 9-1-1 emergency system. Data in this report are derived mainly from case reports submitted by fire departments in the Phoenix metropolitan area. In 2009 there were 103 serious water-related incidents that occurred in the metro area among persons of all ages. Children 0-4 years of age accounted for 59 of these incidents, 47 of which occurred in swimming pools. Of the 59 young children, 14 are known to have died (10 due to incidents occurring in pools). Of the remaining children, many survived the incident without apparent medical complications, but this year 5 children suffered an impairment. Although there has been a 86% increase in the number of young children who live in the county since 1990, the count of serious incidents in swimming pools has remained fairly constant.

In 2009 all of the child deaths in pools occurred in the warm months. The Maricopa drowning death rate for children 0-4 years of age in 2009 remained at 4.1 deaths per 100,000 children (in all bodies of water), and was among the lowest rate on record. The rate of deaths in swimming pools also was among the lowest rate at 2.8 deaths per 100,000 children. We believe that the combined, local, prevention efforts have led to this remarkable progress.

Emphasis on issues relating to supervision of children will have the greatest impact on nonfatal incidents, especially in the summertime. But, to prevent child drowning deaths (in contrast to incidents in which the child survives intact) continued attention needs to be paid to the placement of pool barriers, self-closing gates with latches, and their maintenance. Community campaigns are needed to address the incidents occurring in home pools in the summer time.

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INTRODUCTION

In the mid-1980's the drowning death rate of Arizona's preschoolers ranked first in the nation.¹ Warm weather, long summers, and the presence of more than 300,000 residential swimming pools make Arizona prone to water-related incidents. Furthermore, death is just one outcome of water-related incidents: in about 9% of incidents the child survives, albeit with some degree of neurological impairment.²

To address the problem of water-related incidents in the Phoenix metropolitan area (called "Maricopa County" in this report), the Drowning Prevention Coalition of Arizona was formed in 1988. This Coalition is comprised of municipal fire departments, hospitals, the state and county health departments, community organizations, pool builders, suppliers of pool safety equipment, parents of drowned victims, corporations, and others.

The following report presents the data collected for 2009, and compares the findings to those in previous years. Much of the report focuses on children under five years of age, and specifically on incidents occurring in swimming pools.

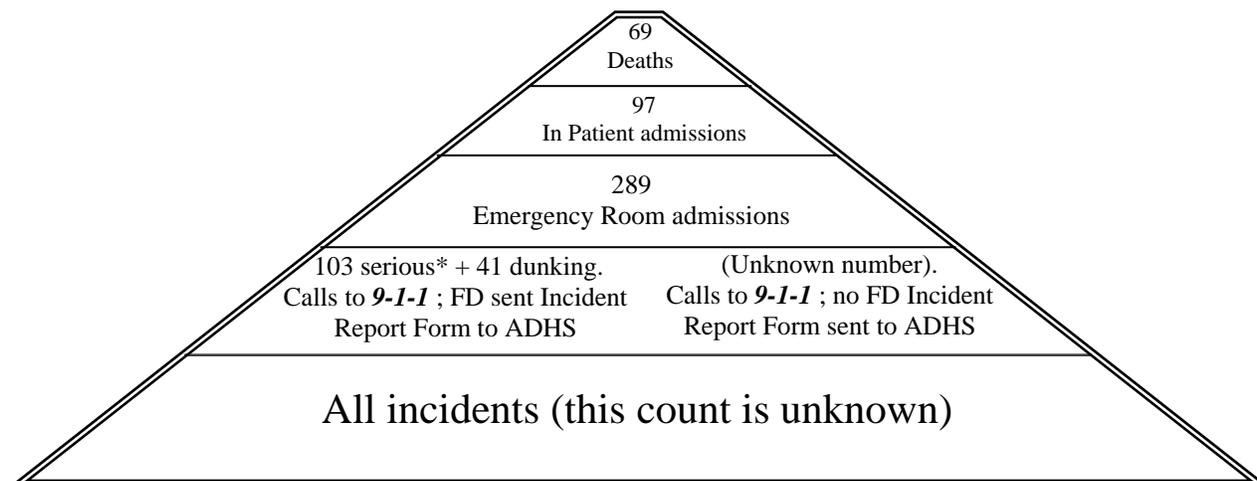
DIMENSIONS OF THE DROWNING DATA PYRAMID

With various data systems now in place (namely, fire department reports and news clippings; hospitalization data; death certificates) we begin to see a clearer picture of the magnitude of water related incidents and drowning deaths in Maricopa County. For the first time, the scope of the various layers of the pyramid can be estimated by using the data obtained from the various data systems.

¹ Arizona Department of Health Services. Unintentional Drowning Deaths, Arizona, 1980-1989. Office of Planning & Health Status Monitoring, October 1990.

² Beyda, D. and Masuello, J. Phoenix Children's Hospital. Oral communication, July 1999.

Injury Data Pyramid. Estimated count of water-related events at various levels of the injury pyramid for events occurring in Maricopa county in 2009. These data include persons of all ages. The definitions of events are not entirely comparable between the levels. Most of this annual report focuses on the incidents indicated by “*” in the pyramid.



METHODS AND DATA SOURCE

Case Definition: In this report a water-related incident is defined as an incident in which a fire department (FD) responded to a 9-1-1 emergency call. We include in the analysis any incident in which the victim was given CPR, was not breathing, and was submerged or not struggling when retrieved from the water. (Some of these cases die the same day or at a later time; some fully recover.) We exclude from analysis any incident that did not appear to be life-threatening; for example, we exclude from analysis an incident in which a victim was struggling and did not require CPR.³

Procedures: Since 1988, the Arizona Department of Health Services (ADHS) has monitored water-related incidents as reported by local fire departments. The fire departments usually are first on the scene of 9-1-1 calls and are generally able to provide information about the event from information provided by witnesses. We assume that very few serious incidents occur without activation of 9-1-1. The fire departments submit case reports on standard Incident Report Form (see appendix) developed in conjunction with the Coalition. The reported data items include the age

³ These relatively minor 9-1-1 incidents that were excluded sometimes are called “dunkings, close calls, or near misses.” In recent years, the count of these minor incidents ranged from 22 to 54; in 2009 there were 41 such incidents. ADHS requests that fire departments submit all such incidents, but we exclude these minor incidents from further analysis in the yearly reports. Obviously trivial incidents that would not even qualify as “dunkings” are not submitted by most fire departments.

and gender of the victim, the location of the incident, and the apparent circumstances surrounding the event. The ADHS Bureau of Public Health Statistics receives and analyzes these case forms.

So far, the data have not consistently included the calls to the Maricopa County Sheriff's Office, which responds to incidents on the surrounding lakes, or the nearby Salt or Verde Rivers. These are popular recreational areas located just outside of the Phoenix metropolitan area. Incidents outside the metropolitan area are included sporadically.

Starting with the 2008 data the ADHS staff who enter data has been reduced to one person (TJF) who receives and codes the forms of each reported incident. Usually, fewer than six incidents per year are questionable as to whether the incident was life-threatening. The fire departments do not submit reports of calls to 9-1-1 that are canceled. This data surveillance system relies mainly upon fire departments to report all the serious cases occurring within their jurisdictions.

Validation: In conjunction with the Coalition, the surveillance system searches the local newspaper (the Arizona Republic) and television daily for reports of water-related incidents. When found, articles are downloaded⁴ or clipped, and attached to the fire department reports. Rarely, there is no associated fire department report. If a report from the fire department is missing, then ADHS contacts the fire department to request a submission. If the fire departments do not submit a case report, then we assume the case was serious, and we use the information from the news clipping to create a case report. We use death certificates only to document the outcome status for incident cases reported by fire departments.⁵

Analysis: Analysis of data is performed using Microsoft Access on the database of the 2,900 records entered since 1988. We have excluded the apparently minor (non life-threatening) incidents,³ also called "dunkings", from subsequent analyses reported herein.

