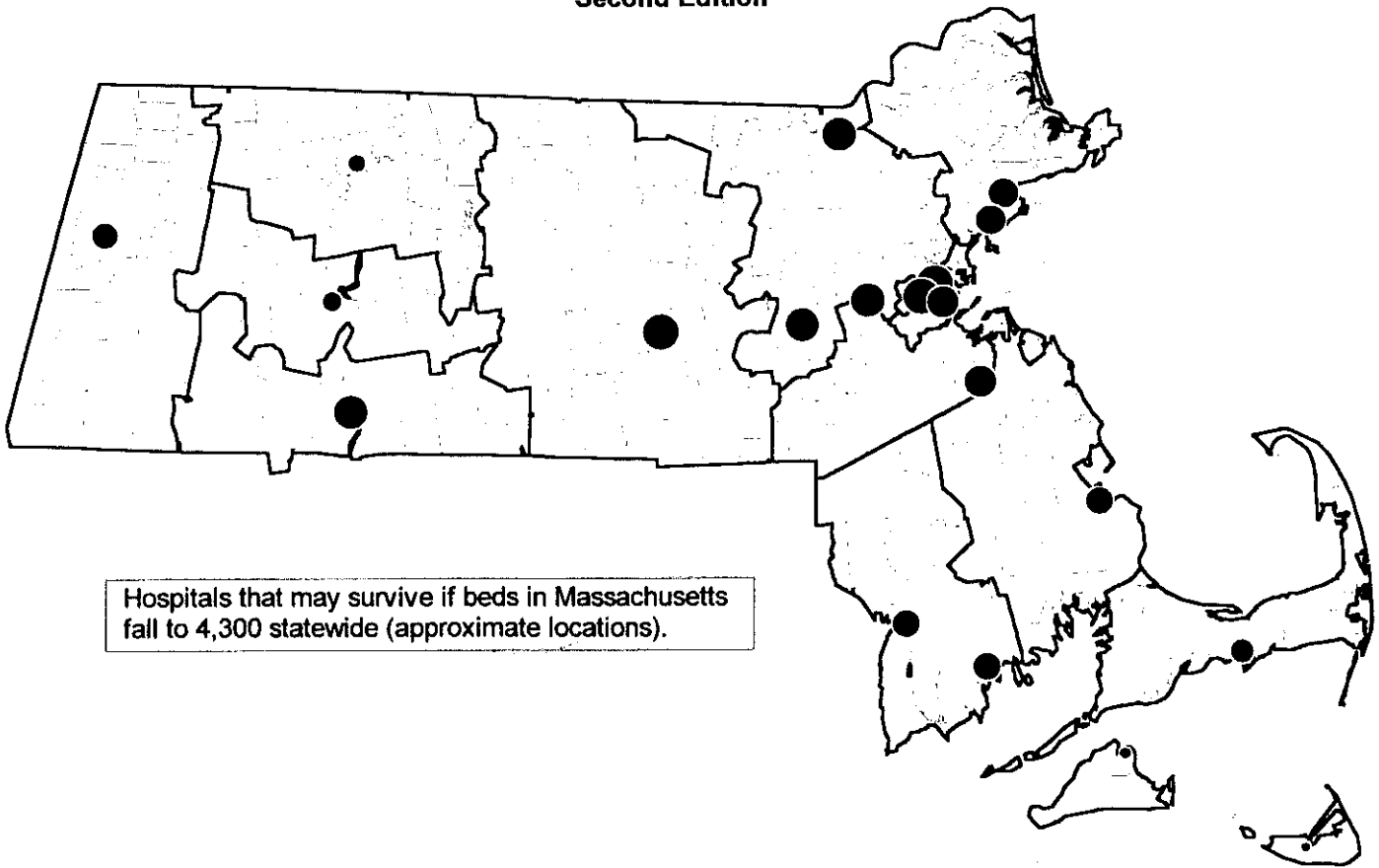


Summary and Excerpts from  
**BEFORE IT'S TOO LATE:  
WHY HOSPITAL CLOSINGS  
ARE A PROBLEM, NOT A SOLUTION**

Second Edition



Hospitals that may survive if beds in Massachusetts fall to 4,300 statewide (approximate locations).

