

# **The Mathematics of Alcoholics Anonymous**

*"As a celebrated American statesman put it, 'Let's look at the record.'"*  
Bill Wilson, *Alcoholics Anonymous*, page 50, A.A.W.S. Inc., 2001.

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## **Part 1: The Growth of the A.A. Membership**

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### **Introduction**

The purpose of the analysis in this report and those to follow is to see what can be learned about A.A: the overall membership numbers, growth of the membership, distribution of length of membership, average sobriety and the effectiveness of A.A., etc., based on A.A. data. For this purpose only official A.A. data will be used – data either from official A.A. sources such as A.A. books, A.A.'s website, A.A. triennial surveys, A.A. newsletters and informational publications and official data from unofficial sources such as the websites and reports of A.A. researchers and historians. Other independent data may be used for demonstration or support, however, conclusions will be drawn only on the basis of the A.A. data.

Why do this? Simply because the results of any independent studies of A.A. will always be delegitimized by A.A. and 12-Step supporters since they do not have the A.A. seal of approval – they are not official, they are not *"Conference Approved"*. It is claimed that independent studies are not reflective of the real A.A. It is also maintained by A.A. and its supporters that A.A. does not lend itself well to analysis since it is an anonymous organization, doesn't keep official membership lists and doesn't follow up with its members.

I disagree. Any industry, organization or treatment method can be analyzed if one puts in the effort. There is a tremendous amount of official A.A. data available that has been published or released by A.A. from the various sources mentioned above. We know that the data can be trusted since, regarding the triennial surveys, A.A. says in *"About AA"* (A.A.'s newsletter to professionals) from its Summer 1999 issue: *"Today, survey results can be used reliably to provide information about A.A. as a whole, though not necessarily about any one group or area."* Available A.A. data can be examined and analyzed and therefore any results will be based on the sound and reliable reporting of an organization which was founded on the principle of rigorous honesty. Surely then, nobody could call into question the findings of such analysis.

### **Section 1: U.S.A./Canada Membership Data and Growth Curve**

When I mention A.A., or the membership of A.A., I am referring to A.A. in the U.S.A./Canada region – this also includes Puerto Rico, the U.S. Virgin Islands, Antigua and the Bahamas. If I refer to other regions I will make that clear. Since two thirds of the global membership of A.A. exists in the U.S.A./Canada region and it is the one area for which we have the most historical data it is therefore the one best suited to mathematical analysis.

From its beginning in 1935 the membership of A.A. grew from just two members to 1.31M members in 2007. From the data in Table 1 we can calculate that from 1962 to 1972 the membership grew by 87%, from 1972 to 1982 by 139% and from 1982 to 1992 by 110%. However, since 1992 the growth of the membership has dropped from a gallop to a crawl. In the fifteen years from 1992 to 2007 the membership grew by just 6.8% (0.44% p.a. on average). This is almost negligible when compared to the growth of 205% in the fifteen years from 1977 to 1992. Why was the growth rate of the membership so high in the past and why has this growth collapsed? If we look at the membership growth curve, Figure 1, we can learn a lot about the past, present and future of the A.A. membership.