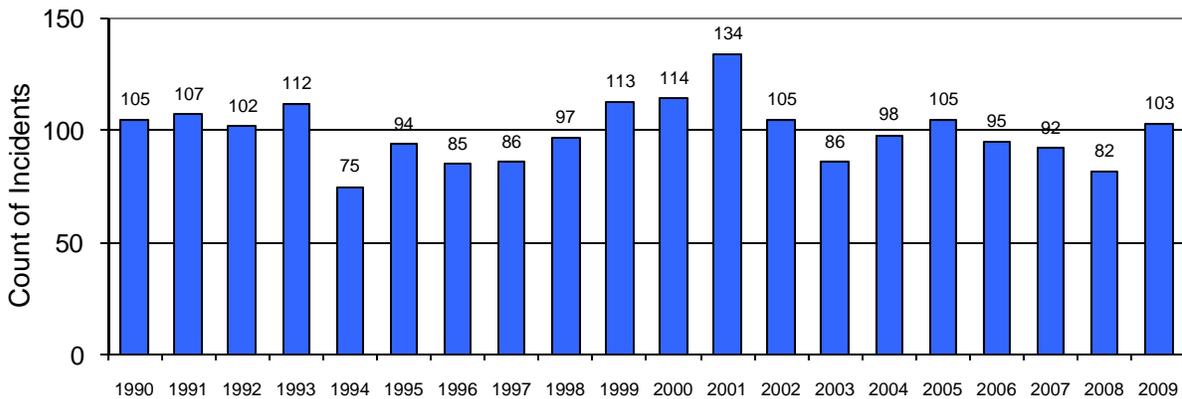
⁴ The Children's Safety Zone collaborates with local fire departments, hospitals and media to gather statistics and stories on water related incidents and fatalities in Arizona. See <http://childrensafetyzone.com/go/>

⁵ We do not use death certificates to supplement the count of incidents reported by fire departments. However, as explained in a later section, we use death statistics as an independent method of tracking drowning trends.

FINDINGS

In 2009, fire departments and the news clips reported 103 serious water-related incidents in Maricopa County among persons of all ages. Twenty-nine incidents in 2009 were reported only in the news clips, a considerable increase of 17 incidents over 2008. The count of 103 serious incidents in 2009 was about average for the annual count of cases since 1990 (see Figure A).

Figure A. Count of reported, serious water-related incidents in Maricopa County among persons of all ages in all bodies of water. An incident may lead to an outcome of death, or survival with impairment or no impairment.



The distribution of the 103 incidents in 2009 according to the city and age of the victim is shown in **Table 1**.

Table 1. Water-related incidents reported for 2009 according to age group and city of incident in Maricopa County. Only life threatening incidents are included in the analysis.

City of Incident	Years of Age of the Victim					Unknown	Total
	0-4	5-14	15-34	35-64	65+		
Avondale	2		1		1		4
Buckeye	4						4
Chandler	2						2
El Mirage	1						1
Gilbert	5	1					6
Glendale	4			1	1		6
Goodyear	1					1	2
Mesa	8	1	1	1	1		12
Paradise Valley	1						1
Peoria	2		2		1		5
Phoenix	22	1	2	8	3	2	38
Maricopa Co, rural			5	1		1	7
Scottsdale	2	1		2	1		6
Sun Lakes				2			2
Surprise	4	1	1				6
Tempe	1						1
All Areas	59	5	12	15	8	4	103

The body of water of the incidents according to age group is presented in **Table 2**. Most incidents took place in pools. Pools, either above ground or in ground, were involved in 74 (71.8%) of the 103 events. Forty-seven of the 74 incidents in pools involved children aged 0-4 years. Bathtubs (10 incidents), rivers and lakes (7 incidents), spas (6 incidents), and canals (4 incidents) were the next most common places for water-related incidents among all ages. No incidents occurred this year in buckets. Seven serious incidents in 2009 involved pre-schoolers who submerged in bathtubs.

Table 2. Water type by age group, 2009. Only life threatening incidents are included in the analysis.

Water type	Years of Age of the Victim						Total
	0-4	5-14	15-34	35-64	65+	UNK	
Bathtub	7		2	1			10
Bucket							
Canal/Irrigation Ditch		1	1	2			4
Fish/Decorative Pond	2						2
Other							
Pool, in ground	46	4	4	10	6	3	73
Pool, above ground	1						1
River/Lake			4	1	1	1	7
Spa	3		1	1	1		6
Toilet							
Unknown							
Missing							
All water bodies	59	5	12	15	8	4	103

Young Children

Children, ages 0-4 years, comprised the largest group experiencing a water-related incident. Although older individuals are equally important to consider in terms of loss of life, society generally feels a greater sense of responsibility to prevent injury to persons in the youngest, highly vulnerable, age group. The remainder of this report analyzes the findings among the 0-4 year old age group.

Some data elements were not collected in the early years of our surveillance, and space considerations make it difficult to include all years of data. For those reasons, the graphs that follow may display a variety of time periods. For a few, selected graphs we display data according to the child's outcome: "died"; "survived but with impairment"; and "survived in apparently normal condition."

The distribution of cases among single ages of the 0-4 year old group is shown in **Figure 1**. Among children 1-4 years old, the count of incidents in swimming pools far overshadows the count in all other bodies of water combined. Among infants (i.e., under one year of age) bathtubs are the most common water body in which incidents occur. **Figure 1b** shows the count when the outcome was death or impairment.

Figure 1. Count of incidents according to the body of water in which life threatening incidents occurred, by single age category, reported in Maricopa County, 1990-2009. Outcome status: all.

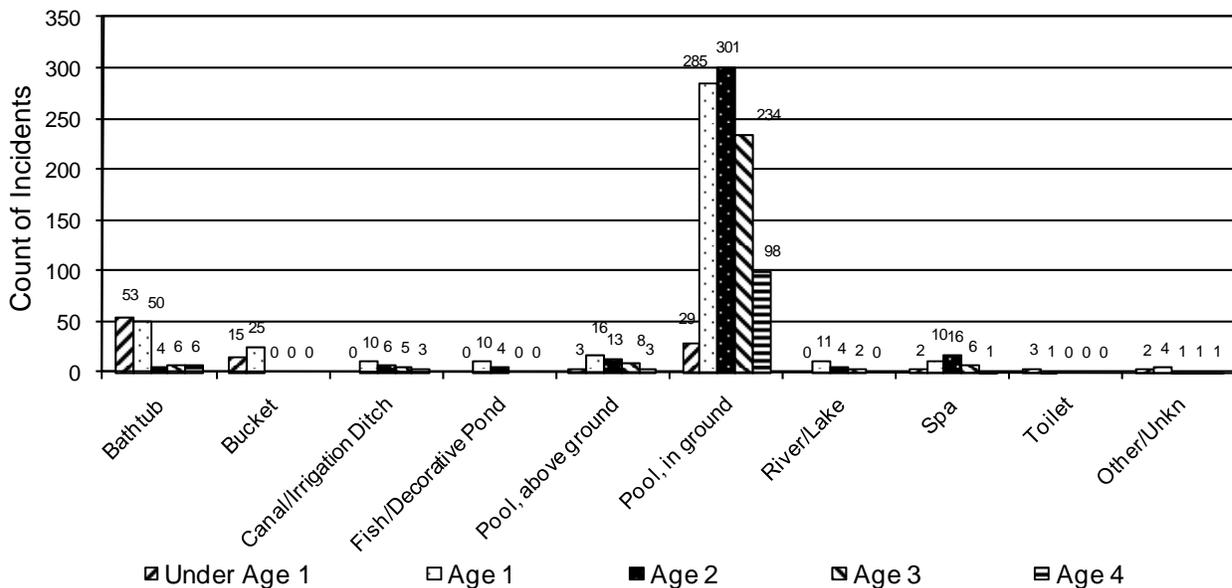
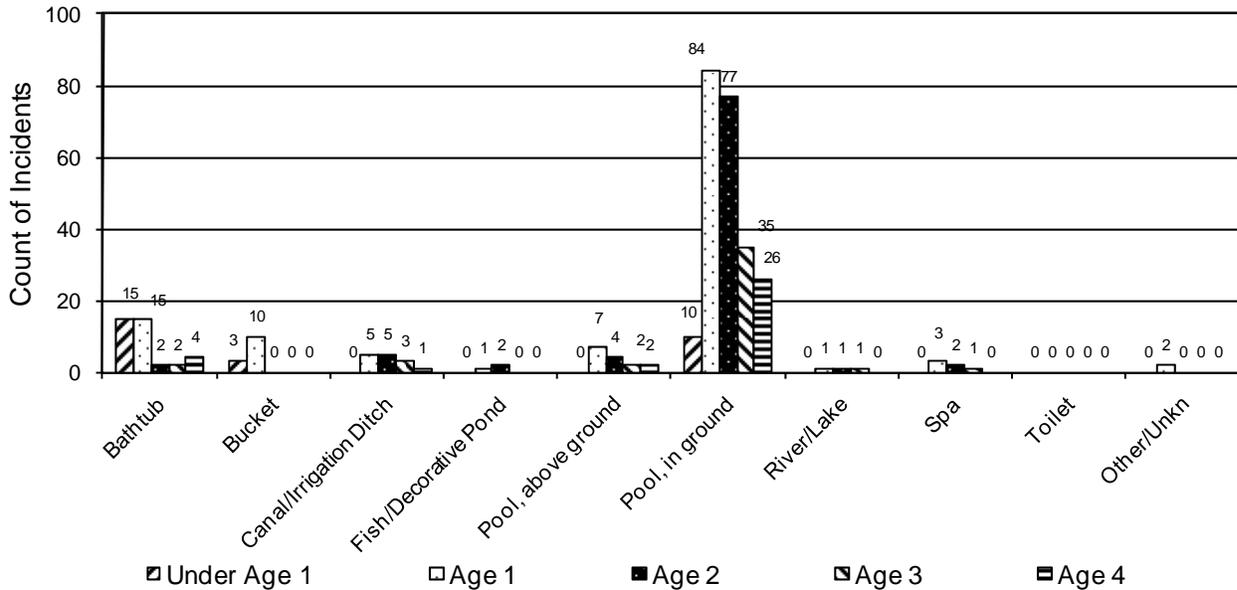