**Alan Sager, Ph.D. and Deborah Socolar, M.P.H.**  
with maps by Jasprit Deol, M.P.H.

Early Findings from the  
Massachusetts Hospital Reconfiguration Study

**ACCESS AND AFFORDABILITY MONITORING PROJECT**  
Boston University School of Public Health

2 June 1997

## ACKNOWLEDGMENTS

The work of Jasprit Deol, M.P.H., in compiling data and preparing maps, has been indispensable to this study.

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**Note on the second edition.** This report has been expanded from the edition circulated 10 April 1997. Several additional issues are addressed; new maps, figures, and tables are included; some data have been slightly refined; and additional recommendations are included as well.

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**Access and Affordability Monitoring Project**  
Boston University School of Public Health  
80 East Concord Street, Boston, Massachusetts 02118

phone: (617) 638-5042  
fax: (617) 638-5374  
email: [asager@bu.edu](mailto:asager@bu.edu), [dsocolar@bu.edu](mailto:dsocolar@bu.edu)

## SUMMARY

For 10 years, this state's policy has been to close and down-size community hospitals, even though there has been no public assessment of this policy's effects on the public's health or safety. For even longer, getting care out of the hospital has been a main goal of managed care plans and others seeking to cut medical costs. Market forces are being used as the tool to select which hospitals to close.

Several myths, widely-held here and nationwide, are used to justify those policies:

- the myth that health care costs are so high here largely because we have too many hospitals and hospital beds, and too much of our care takes place in them;
- the myth that market forces and price competition will move health care to the most efficient sites, putting resources where they are needed, while closing inefficient, unneeded hospitals, and thus saving money; and
- the myth that the market can judge which hospitals— how many hospitals, located where— should survive, and which should die.

The Access and Affordability Monitoring Project (AAMP) has found much evidence which contradicts these and related myths and reveals them as dangerous. In reality:

- Excess beds and hospitals cannot explain this state's high costs.
- Market forces are closing too many hospitals, often hospitals that are needed.
- Moving care out of hospitals and closing hospitals often does not save money— indeed, it could be increasing overall health costs here.
- Inefficiency does not predict which hospitals will close, because the inevitably unfree health care market often closes the wrong hospitals.
- Hospital closings can cause grave harm as communities lose emergency rooms and other vital services, along with nearby physicians, and as patients lose trusted sources of care.
- Closings look gradual because there are only a few each year. But their cumulative effects over a decade or so are radical.
- There is nothing to stop this radical rush to close hospitals. By the time a closing is announced, it is often too late to act to analyze whether a hospital is needed, or to take steps to save it.
- Therefore, the state must act to identify and preserve needed but financially vulnerable caregivers.

We report the following findings— and illustrative projections of the beds and hospitals that may survive if this state does not change course— not because we want this future for Massachusetts. On the contrary, we find reason for great concern. We hope to alert communities, hospitals, state policy-makers, and others to evidence of what lies ahead, so that they can, if they choose, take action to change direction.

## **COSTLY HOSPITALS**

1. Massachusetts acute hospitals have long been the most expensive in the world. Hospitals here spent \$1448 per Massachusetts resident in 1995, we calculate. That was \$377 above the U.S. per capita average— so hospital spending here totaled \$2.3 billion more than if costs here had been at the national average.

## **IS CLOSING HOSPITALS THE SOLUTION?**

2. Why are hospitals here so expensive? The usual explanations— research, teaching, service to out-of-state patients, higher wages, more outpatient care, and an older population— explain only about one-third of this state's excess costs, we found in a previous analysis.

3. The net inflow of out-of-state patients to caregivers here accounts for a very small share of health spending— 2.7 percent of personal health spending in this state, and 3.8 percent of spending for hospital care.

4. Another enduring myth blames over-bedding for this state's high costs. Actually, in 1995, Massachusetts had 5.5 percent fewer beds per capita than the nation as a whole. So over-bedding can't explain our high costs.

5. Nor is over-bedding to blame for high health costs in the nation as a whole. Most wealthy countries have more hospital beds per person than the U.S. does, but spend only half as much on health care.