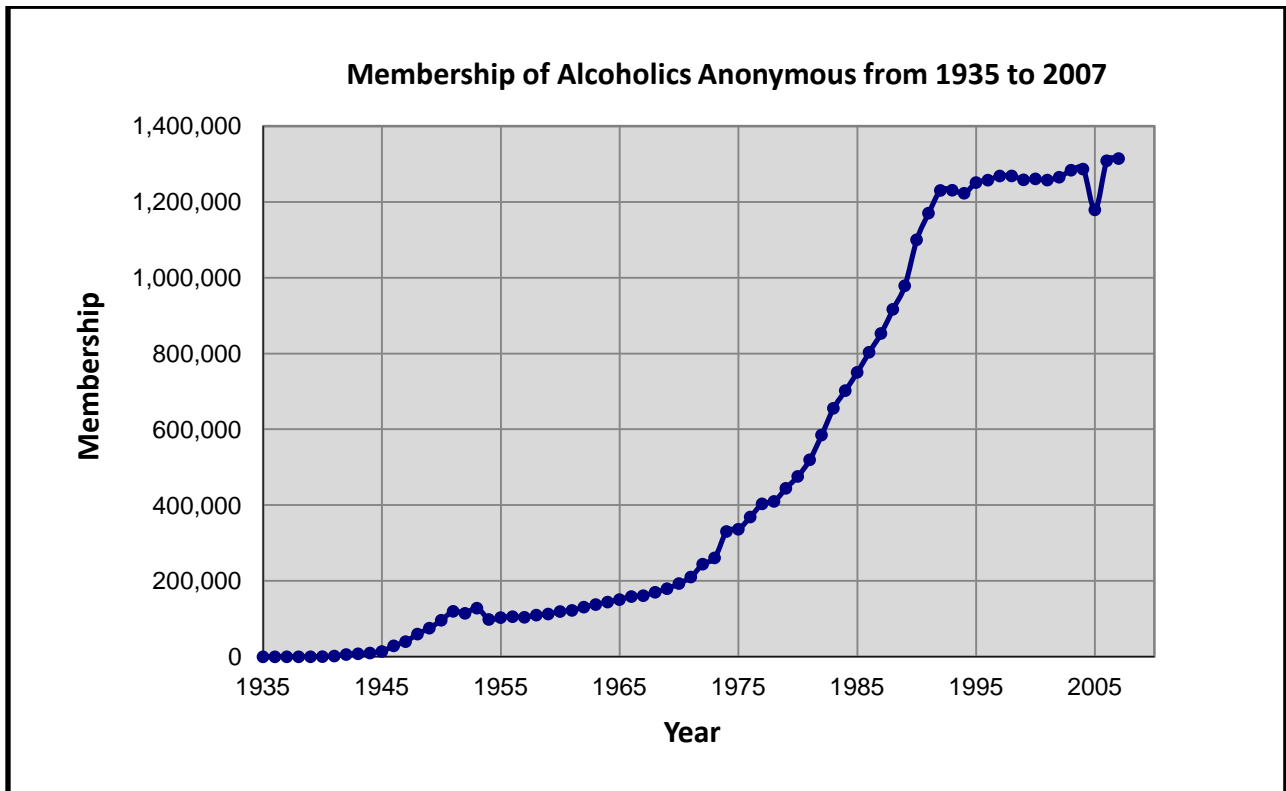
**Table 1: Membership\* of Alcoholics Anonymous, 1935-2007<sup>1-4</sup>**

Year	AA Mem.	Year	AA Mem.	Year	AA Mem.	Year	AA Mem.	Year	AA Mem.
2007	1,314,552	1992	1,230,381	1977	403,590	1962	131,046	1947	40,000
2006	1,308,712	1991	1,170,454	1976	368,756	1961	122,477	1946	29,000
2005	1,179,210†	1990	1,100,155	1975	336,549	1960	119,528	1945	14,000
2004	1,286,844	1989	978,982	1974	330,621	1959	112,899	1944	10,000
2003	1,283,819	1988	916,782	1973	261,002	1958	110,039	1943	8,000
2002	1,265,304	1987	853,097	1972	244,426	1957	104,294	1942	6,000
2001	1,257,775	1986	803,522	1971	210,492	1956	105,896	1941	2,000
2000	1,260,928	1985	750,511	1970	193,321	1955	103,496	1940	500
1999	1,258,490	1984	702,311	1969	179,680	1954	98,541	1939	100
1998	1,268,713	1983	655,754	1968	170,250	1953	128,361	1938	65
1997	1,268,578	1982	585,134	1967	161,323	1952	114,724	1937	40
1996	1,257,570	1981	519,749	1966	159,009	1951	120,000	1936	15
1995	1,251,192	1980	475,965	1965	150,966	1950	96,475	1935	2
1994	1,223,017	1979	444,547	1964	144,426	1949	75,625		
1993	1,231,000	1978	409,984	1963	137,893	1948	60,000		

\* Total world membership from 1935-53, U.S.A./Canada region only from 1954 onward.