Figure 1b. Count of incidents according to the body of water in which the incident occurred, by single age category, reported in Maricopa County, 1990-2009, where the child's outcome was death or impairment.



The next tables and figures provide information about incidents occurring in swimming pools for this age group. **Figure 2** shows the count of pool-related incidents reported over the previous 22 years. In 2009, the count (47) increased noticeably compared to the count of 33 in 2008. Because of the increasing population of children residing in the metro area (from 170,182 resident children in 1990 to 316,089 in 2009 – an 86% increase), **Figure 3** displays the rate of pool incidents, expressed per 100,000 children residing in Maricopa County. The rate of 14.9 for 2009 is similar to that of the last seven years. The inverse of this rate (100,000 / 14.9) reveals that for every 6,711 children, one child experienced a life-threatening pool incident for 2009 in Maricopa county.

Figure 2. Count of life-threatening incidents in pools, by year, among 0-4 year olds. Outcome status: all.

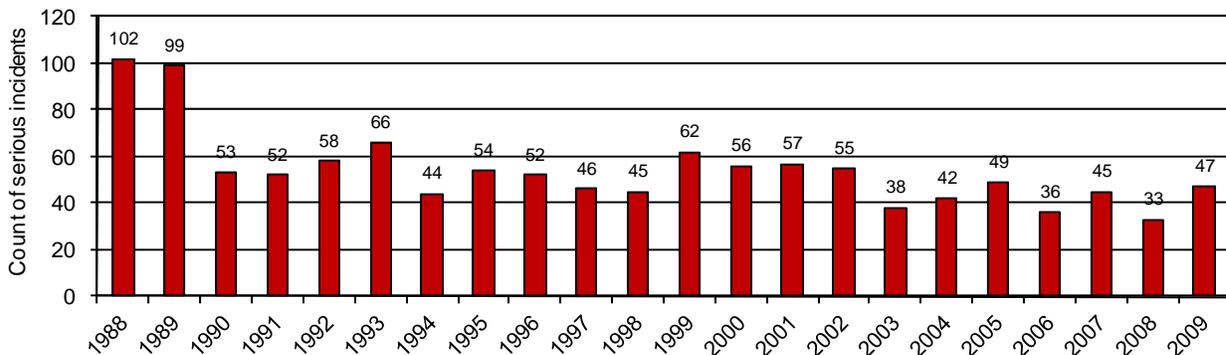
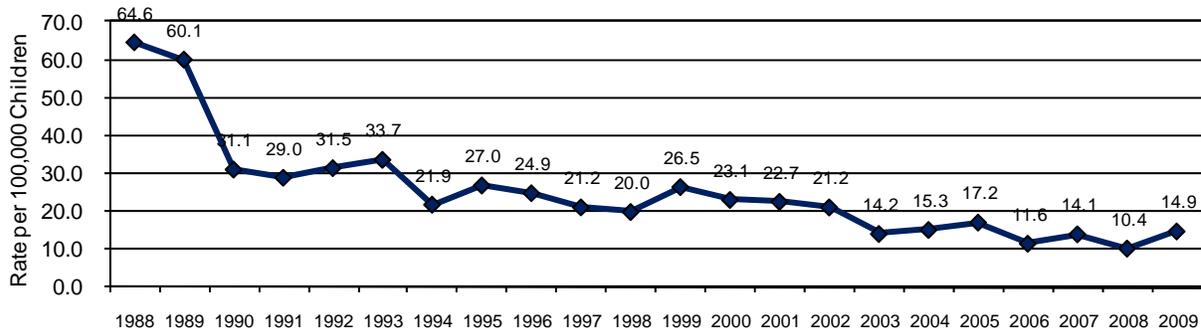
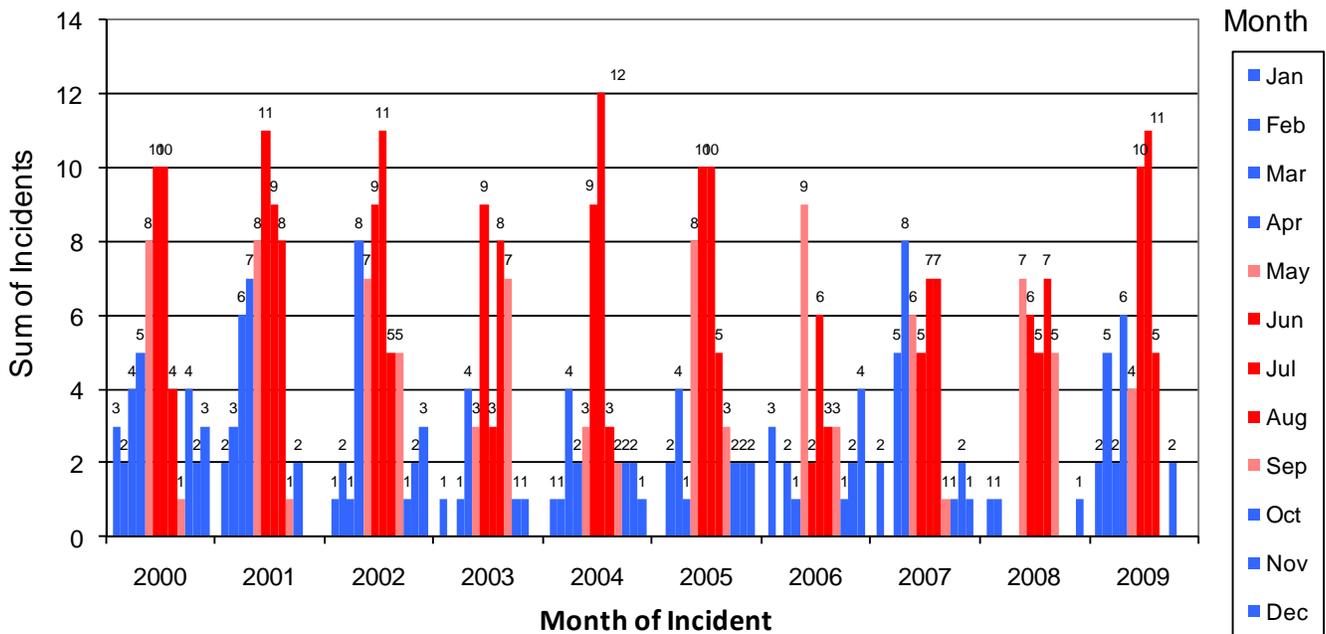


Figure 3. Rate (per 100,000 children aged 0-4) of life threatening pool incidents occurring in Maricopa County. The rates consider the increasing population of children in the county. The numerators for the rates are the counts of incidents (shown in Figure 2) regardless of the county in which the child resided. Outcome status: all.