6. Those facts raise questions about the desirability of closing hospitals. Does the state's current policy of closing and down-sizing hospitals really attack the causes of this state's high cost problem?

7. The number of acute hospitals in Massachusetts has fallen from 127 in 1970 to 81 today— a drop of 36.2 percent, or more than one-third. The safety of this 36.2 percent drop is unproven.

8. Between 1990 and 1995, American Hospital Association data indicate, while the U.S. cut 5.9 percent of its acute hospital beds, the number in Massachusetts dropped 13.8 percent. Looking back farther, from 1980 to 1997, over one-third (at least 35.7 percent) of the state's acute hospital beds have disappeared.

9. Proponents of closings claim that only excess, unneeded hospitals will close, through the workings of the "invisible hand" of a free market. But there has been no systematic assessment of the effects of past closings on the public's health or safety.

#### **MAYBE CLOSING HOSPITALS IS A PROBLEM, NOT THE SOLUTION.**

10. Many needed hospitals close. Other research by AAMP principals has found that hospital closings nationally tend disproportionately to be in communities with higher percentages of African-American or Latino-American residents, and higher percentages of poor people. Such communities tend to have many unmet health needs.

11. Closings and down-sizing may not save money, for several reasons:

- Shortening hospital stays does not tend to greatly cut real costs.
- Whether recuperative, emergency room, day surgery, or other care— in-hospital care may be more efficient than the out-of-hospital alternatives.
- Hospitals save little by simply cutting beds.
- Current pricing policies artificially make out-of-hospital care look far cheaper.
- Hospital fixed costs persist, even when use declines.
- When HMOs dodge paying their fair share of a hospital's fixed costs, they force price increases for those who do use the hospital, and perpetuate a cycle of dehospitalization.
- This represents market failure.

12. In fact, there is evidence that closing hospitals may even have raised this state's health care costs.

- In some periods, surviving Massachusetts hospitals have been more costly than those that closed, although this pattern may be changing. A new AAMP analysis shows that hospitals closing from 1980 to 1990 were slightly less costly than survivors, as judged by their 1981 cost per discharge, adjusted for case-mix. The same is true for hospitals closing between 1980 and 1997. But hospitals closing over the past seven years, when judged by their 1990 efficiency, were slightly more costly than survivors. This is an encouraging sign. The differential, however, is nowhere near as large as would be expected if true free market forces were at work here; neither difference is statistically significant. Thus, efficiency still does not seem to be the bedrock on which hospital survival rests in Massachusetts.
- This state's bed-to-population ratio has dropped from 6.2 percent above the national average in 1985 to just below the U.S. figure in most years since 1989— and to fully 5.5 percent below the U.S. average in 1995.

- But recent federal data indicate that health care spending per capita in Massachusetts rose relative to the U.S. average, from 20-22 percent above the U.S. average from 1980-1985, to 29 percent above the U.S. average in 1993.
- Steep increases in spending for non-hospital care seem to have driven the state's rise, relative to the nation, in total health care spending. We climbed from just above the U.S. average in non-hospital spending per person in 1980 to nearly 30 percent above by 1990.

13. Any savings from closings today may come from cannibalizing hospital assets, and thus are one-time-only gains.

14. Another concern is the likely health consequences of hospital closings. Closing hospitals can do irretrievable harm. Communities often lose emergency rooms, outpatient care, and physicians in private practice. Patients may face dangerously long travel times to care, and many are lost to the health care system. Because hospitals have been most likely to close in less-well-off communities, closings are likely to increase unmet health needs where needs are already greatest.

15. We have assessed which factors best predict hospital survival in Massachusetts. That model found that six variables were of use in predicting survival between 1990 and 1997. Listed in order of importance, they were: number of 1990 beds, total fund balance per discharge in 1990 (a measure of financial reserves), miles from Boston, teaching hospital status in 1990, operating margin in 1990, and median family income in the community around the hospital in 1989.

16. If the different bed demand standards that prevail elsewhere in the U.S.— including in California, where managed care has cut hospital use rates most— were to take hold here, the number of hospital beds used here would drop sharply. If the 1995 average use rate among U.S. HMOs prevailed here (at 85 percent occupancy), only 9,600 hospital beds would be demanded to serve the Massachusetts population.