† A drop of over 100,000 in 2005 and subsequent recovery in 2006 seems unlikely.

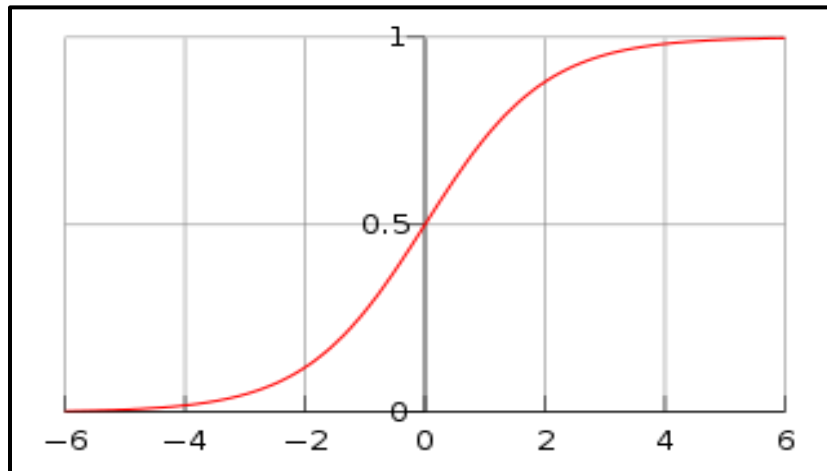
**Figure 1: A.A. Membership growth curve, 1935-2007<sup>1-4</sup>**



If we look at Figure 1, the A.A. membership growth curve, the general shape of this curve bears a striking resemblance to the classical “lazy S” shape of a logistic function. An example of a logistic function is shown in Figure 2. Functions of this type are commonly used to model population growth. The typical logistic function can be described in the early stages as having approximately exponential growth up to a point, as saturation begins, when the growth of the population slows and eventually stops as the population reaches maturity, i.e. reaches its maximum. A biological population will reproduce at a rate that is proportional to both the existing population and the amount of available resources. Initially there is a surplus of resources in comparison to the size of the population but as the population grows the amount of available resources decreases in proportion to the existing population causing the rate of growth to decrease and eventually to stop as the population reaches its maximum achievable level.

The logistic function can be applied to the growth of any biological population such as bacteria in a Petri dish, the population of rabbits on an isolated island or, interestingly, the growth of a tumor. Bacteria will multiply, given the correct conditions, until they simply run out of nutrients. Rabbits, in a confined living area, will do what rabbits do best, in the absence of any introduced disease or predator, until they simply run out of sufficient food/living space to support the growing population of rabbits. Eventually, in each system, a balance emerges between what the environmental system can support and a stable population. Both of the systems mentioned are self limiting, i.e., the bigger the population gets the more resources that are needed to produce further growth in the population. Generally for biological populations resources are fixed thus the population cannot continue to grow indefinitely. The population has a mathematical upper limit (asymptote) which, all things remaining equal, cannot be exceeded for a given set of conditions specific to each individual system.

**Figure 2: A Logistic Function**



Other examples of the logistic function are in to be found in chemistry, sociology, mathematical psychology and economics. An example of a logistic function in economics is in the growth of sales of a new technology, such as cell phones. Initially, costs were high so sales were positive but slow, followed by a period of rapid growth with consequent drop in manufacturing costs and retail prices, followed by a slowing of the rate of sales as market saturation begins and finally maturation as all in this market who are likely to buy this technology have done so. This curve can apply to any new technology such as Television, DVDs, home internet access, mp3s, etc. How the logistic function applies to the growth of A.A./12-Step can be understood in more detail with an understanding of the theory of the Diffusion of Innovations which explains how, why, and at what rate new ideas and technologies spread through cultures.