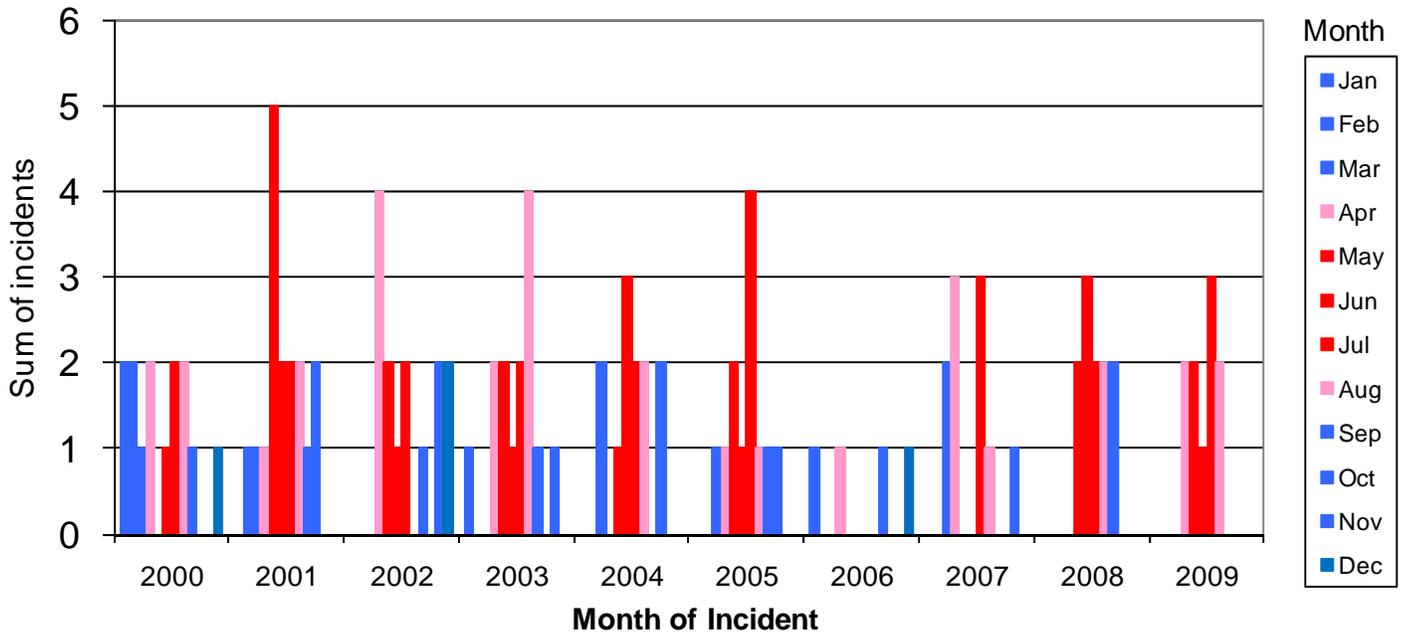
The occurrence of incidents by month is shown in **Figure 4**. We note the typical pattern seen in previous years, with the number of pool-related incidents peaking during the summer months of June, July, and August. In 2009 the counts in June and July exceeded the Coalition’s goal of seeing fewer than 10 serious incidents in any month. In 2006 the fire departments reported not a single pool-related death all summer. However, the summer again turned deadly for young children when all the fatal pool incidents in 2009 occurred in the hotter months (see **Figure 4b**).

Figure 4. Monthly sum of life-threatening swimming pool incidents, 0-4 year olds, Maricopa County. Outcomes: all.



Source: DPCCA Fire Depts and newsclippings.

Figure 4b. Monthly count of incidents in pools in which the child's outcome was "died."



Source: DPCCA Fire Depts and newsclippings.

As shown in **Table 3**, boys comprised a majority of the pool-related victims in 2009. This finding has been present in most years.

Table 3. Gender of 45 children, 0-4 years old, involved in pool-related incidents, 2009. Outcome: all.

Gender	Count	(%)
Male	30	64%
Female	17	36%

Race and ethnicity are difficult variables to analyze because of the way that Hispanic ethnicity is often mistakenly considered a race group. Currently, most demographers consider Hispanic as an ethnic group, not a race group. For analysis here, we count Whites as either Hispanic or non Hispanic. The remaining races are counted regardless of Hispanic ethnicity. A tabulation of the available data is presented in **Table 4**.

Table 4. Race and ethnic characteristics of children, 0-4 years of age, involved in water-related incidents in pools in 2009. Outcome: all.

Race/Ethnicity	Count	%
Asian	1	2.1%
American Indian	0	0.0%
Black	1	2.1%
Hispanic	9	19.1%
White, non Hispanic	26	55.3%
Other	1	2.1%
Unknown	9	19.1%
TOTAL	47	100.0%

The 2000 Census found that 40.1% of children age 0-4 residing in Maricopa County were Hispanic.⁶ Furthermore, starting in 2003 the number of births to Hispanic mothers exceeded that of white mothers. However, in 2009 the number of births to Hispanic mothers dipped below that of Hispanic mothers.⁷ The proportion of Hispanic families that actually have pools is not known, but is probably less than the population as a whole.

⁶ To calculate the percentage of Hispanic children in Maricopa County, the numerator was derived from the U.S. Census Bureau at <http://factfinder.census.gov/> and the denominator was derived from the Arizona Department of Economic Security's Population Statistics at <http://www.de.state.az.us/>

⁷ Arizona Health Status and Vital Statistics, 2009. page 10. ADHS, published November 2010.

Table 5 presents the incidents according to the body of water and the site of the 59 incidents involving children between the ages of 0 and 4. The most common site of incidence was an in-ground pool located at the victim's home (27 incidents). In eight incidents the site was a relative's pool. Three incidents occurred at a friend's pool. In four incidents the pool site was not documented. The seven bathtub incidents all occurred at the victim's home. Two of the spa incidents occurred at the victim's home, and one at a friend's home.

Table 5. The body of water according to the site of incident for children, 0-4 years of age. Life-threatening incidents only, Maricopa County, 2009. Outcomes: all.

Body of Water	Friend's Home	Neighbor's Home	Public & Semi-pub	Relative's Home	Victim's Home	Other / Unknown	All Sites
Bathtub					7		7
Bucket							
Canal/Irrigation Ditch							
Fish/Decorative Pond				1	1		2
Pool, above ground					1		1
Pool, in ground	3	2	2	8	27	4	46
River/Lake							
Spa	1				2		3
Toilet							
Other/ Unknown/ Missing							
TOTAL	4	2	2	9	38	4	59

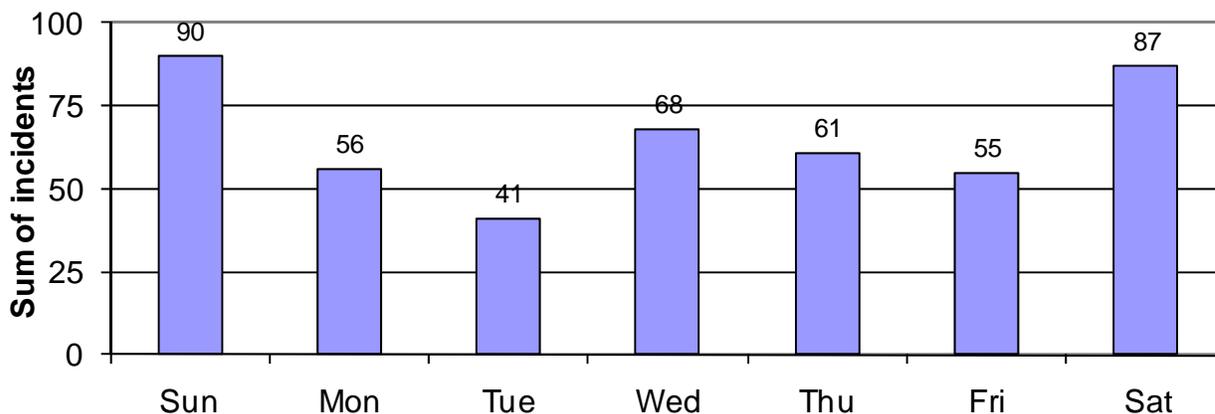
Table 6 presents the type of dwelling where the incidents took place. Thirty-nine (83%) of the 47 pool incidents occurred at a single family home. Five of the 47 pool incidents occurred in apartments, condos, or hotels in 2009. In past years, apartments were the location of most bathtub incidents; this year just one bathtub incident occurred in an apartment and six occurred in single homes.