That would be less than half the actual 1994 number of beds here. This standard thus would require huge cuts— to 1.5 beds per 1000 residents (assuming a state population of 6.2 million). That would be a drop from 4.0 beds per 1000 residents in 1987, and from 3.1 in 1995. And if insurers are permitted to cut hospital use here to what has been called the 1995 California HMO "best practice" standard, just 4,330 beds would be demanded statewide— or just 0.7 beds per thousand residents.

17. Using the predictive model described above (based on hospital survival from 1990 to 1997), we calculated predicted probabilities of survival for all hospitals remaining open in 1997. We present illustrative predictions of which— perhaps 55— hospitals and which beds might survive to the year 2002, assuming 9,600 beds statewide.

We urge the greatest caution in using these projections about the future. First, the assumptions in question should be examined by the reader. Second, the projections are not our view of what is inevitable or desirable. We think that so many hospital

closings and bed reductions may be dangerous to the health of the people of the Commonwealth. We do not think that they will save money. And we are convinced that the policy of hospital closings has not been subject to remotely adequate study.

We hope that this study's concrete identification of hospitals and beds that might be at greater risk will spur public debate about which hospitals are needed, and how to preserve them.

18. And Massachusetts is headed toward a day when only 15-20 hospitals survive. If hospital bed demand here falls to what one analysis has called the 1995 "best practice" standard of California HMOs, just 4,330 beds would be demanded statewide (though more will actually be needed, we believe), or roughly half the number used in the previous projection for 2002. We suggest locations where hospital beds might survive a dozen years from now, in 2010, distributing those 4,330 beds among 20 sites.

Again, several cautions are outlined. However, while the specific details of both sets of projections can and should be disputed, they do show the magnitude of bed reductions and closings that would result if Massachusetts were to drop to certain rates of hospital use that already prevail elsewhere.

19. Competition is giving way to monopoly. Is this the intention of competition advocates? Long travel times to hospitals would seriously harm access to care. And competition requires competitors. Regional monopolies will mean higher hospital prices and reduced quality of care. Further, the wrong hospitals often survive.

20. People will still need hospitals. Primary care and prevention may postpone the need for hospital care, but they can't keep anyone from eventually getting sick and dying. And they may even increase health care costs. Further, although timely primary care can avert hospitalizations for certain "ambulatory care-sensitive conditions," those generated a rising share of U.S. hospital discharges between 1980 and 1994, Peter Cunningham has reported. And the share of discharges that were for such problems rose twice as fast among uninsured people. All this despite growing emphasis (verbal, at least) on primary care.

21. Why don't hospitals speak up for themselves and fight for their own survival? For many reasons, including ideology, embarrassment, exhaustion, the thrill of competition, and domination of the industry association by wealthier hospitals and those that believe themselves likelier to survive. Lamentably, the Massachusetts Hospital Association shows no willingness to acknowledge that hospital closings might be a problem, no interest in investigating the seriousness of the problem, and no inclination to help devise solutions.

22. Today, nobody in Massachusetts is thinking ahead, to make sure that needed hospitals can be secured before too many— or the wrong ones— close. Because each year hospitals close in only a few communities, most of the state is complacent. But a scramble to save a hospital at the last minute has usually come too late. So looking ahead is vital.

23. For-profit chains will not be rescuers. They are more likely than non-profit owners to close hospitals, in part because they are less tolerant of low financial margins.

24. Nor does merging with larger hospitals, with deeper reserves, offer security. The weaker party is often drained of resources, ultimately closing. And after mergers, hospitals tend to consolidate services into better-off and ethnically-mainstream communities.

25. In keeping with the medical admonition to "First, do no harm," advocates of hospital closings and service cuts should be forced to prove that proposed changes would be safe. Systematic assessments of dehospitalization and closings are still lacking, yet these trends are accelerating. While the bias should be toward conservatism, this state's policy has lurched from supporting, first, massive and unnecessary over-building (which our Project opposed), to massive and unnecessary dehospitalization (which we also oppose).