We can now see that the membership of A.A. has grown and reached, or is very close to, its maximum capable membership level in accordance with established mathematical theory. It is refreshing to see that A.A. in the United Kingdom has recognized this and has communicated this observation to its members and the public. A 2002 report by A.A. in the U.K. has the following to say about its fellowship:

*“There has been a decreasing rate of growth in the number of meetings since 1986. The percentage growth rate per annum since the inception of AA in the early 50's show, in the first ten years huge - and unsustainable - growth rates of some 30 to 20%, falling to 10% by the mid 70's and to 5% by the mid 80's. The average growth level now is around 1%. There can be little doubt that the number of AA meetings per week in relative terms has virtually ceased to grow... In business terms, the growth curve is characteristic of a product or process which has lost its novelty and is in need of some form of revitalization”.*<sup>5</sup>

What about the future of A.A.? Based on the average growth rate between 1992 and 2007 of 0.44%p.a. the membership of A.A. will not reach 1.4M until 2022 unless there is a change in either its available resources or the mechanics of the system. The single most important resource for A.A. is newcomers and this has been reasonably constant since 1992 and shows little sign of increasing. The growth curve and population theory tell us that the membership of A.A. has reached or is very close to its maximum level and will most likely remain reasonably constant in the short term. However, we will see in Section 3 that at some stage in the future a gradual decrease in the number of newcomers to A.A. will signal the start of a slow, sustained and unavoidable decrease in the A.A. membership.

## **Section 2: Per Capita Membership Data and Per Capita Growth Curve**

If we observe the A.A. per capita membership rate in the U.S.A./Canada region, Table 2 and Figure 3, we can see that the per capita membership of A.A. increased steadily and reached a peak of 0.432% in 1992 before decreasing steadily to 0.393% by 2007. At the peak in 1992 there were 432 A.A. members per 100,000 of the population and by 2007 there were 393 A.A. members per 100,000 of the population. That's a decrease in the per capita A.A. membership of 9.0% from 1992 to 2007.