Table 6. The body of water according to the type of dwelling for children, 0-4 years of age, who experienced a water-related incident in 2009. Outcomes: all.

Body of Water	Apt/ Condo	Hotel/ Motel	Single Home	Multiple Units	Trailer/ Mobile	Unknown/ Other/NA	Total
Bathtub	1		6				7
Bucket							0
Canal/Irrigation Ditch							0
Fish/Decorative Pond			2				2
Pool, above ground			1				1
Pool, in ground	4	1	38			3	46
River/Lake							0
Spa	2		1				3
Toilet							0
Other/Unknown							0
Total	7	1	48	0	0	3	59

Figure 5 displays the occurrence of pool-related incidents by day of week. Incidents occurred on every day of the week, and there was no day when vigilance would not have been important. The graph shows that pool incidents tend to occur more often during the weekend.

Figure 5. Day of the week of life-threatening pool incidents among children 0-4 years old, Maricopa County, 2000-2009. Outcomes: all.



The distribution of pool incidents by hour of the day is shown in Figure 6. Not surprisingly, the incidents occurred when children were likely to be awake. The peak time for an incident in the 0-4 year old age group was in the mid to late afternoon.

Figure 6. Life threatening pool-related incidents by hour of the day among children 0-4 years of age. Cumulative count, 2000-2009, Maricopa County. Outcomes: all.

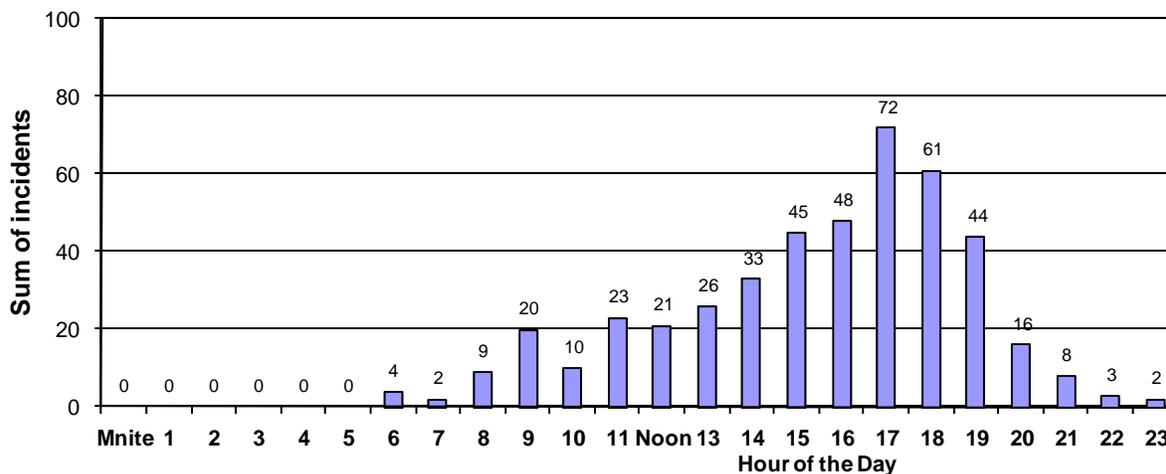


Table 7 presents information about the type of clothing worn at the time of a pool-related incident. In at least 38% of the cases, the children were not wearing swimming attire. These incidents did not occur in a swimming situation; rather, they occurred at a time when the children were not expected to be in or near the pool.

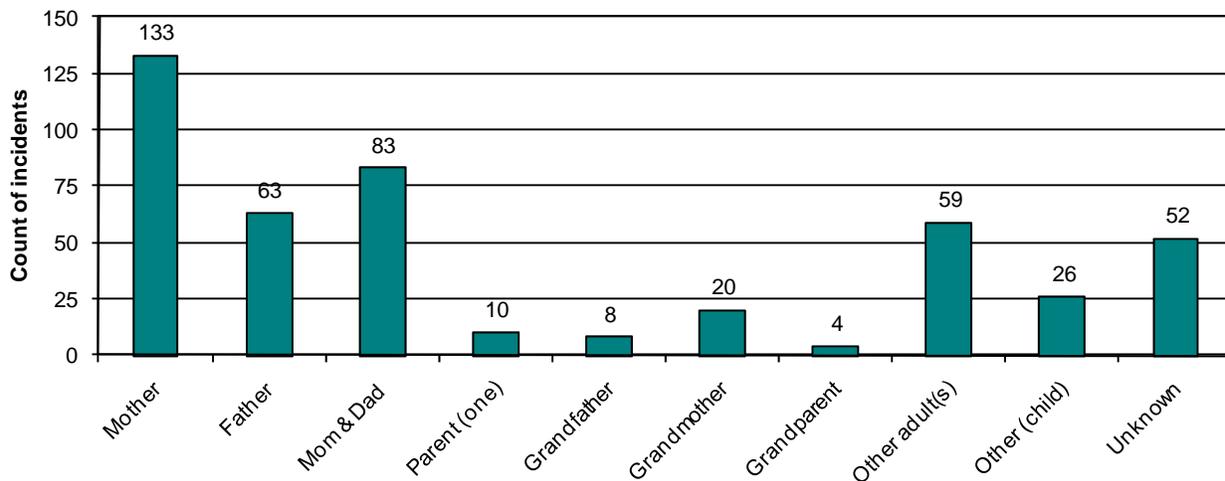
A major purpose of this surveillance system is the identification of the factors surrounding water-related incidents in young children. To assist in this effort, the personnel from the responding fire departments attempt to determine the apparent circumstances surrounding each event. In gathering this data, a firefighter asks about supervision at the time of the incident and looks for breaches in layers of protection that likely allowed a young child to access the pool.

Information about the supervisor of the victim at the time of incident is shown in Figure 7. Over the past decade, a mother or father or both was supervising the child in 289 (63%) of the 458 life-threatening incidents involving children 0-4 years old. In 169 (37%) incidents, the supervisor was someone other than the child's parent. This seems to be a higher proportion than the amount of time that children in this young age group spend outside the supervision of a parent. Thus, babysitters, grandparents, and other supervisors also need to be even more alert to the potential for a pool-related incident to occur.

Table 7. Clothing worn by children ages 0-4 who experienced a life threatening water related incident in a pool, 2009. Outcomes: all.

Clothing	Number	%
None	3	6.4%
Swimwear	18	38.3%
Other clothes	18	38.3%
Unknown	8	17.0%
Total	47	100.0%

Figure 7. Cumulative count of presumed supervisor in life-threatening pool incidents involving children, age 0-4, 2000-2009. Outcomes: all.



Outcomes

To determine outcomes, we used data from fire departments, and supplemented it with data from death certificates and other sources. We documented that at least 14 of the 59 young children (0-4 years old) who experienced a serious water-related incident in 2009

have died (see **Table 8**). Ten children died from incidents in pools. Four children died from incidents in bathtubs. Of the 59 children, 33 had no reported impairment when released from the hospital. But, there were five documented or presumed cases of neurological impairment in this age group in 2009; this is approximately twice the number seen in previous years.

Table 8. Outcome status of children 0-4 years of age reported as having a life-threatening water related incident in 2009.