26. Much of the early pressure to close beds rested on a concern that a bed built was a bed filled by a patient. This may have been true under cost reimbursement. But it no longer holds, given the way we pay for care today. And even the leading early proponent of closings, Walter McClure, recognized that prospects for saving by closing hospitals depend largely on the type of hospital closed.

27. Hospital industry consolidation is not advancing efficiency. Many mergers do little to cut costs, and some may raise costs. And monopolization grows. Many merging hospitals seek not efficiency but market power for negotiations with HMOs. The HMOs then merge, too, prompting a cycle of greater consolidation with no prospect of equilibrium.

28. Many requirements of free markets are inevitably absent in health care, so there can be no invisible hand to advance the public good. There is market failure at both the micro and macro levels. As a result, government action is needed to preserve vital caregivers, and thus to protect access and contain cost.

#### **STATE ACTION NEEDED— BEFORE IT'S TOO LATE**

29. If you liked paying \$500 billion to bail out the savings and loan industry, you'll love paying to re-build closed hospitals. Re-regulation of hospitals is inevitable. The question is not whether, but when. Why not do it before dangerous and costly damage is done? Must we wait until too many hospitals have closed and the survivors enjoy geographic monopolies and higher prices, or until hospitals must be re-built, as cities and towns now must rebuild schools? The cost would be prohibitive.

30. Aging baby-boomers' rising need for hospital care is likely to slam up against plummeting hospital capacity. The resulting resource crunch will endanger us all. And demand will also rise if coverage is extended to people who now cannot pay for needed care.

31. Neither state nor federal government policies today provide protection against closure of hospitals crushed by competitive pressures— no matter how essential a particular hospital may be to maintaining access to care.



32. Steps to help preserve needed hospitals could include those proposed in the hospital stabilization legislation sponsored by state representatives Emile Goguen and James Marzilli (very similar bills filed as House 1311 and House 3442):

- a. Require the Commissioner of Public Health to identify
  - all hospitals needed to protect the health of the public, and
  - all financially vulnerable hospitals.
- b. Create a stabilization pool to protect needed but vulnerable hospitals.
  - Stabilization and preservation assistance could be either:
    - financing for technical and managerial assistance for a hospital needing reorganization, or
    - partial under-writing of a needed but financially-distressed hospital's capital and operating costs.
  - The stabilization pool would be financed by
    - all acute hospitals statewide
    - each contributing one-quarter of one percent of its revenues
    - yielding a pool of about \$25 million this year (accumulating to a maximum of one percent of statewide hospital revenues).
    - This mechanism would not diminish hospital margins— they would remain intact statewide. The pool would simply recycle a tiny fraction of hospital revenue within the industry to the institutions that need it most.
    - This mechanism would not cost \$1 in public revenue, or boost already ample health care spending.
- c. Allow the state to appoint a receiver to stabilize a hospital in danger of closing but needed by its community.

33. To correct market failure and to promote efficiency, hospitals could be required to price services fairly in relation to incremental cost, plus their appropriate shares of fixed costs. HMOs could be obliged to pay for services in the same way.

34. To conserve resources today and provide safety for the future, Massachusetts should maintain both a ready reserve and a mothballed reserve of hospital beds.

35. Prohibiting further conversions to for-profit hospitals could also be useful. And public officials should be held accountable for securing affordable, quality care for all.

36. We also need longer-term changes. The proposed measures offer stop-gap protection to help prevent catastrophe now. Then, after our state stops being short-sighted, we can begin thinking about a more rational way to finance hospitals and health care.

In the end, public action will be required to identify which hospitals— located where, with how many beds, and with what reserve capacities for disasters— are essential to protect the health of the people of the Commonwealth. Then, public action will also be necessary to ensure that each such hospital is paid enough money to remain in business, if operated efficiently.

The report details a number of CAUTIONS, summarized here:

These illustrative predictions of hospital survival for 2002 and 2010 rest on a number of elements which may reasonably be debated. These include a predictive model of moderate accuracy which reflects 1990-1997 experience, some judgments, use of specific bed demand standards, and a necessarily arbitrary time-frame.