**Table 2: Per capita membership (PCM) of Alcoholics Anonymous, 1980 – 2007**<sup>1-4, 6-7</sup>

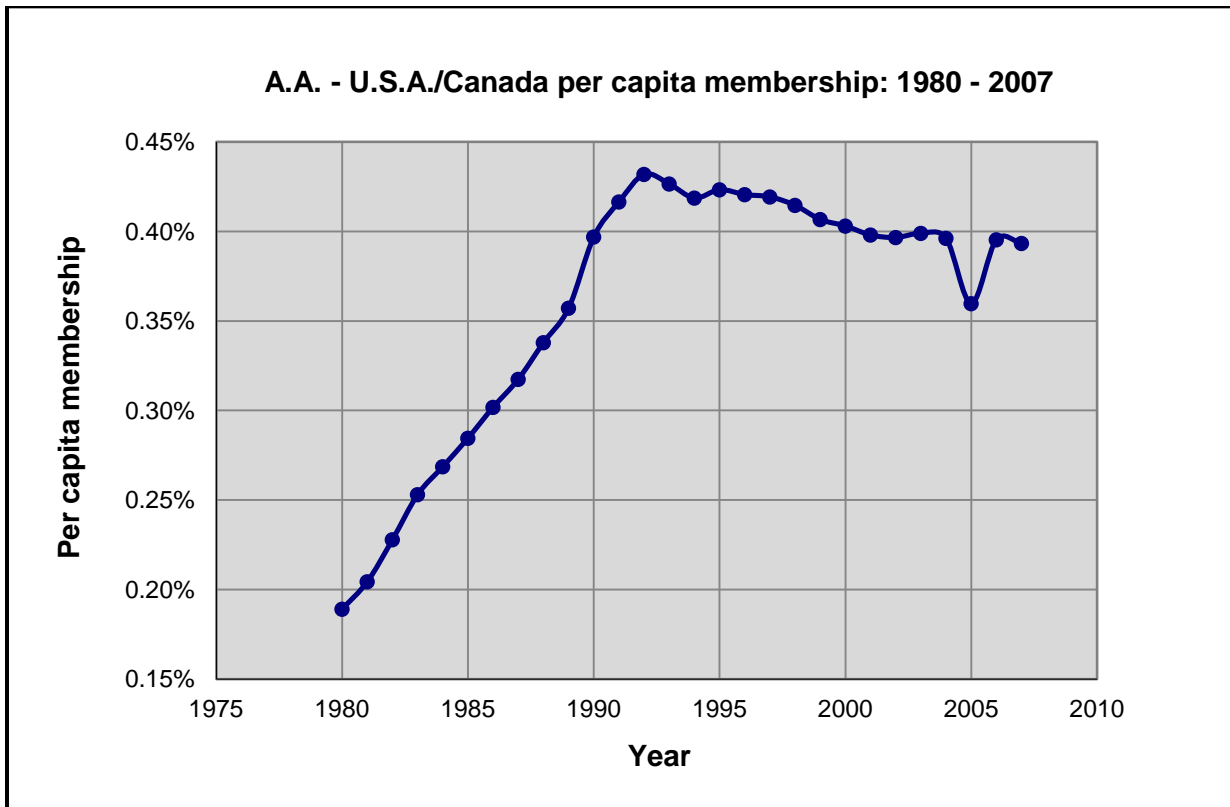
Year	USA/CAN Pop.	AA Mem.	PCM	Year	USA/CAN Pop.	AA Mem.	PCM
2007	334,207,233	1,314,552	<b>0.393%</b>	1993	288,600,264	1,231,000	<b>0.427%</b>
2006	331,003,402	1,308,712	<b>0.395%</b>	1992	284,880,961	1,230,381	<b>0.432%</b>
2005	327,816,095	1,179,210†	<b>0.360%</b>	1991	281,012,335	1,170,454	<b>0.417%</b>
2004	324,794,752	1,286,844	<b>0.396%</b>	1990	277,161,926	1,100,155	<b>0.397%</b>
2003	321,784,010	1,283,819	<b>0.399%</b>	1989	274,101,025	978,982	<b>0.357%</b>
2002	318,997,780	1,265,304	<b>0.397%</b>	1988	271,294,365	916,782	<b>0.338%</b>
2001	315,990,206	1,257,775	<b>0.398%</b>	1987	268,737,773	853,097	<b>0.317%</b>
2000	312,851,446	1,260,928	<b>0.403%</b>	1986	266,234,042	803,522	<b>0.302%</b>
1999	309,444,046	1,258,490	<b>0.407%</b>	1985	263,766,531	750,511	<b>0.285%</b>
1998	306,011,186	1,268,713	<b>0.415%</b>	1984	261,432,553	702,311	<b>0.269%</b>
1997	302,554,097	1,268,578	<b>0.419%</b>	1983	259,158,963	655,754	<b>0.253%</b>
1996	299,005,041	1,257,570	<b>0.421%</b>	1982	256,781,900	585,134	<b>0.228%</b>
1995	295,580,484	1,251,192	<b>0.423%</b>	1981	254,286,107	519,749	<b>0.204%</b>
1994	292,124,827	1,223,017	<b>0.419%</b>	1980	251,740,752	475,965	<b>0.189%</b>

† A drop of over 100,000 in 2005 and subsequent recovery in 2006 seems unlikely.

Population numbers include Puerto Rico and the U.S. Virgin Islands, but exclude the Bahamas and Antigua.

Membership numbers include Puerto Rico, the U.S. Virgin Islands, the Bahamas and Antigua.

**Figure 3: A.A. per capita membership growth curve, 1980 – 2007** <sup>1-4, 6-7</sup>



Although the high rate of growth of the A.A. membership stopped in 1992 we would still expect that the membership would continue to grow at the same rate as the overall population of the U.S.A./Canada region thus maintaining its 1992 per capita ratio of 0.432%. However, from 1992 to 2007 the population of the U.S.A./Canada region increased by approx. 1% p.a. while the membership of A.A. increased by only 0.44% p.a. giving a decrease in the per capita membership of 9.0%. Assuming that the problem of alcoholism, its rate of occurrence or its rate of diagnosis did not decrease from 1992 to 2007, and there is no evidence to suggest that it did, then we can clearly see that the rate of use of A.A. among alcoholics decreased during this time and that it will continue to decrease in the future.