Water type	Outcome Status				Total
	Unknown	Died	Impairment	No Impairment	
Bathtub		4		3	7
Bucket					0
Canal/Irrigation Ditch					0
Fish/Decorative Pond	1			1	2
Other & Unknown					0
Pool, above ground		1			1
Pool, in ground	6	9	5	26	46
River/Lake					0
Spa				3	3
Total	7	14	5	33	59

Concerns about confidentiality make it difficult to properly document the outcome of cases that enter the medical care system. The outcome status of 7 of the 59 children was unknown. Our linkage to hospital discharge records allows assignment of a presumed outcome status to many cases that the fire fighters have not been able to follow up. Since firefighters try to obtain the follow-up status on cases which have not responded to their resuscitative efforts, we speculate that in most cases a follow-up status of “unknown” means that the child probably recovered well.

The narrative section of the incident report form often provides additional information concerning the incident. This narrative section reveals that a family member or other person often resuscitated the child at the scene by promptly administering CPR when the child was pulled from the water. It is our belief that this immediate resuscitation is a vital step in stabilizing the child and counteracting the detrimental effects of the submersion. However, we cannot determine whether prompt CPR leads to the survival in a vegetative state of some children who otherwise would have died.

When the 458 serious incidents in pools from 2000-2009 are assessed we note the following outcomes: 25.8% died; 4.1% had a neurological or other impairment at last contact (usually at the time of discharge from the hospital); 44.3% were reported as normal (usually as determined at time of discharge from the hospital); and 25.8 % had an unknown or undocumented outcome. Currently, we do not have resources to conduct a longer term assessment of the child’s status.

Attributed Cause

Upon review of the incident form, we assign a single, “attributed cause” of each pool incident to one of the following six categories:

- No barrier to pool
- Inadequate fence
- Gate or latch failed or was propped open
- Back safety door or latch failed
- Supervision issue
- Other or unknown.

This information is further classified into events that occurred during the seven “cold” months, October through April, and the five “warm” months, May through September.

Similarity To Child Fatality Review Data

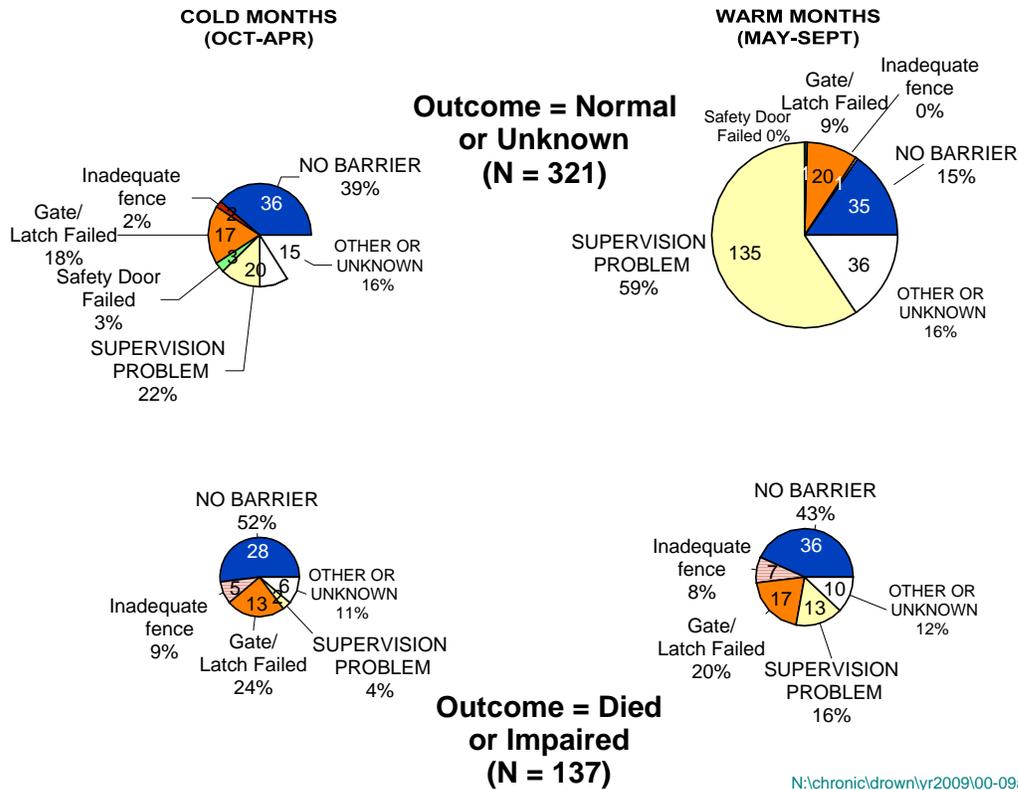
The findings in our analysis are similar to that of the Arizona Child Fatality Review (CFR) Program. The CFR program has published their findings of drowning of young children, 1995-1999, and reported that only 4 of 81 drowning **deaths** of children less than 5 years of age occurred in backyard pools in which it was known that there was an adequate pool fence that had a properly functioning locked gate.⁸

A comparable analysis of our data, looking specifically at the children who died or were impaired, yields similar findings. To relate the incidence data reported by fire departments to the mortality data from CFR, we combined the categories of the 137 incidents occurring between 2000 and 2009 where the child’s outcome was “died (118) or impaired (19).” For additional comparison, we also analyzed the combined category of 321 incidents where the outcome was “normal (203) or unknown (118).” As in previous reports, we display the findings according to season (warm or cold). The results are shown in the four pie charts of **Figure 8**.

⁸ Rimza ME, Schackner RA, Bowen KA, Marshall W. Can Child Deaths Be Prevented? The Arizona Child Fatality Review Program Experience. Pediatrics. 2002; 110(1). www.pediatrics.org/cgi/content/full/110/1/e11

Figure 8. Comparison of the single attributed cause of incidents in pools, according to time of year (cold vs warm months) and outcome of the child (normal and unknown vs. died and impaired). This figure analyzes cases occurring in 2000-2009. Data are derived from reports submitted by fire departments in Maricopa County.

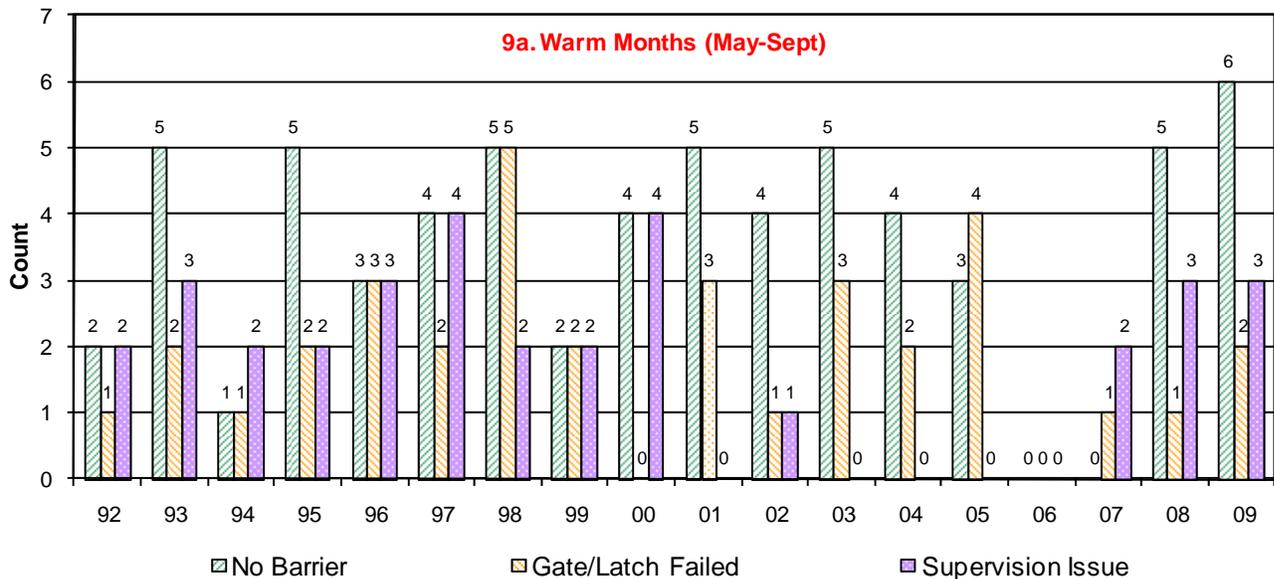
Attributed cause in pools, children under 5 years of age, Maricopa County, 2000-2009