But the predictions reflect hospital use rates which already prevail elsewhere. Many experts consider such use rates desirable and even inevitable. We do not agree. Unfortunately, public decision-makers have abdicated choices to a non-existent free market. It is now vital to investigate the needed number, location, and size of hospitals,

Our illustrative predictions are necessarily imprecise. We put them forward because certainty is not possible until a hospital announces a closing— and then it is usually too late either to debate the need for the hospital, or to take steps to preserve a needed hospital.

The illustrative predictions show one way to reach statewide figures of some 9,600 beds in 2002 and 4,300 beds in 2010. These may well be the wrong bed totals, or the wrong way to achieve them. We do not say these are the right totals or the right way to reach them. Indeed, we suspect that more beds would be both cheaper in the long run and better for health care in the long run.

All this should be a matter for study and debate— neither of which has yet happened. The burden of proof is on those who propose change. The bias should be toward conservatism.

TABLE 3

HOSPITALS OPEN IN 1997 AND  
 DISTRIBUTION OF 9,600 BEDS AMONG SURVIVING HOSPITALS  
 (RANKED WITHIN EACH COUNTY BY PREDICTED PROBABILITY OF SURVIVAL)

<u>County</u>	<u>Hospital Name</u>	<u>Hospital Predicted Probability of Survival 1990-1997</u>	<u>Hospital Projected Beds 2002</u>	<u>County Totals Projected Beds 2002</u>
Barnstable	FALMOUTH	91.2%		
Barnstable	CAPE COD	98.7%	175	175
Berkshire	BERKSHIRE	95.0%	250	
Berkshire	FAIRVIEW	95.9%	20	
Berkshire	HILLCREST	97.2%		
Berkshire	NORTH ADAMS	98.1%	20	290
Bristol	ST ANNES	84.8%		
Bristol	MORTON	87.9%		
Bristol	STURDY	92.9%	75	
Bristol	ST LUKES	94.5%	300	
Bristol	CHARLETON	96.5%	300	675
Dukes	MARTHA'S VINYARD	86.9%	20	20
Essex	ATLANTICARE	79.2%		
Essex	HAVERHILL	87.5%	50	
Essex	BON SECOURS	89.4%		
Essex	ANNA JACQUES	90.5%	100	
Essex	LAWRENCE GENERAL	90.7%	200	
Essex	ADDISON-GILBERT	98.5%	50	
Essex	SALEM	99.0%	275	
Essex	BEVERLY	102.6%	225	900
Franklin	FRANKLIN	97.0%	60	60
Hampden	WING MEMORIAL	94.7%		
Hampden	HOLYOKE	102.3%	150	
Hampden	NOBLE	104.0%	50	
Hampden	MERCY	106.7%	150	
Hampden	BAYSTATE	108.6%	350	700
Hampshire	MARY LANE	79.5%		
Hampshire	COOLEY-DICKENSON	100.8%	125	125