A.A. is the most widely used method for the treatment of alcoholism in both public and private treatment centers according to the Institute for Behavioral Research at the University of Georgia.<sup>8,9</sup> Why then, if A.A. is so useful and effective to warrant its widespread use, would the per capita rate of A.A. membership decline by 9.0% in the fifteen years between 1992 and 2007?

Due to the logistic nature of its membership growth, its membership dropout rate and the fact that A.A. can only attract a more or less fixed number of newcomers to A.A. each year it is mathematically impossible for A.A. to grow its membership at a rate that is sufficient to maintain its per capita membership level. The consequences of A.A.'s inability to attract an ever increasing number of newcomers will be discussed in Section 3.

### **Section 3: Newcomers – a brief look at their effect on the overall membership level**

One of the most important factors involved in the growth and support of A.A. is the marketing and promotion of A.A. by A.A. members themselves. Because of this A.A. is deeply and positively embedded in our society and there are few new areas in which A.A. can seek to embed itself. There is also, in spite of any scientific evidence to support its use, a growing inclusion of A.A. in, and secondary promotion of A.A. by, medical, judicial and social agencies. Add to that a steadily increasing level of popular awareness of addiction issues over the past few decades and you have tremendously powerful forces at work not just encouraging but often coercing newcomers in the doors of A.A. Yet, in spite of these great forces working to support A.A., the membership of A.A. has barely grown and the per capita membership has decreased since 1992.

As mentioned previously, the membership of A.A. is self limiting, i.e., the bigger the membership gets the more new members that are required to produce further growth in the membership. This is mainly due to the very high attrition (drop out) rate which now requires A.A. to attract huge numbers of newcomers each year in order to maintain the same level of membership. Since 1992 there were just enough newcomers going to A.A. to outweigh the numbers who dropped out - hence the small net growth of 0.44% p.a. on average in the fifteen years between 1992 and 2007. But how many members are required every year in order to maintain the overall membership? I will show in Part 2 of this report how it is possible to calculate the number of newcomers going to A.A. in a given year but for now I want to briefly discuss how the future of the A.A. membership is dependent on the numbers and percentages of newcomers.

Between 1992 and 2007 there were, based on A.A. data, on average, slightly over 800,000 newcomers going to A.A. each year. There was little growth in the membership during this time so the system was essential stable, i.e., what goes in must drop out. Therefore it is obvious that the A.A. membership was losing approx. 800,000 members each year during the period 1992 to 2007. To express this in an equation:

$$\text{Existing mem. (year } x) + \text{Newcomers (year } x) - \text{Drop out (year } x) = \text{Existing mem. (year } x+1)$$

**For example:**

$$\text{Existing mem. (2001) + Newcomers (2001) - Drop out (2001) = Existing mem. (2002)}$$

$$\Rightarrow 1,257,775 (2001) + 860,318 (2001) - \text{Drop out (2001)} = 1,265,304 (2002)$$

$$\Rightarrow \text{Drop out (2001)} = 1,257,775 + 860,318 - 1,265,304$$

$$\Rightarrow \text{Drop out (2001)} = 852,789$$

This is not to say that 99% of the newcomers who go to A.A. each year will drop out during their first year of attending A.A. However, the majority of newcomers will drop out during their first year with a minority continuing on as members for some time with most of these dropping out in the years to come. Thus, the annual drop out rate includes all members who drop out from all stages of membership.

As can be seen from the example above the membership of A.A. is incredibly dependent on a huge amount of newcomers to maintain the existing membership level. More specifically, it is dependent on the number of newcomers as a percentage of the existing membership. Based on data from the A.A. triennial surveys the amount of newcomers coming to A.A. in any given year, as a percentage of the then existing membership, varied from 91% in 1968 to 71% in 1992. This is how the A.A. membership grew consistently during those years: more newcomers joined A.A. every year than existing members dropped out. Since 1992 the membership has barely grown while at the same time its supply of newcomers varied from 59% to 71% of the existing membership which just about exceeded the annual drop out rate for the existing membership, (as shown in the example above) and consequently there was very small net growth in the membership.