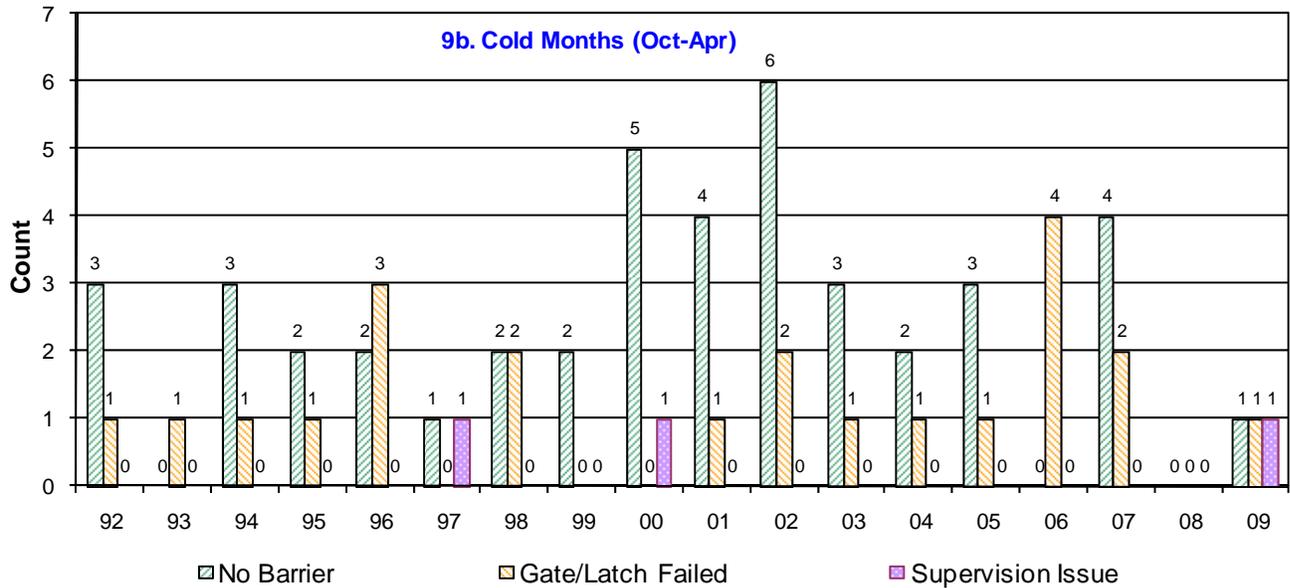


This approach reveals a notable finding for incidents that occurred during the warm months. The roles of supervision and barriers differ for the outcome categories. The role of barriers (absent or failed) for cases whose outcome is “died or impaired” markedly differs compared to those cases whose outcome is “normal or unknown.” Absent barriers appear to be a significantly more prominent factor in cases where the child died or was impaired than is supervision. On the other hand, supervision is the predominant factor in warm month incidents in which the child survived with normal or unknown outcome. In cold months, **Figure 8** shows that a barrier is the major factor regardless of outcome. The data here support the findings of the CFRT regarding the role of inadequate barriers as a major factor that contributes to child drownings in swimming pools.

Figures 9a and 9b present data on the trend of the attributed cause of pool-related incidents over the 18-year period. As noted above, the attributable cause is best analyzed by excluding cases in which the outcome is “normal” or “unknown.” An interesting and probably more relevant pattern is noted by analyzing the cases where the child’s outcome is death or impairment. Approximately 10 deaths occurred annually from pool incidents in warm months, and about 5 deaths annually from incidents that occurred in cold months (see Figure 4b). The counts swing widely from year-to-year because the counts are relatively small. We could not discern a trend in the count of attributed causes in warm months. Similarly, for events occurring in cold months (see next page) we hesitate to draw conclusions about a time trend because the counts are so small and year-to-year variability so great.

Figures 9a (warm) and 9b (cold). Trend of attributed causes (expressed as the count of all cases in the warm or cold season) of pool incidents in Maricopa County involving children 0-4 years of age in which the outcome of the incident was death or impairment. The graphs do not show the counts of the few cases attributable to “Inadequate barrier” and “Other&Unknown.”





LIMITATIONS OF ACCURACY OF INCIDENCE DATA

Our surveillance system relies mainly upon voluntary reporting by fire departments and is subject to under-reporting if they reduce their participation in submitting the report forms. The downturn in the local economy and municipal revenues in 2008 and cutbacks in staff at fire departments clearly affect their ability to report cases.

The surveillance system assumes that few serious water-related incidents occur without the activation of the 9-1-1 system. However, this assumption has not been rigorously tested. Cases that generally lack a fire department report include those that are obviously dead when the law enforcement responders arrive on scene, crime scene cases, and cases under the jurisdiction of the sheriff's office or a tribal government.

One of the ways we evaluate completeness of case ascertainment is by matching the case reports to a list of cases discharged from hospitals. For 2009 we note that five child cases in Maricopa county, hospitalized for 3 or more days or who died, were not captured by the incidence system.⁹

Information from death certificates (described below) reveals that only one child drowning in 2009 in Maricopa county was missed by the reports we received from fire departments or from news clippings.⁹ The incidence data recorded 14 deaths of children in this age group for incidents occurring in 2009.

⁹ For consistency with methods used in previous years, we do not add missed cases to the surveillance database.

DEATH CERTIFICATE DATA

Death certificates provide an independent data source to measure the counts, rates, and trend of child drownings. While we use information from death certificates to supplement the outcome status of cases identified through fire department reports (described above), we do not add otherwise unreported drowning cases to the incidence database. Thus, the mortality data can help to measure the accuracy and completeness of the incidence surveillance system for the cases who die. The case definitions used for vital statistics differ slightly compared to those used in the incidence data.

Customarily, mortality data show deaths of the resident population during a given year. However, for this report we present an unconventional analysis that more precisely reflects the local, year-to-year findings. We reviewed Arizona death statistics to find child cases who died in Maricopa County, regardless of where they resided. We include only the cases whose incident occurred in Maricopa County and whose death occurred in Arizona. Thus, we present the local rates of drowning deaths, regardless of residency. To calculate the mortality rate, we divided the count by the estimated number of children age 0-4 each year residing in Maricopa county. This method improves the accuracy of identifying locally occurring events which is important for the Coalition that needs yearly feedback about the effectiveness of their prevention programs.

Figure 10 shows these drowning death rates for children under five years of age.¹⁰ The data are shown for drownings in all bodies of water, and separately for drownings that occurred in swimming pools (including spas), and in bodies of water other than pools and spas.¹¹ In 2009, the Maricopa drowning rate for all bodies of water remained at 4.1 deaths per 100,000 resident children, the third lowest drowning rate since we began tracking the rates. Similarly, the death rate for pools decreased slightly to 2.8 per 100,000 children, also a comparatively low rate during the past 27 years. The overall decline in the pool death rate looks generally similar to the decline in the rate of pool incidents reported by the fire departments shown previously in **Figure 3**. For comparison, the goal of *Healthy Arizona 2010* is to reduce drowning fatalities to no more than 0.9 deaths per 100,000 young children.^{12,13}

¹⁰ To calculate this rate, the numerator includes non-residents and Arizona residents, age 0-4 years old, whose death occurred in Maricopa County. The denominator, however, is the Maricopa County population of children 0-4 years old. We chose this unconventional method for calculating the rate because we occasionally encounter nonresident visitors whose incident and death occurred in Maricopa county. We count these cases because the Drowning Prevention Coalition is focused on reducing the number of local incidents regardless of whether the child is a county resident or a visitor.