Conversely, it can be shown that if the supply of newcomers to A.A. were to decrease to 50% of the existing membership of 1.36M (2010) then, based on the current drop out rate, the membership of A.A. would decrease to below 1.0M by the end of five years. If no more newcomers were to go to A.A. from today onward then the membership of A.A. would decrease to approximately half of its current level by the end of just three years. It is obvious that without this massive supply of newcomers the A.A. membership would quickly collapse. These figures prompt some very important questions: What has happened to the, at least, 12,000,000 people who tried A.A. over the fifteen years from 1992 to 2007 and subsequently left? Why didn't A.A. work for those newcomers? Statistically, does A.A. really work for anybody? Is the A.A. method so unpalatable that few people choose to continue as members? Why are medical organizations, our courts, our government and our society not asking some serious questions of A.A. and of those who support and promote it?

In summary, there appears to be a benefit for a very few, a massive waste of time and money for the overwhelming majority and the whole system falls apart if it can't attract a huge amount of newcomers each year. This leaves us with one final and extremely important question:

**Why do the mathematics of the A.A. membership increasingly resemble those of a pyramid scheme?**

## Conclusion

The membership of A.A. has grown according to population theory and has reached, or is very close to, its maximum possible sustainable membership. However impressive the growth of A.A. in the past it is clear than it has entered, since 1992, a period, now almost twenty years long, of stagnation. The membership of A.A. has grown from 1.23M to 1.31M, or by only 6.8%, from 1992 to 2007. The per capita A.A. membership has fallen from 0.432% to 0.393%, that's a decrease of 9.0%, from 1992 to 2007. The number of newcomers going to A.A. each year averaged approx. 800,000 from 1992 to 2007 and yet with this massive influx of newcomers the membership averaged a net annual growth of 0.44%p.a. or just 5,611 members per year.

In 1992 A.A. reached what is known in population modeling as a bottleneck. This bottleneck is due to the number of newcomers being almost equally balanced by the drop out rate as follows:

1. The medical/judicial/social system and A.A. itself cannot provide any more than approx. 800,000 newcomers to A.A. every year.
2. The drop out rate in A.A. is so high, ~ 800,000 p.a., that there cannot be any appreciable net growth in the A.A. membership.

In order for the membership of A.A. to grow it must attract much more newcomers, retain more members (increase its effectiveness) or both. Based on all of the A.A. data available and especially the data from 1992 onward it seems unlikely that either of these is possible. Thus, there cannot be any appreciable growth in the membership in the near future. The long term prospect for the membership is a mathematically inevitable decline since at some stage in the future the membership will begin to decrease when the percentage of newcomers falls too low to overcome the drop out rate.

Why will the numbers of newcomers drop at some stage in the future? Most likely this will occur because the reality of A.A. is being revealed and the myths of A.A. are being exposed. Not only are there many websites dedicated to this purpose but now there are many more qualified treatment professionals who are publicly voicing their opinions on this subject. In addition data from the National Treatment Center Study in 2004 shows that the percentage of treatment centers using 12-Step treatment has decreased to 76% in private treatment centers<sup>8</sup> and decreased to 60% in public treatment centers<sup>9</sup>. Further to this there are more frequent reports in the national media questioning the efficacy and cost, both to the patient and the taxpayer, of using A.A./12-Step treatment methods. The tide of public opinion is slowly beginning to turn away from A.A. and toward evidence based treatment methods. However, the medical, judicial and social agencies that use and promote A.A. will most likely not transfer their allegiance to evidence based treatment methods until there is a more fundamental change in public opinion and the perception of A.A.

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In the following parts these subjects will be covered:

- Distribution of the length of membership within A.A.
- Calculation of the number of A.A. newcomers each year
- Calculation of the "effectiveness" of A.A. over various time periods
- A.A.'s calculation of the "average sobriety" in A.A.
- A realistic calculation of "average sobriety" in A.A.
- Discussion of the triennial survey data and the internal A.A. report "Comments on Triennial Surveys"
- Age distribution in A.A. and the effect of the "A.A. baby boom" on the membership
- The influence of meeting frequency on duration of membership



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