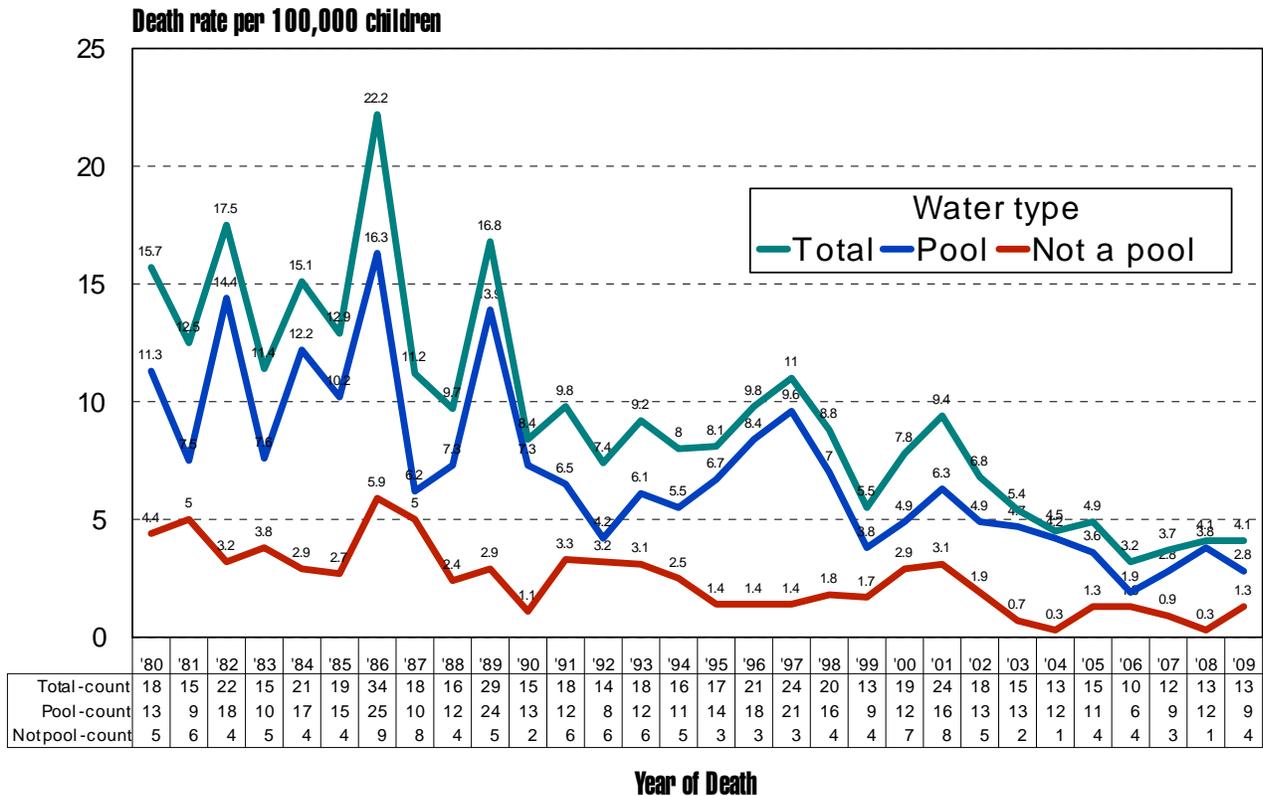
¹¹ We consider a hot tub or spa in the same category as swimming pool.

¹² U.S. Department of Health and Human Services. *Healthy People 2010*, 2nd ed., Volume 2. Injury Prevention, Section 15-29: Reduce Drownings, page 15-40. U.S. Government Printing Office, November 2000.

¹³ <http://www.azdhs.gov/bems/trauma-pdf/injuryprevplan.pdf> ADHS Injury Surveillance and Prevention Plan, 2002-2005.

Figure 10. Drowning death rate for children, 0-4 years of age, where the occurrence of the death and the incident was in Maricopa County. [Data Source: ADHS, Vital Statistics, death certificates coded with underlying cause of death as: E830, E832, or E910 (prior to year 2000); or W65-W74, V90-V92, or Y21 (year 2000 and later). Manner of death: accidental or undetermined].

Child drowning rate and count in Maricopa County, Arizona
Deaths occurring in 1980-2009; 0-4 years of age



DISCUSSION

The rates of child incidents and deaths in pools in Maricopa county for the latter part of the 2000 decade have been cut by a half compared to the rates seen in the 1980's or 1990's. Informal conversations with the Board of the Drowning Prevention Coalition of Arizona have not identified a specific factor that explains this favorable trend. However, we believe that a combination of factors contributes to this trend: pool safety awareness campaigns sponsored by private and public sectors; intense media support in reporting individual incidents; widely publicized prosecution of cases of gross negligence; prompt use of CPR; and the slowly accumulating, favorable impact of pool barrier laws passed in the early 1990s. Further reduction of the drowning death rate could be achieved through wider use of barriers (eg, fences) and working gates.

In 2009 a scientific article was published that showed a reduced risk of drowning among children age 1-4 years who received formal swim lessons compared to those children who had not received such lessons.¹⁴ The Maricopa surveillance system does not determine the swimming ability of the young children. The Coalition may wish to consider adding this factor to the data collected locally.

¹⁴ Brenner RA, Taneja GS, Haynie DL, et al. Association between swimming lessons and drowning in childhood. Arch Pediatr Adolesc Med. March 2009; 163(3);203-210.

**INCIDENT REPORT FORM: DROWNING
OR NEAR-DROWNING IN ARIZONA – 2009**

DATE OF INCIDENT
(MM/DD/YR)

HOUR
(24:00)

AGE
(yrs)

SEX

INCIDENT # _____
PLAT or ZIP CODE _____

FIRE DEPT.

(Reporting agency)

CITY OF INCIDENT:

- Chandler Mesa Rural area
 Gilbert Peoria Scottsdale
 Glendale Phoenix Tempe
 Other: _____

RACE/ETHN:

- Hispanic White Amer. Indian
 Black Asian/PI Unknown
 Other: _____

WATER TYPE:

- Pool--in ground Spa
 Pool--above ground Bathtub
 Canal or Irrigation Ditch Bucket
 Lake Other: _____

AT WHOSE HOME DID INCIDENT OCCUR:

- Victim's Home Neighbor's
 Relative's Friend's
 Not at a home _____

TYPE OF DWELLING OR FACILITY:

- Single Home Apt/Condo
 Hotel/Motel Other: _____

ATTIRE OF VICTIM:

- Swimwear Other Clothes
 None Other Clothes

**PATIENT'S ACTIVITY AND LOCATION
IMMEDIATELY PRIOR TO INCIDENT:**

- Swimming Playing inside
 Bathing Playing outside
 Other: _____

CHILD SUPERVISION AT TIME OF INCIDENT:

- Mother Father N/A
 Other (Specify) _____

SUPERVISOR'S ACTIVITY PRIOR TO INCIDENT:

- Sleeping Watching TV On phone
 Yard work Housework Other: _____

STATUS OF PATIENT WHEN FOUND IN WATER:

- Submerged Floating
 Struggling Unknown
 Other: _____

**RESPIRATORY EFFORT WHEN PULLED
FROM WATER:**

- Present Absent

ESTIMATED DURATION OF ANOXIA: _____

RESCUER(S) ACTIONS PRIOR TO FD ARRIVAL:

- Chest compressions AND breaths (CPR)
 Chest compressions only
 Rescue breaths only
 None attempted Unknown

For pool incidents at dwellings AND patient < 6 y/o:

BARRIER

IS IT PRESENT?

- Fence between house and pool Yes No
Gates Self-Close with Latch Yes No
Gates Work Properly Yes No
House Doors Self-Close with Latch Yes No
Doors Work Properly Yes No
Pool Cover, Type: _____ Yes No
Door or Window Alarm Yes No

LIKELY METHOD OF ACCESS TO POOL OR SPA:

- Supervisor allowed child into pool or deck area
 No barrier -- child wandered in
 Climbed (specify): _____
 Child entered unsecured or propped gate
 Other: _____

DISPOSITION (if known):

- D.O.A.
 Transported to: _____
 Died in E.D. Admitted
 Treated as outpatient and released
 P.O.V. transport to: _____
 Evaluated and left on-scene

FOLLOW-UP & DATE PATIENT WAS LAST SEEN:

- Died _____ / _____ / _____
 No Impairment _____ / _____ / _____
 Impairment _____ / _____ / _____

DESCRIBE THE APPARENT CIRCUMSTANCES (how/why it happened; how child was found & revived): _____

(Initials)

(Today's Date)