TABLE 3, continued

<u>County</u>	<u>Hospital Name</u>	<u>Hospital Predicted Probability of Survival 1990-1997</u>	<u>Hospital Projected Beds 2002</u>	<u>County Totals Projected Beds 2002</u>
Middlesex	SYMMES	62.2%		
Middlesex	SOMERVILLE	63.8%		
Middlesex	MT AUBURN	65.8%	150	
Middlesex	CAMBRIDGE	73.8%	100	
Middlesex	NASHOBA	79.8%		
Middlesex	WHIDDEN	83.0%		
Middlesex	ST. JOSEPH	83.2%		
Middlesex	LAWRENCE MEML.	89.1%		
Middlesex	MALDEN	89.2%		
Middlesex	MARLBORO	89.8%		
Middlesex	FRAMINGHAM	90.1%	300	
Middlesex	WALTHAM	91.3%	150	
Middlesex	LAHEY	91.9%	250	
Middlesex	LOWELL GENERAL	92.1%	200	
Middlesex	ST JOHNS	92.3%	200	
Middlesex	LEONARD MORSE	94.1%		
Middlesex	MELROSE	94.4%	150	
Middlesex	N.E. MEMORIAL	95.0%	150	
Middlesex	WINCHESTER	98.5%	100	
Middlesex	EMERSON	98.9%	100	
Middlesex	NEWTON-WELLESLEY	104.4%	200	2,050
Nantucket	NANTUCKET	72.9%	10	10
Norfolk	GLOVER MEMORIAL	82.6%		
Norfolk	QUINCY CITY	82.8%	150	
Norfolk	NORWOOD	86.4%	125	
Norfolk	MILTON	93.0%	100	
Norfolk	SOUTHWOOD	93.7%		
Norfolk	SOUTH SHORE	97.0%	200	575
Plymouth	CARDINAL CUSHING	78.5%	150	
Plymouth	TOBEY	80.1%		
Plymouth	JORDAN	88.5%	75	
Plymouth	BROCKTON	89.0%	175	400
Suffolk	FAULKNER	70.1%	100	
Suffolk	CARNEY	72.3%		
Suffolk	MASS. EYE + EAR	75.2%		
Suffolk	ST ELIZABETH'S	80.1%	200	
Suffolk	CHILDRENS	91.9%	250	
Suffolk	BRIGHAM+WOMEN'S	93.9%	500	
Suffolk	BETH ISRAEL	95.4%	600	
Suffolk	N E BAPTIST	100.2%		
Suffolk	NEW ENG MED CTR	100.3%	150	
Suffolk	BOS. MED. CTR./U.H.	110.3%	250	
Suffolk	MASS. GENERAL	162.0%	600	2,650

TABLE 3, continued

<u>County</u>	<u>Hospital Name</u>	<u>Hospital Predicted Probability of Survival 1990-1997</u>	<u>Hospital Projected Beds 2002</u>	<u>County Totals Projected Beds 2002</u>
Worcester	CLINTON	73.7%		
Worcester	ATHOL	77.5%		
Worcester	HUBBARD	78.8%		
Worcester	ST VINCENT	79.7%	250	
Worcester	U MASS MED CTR	81.5%	250	
Worcester	HEYWOOD	81.7%	50	
Worcester	MILFORD	84.8%	50	
Worcester	WORCESTER MEML	89.4%	250	
Worcester	LEOMINSTER	90.8%	50	
Worcester	HARRINGTON	98.6%	75	975
<b>State-wide totals</b>			<b>55 hospitals</b>	<b>9,605 beds</b>

- Again, the maps and tables here present illustrative predictions, not statements of fact. As always, we urge the greatest caution in using these projections about the future. First, the assumptions in question should be examined by the reader. (See discussion below.) Second, the projections are not our view of what is inevitable or desirable. We think that so many hospital closings and bed reductions may be dangerous to the health of the people of the Commonwealth. We do not think that they will save money. And we are convinced that the policy of hospital closings has not been subject to remotely adequate study.

**18. And Massachusetts is headed toward a day when only 15-20 hospitals survive.**

- If hospital bed demand here falls to what one analysis has called the 1995 "best practice" standard of two California HMOs, as noted above, just 4,330 beds would be demanded statewide (though more will actually be needed, we believe). That would be roughly half the number used in the previous projection for 2002. Plausibly, the forces at work in health care today might require such cuts in Massachusetts hospital use in the next dozen years— say by 2010— if they are allowed to persist.
- TABLE 4 summarizes the large decline in Massachusetts acute hospitals and beds already seen since 1970, and the even sharper cuts that may lie ahead, again if present trends are allowed to persist.

TABLE 4

**Massachusetts Acute Hospitals and Beds, 1970 - 2010**

<u>Year</u>	<u>Acute Hospitals</u>	<u>Beds</u>
1970	127	24,240
1980	112	25,131
1990	99	21,582
1995	85	17,145
1997	81	16,150
2002	55	9,600
2010	20	4,300

**Notes:**

1997 beds are calculated by taking the 1995 beds of the hospitals surviving to 1997; no allowance is made for bed reductions in these hospitals between 1995 and 1997.

2002 beds reflect the number that would be used in Massachusetts, assuming that the state used beds at the age-adjusted rate actually achieved, on average, by U.S. HMOs in 1995. An occupancy rate of 85 percent and a total state population of 6.2 million are assumed.

2002 hospitals are those that we project would be open to hold the 9,600 beds.

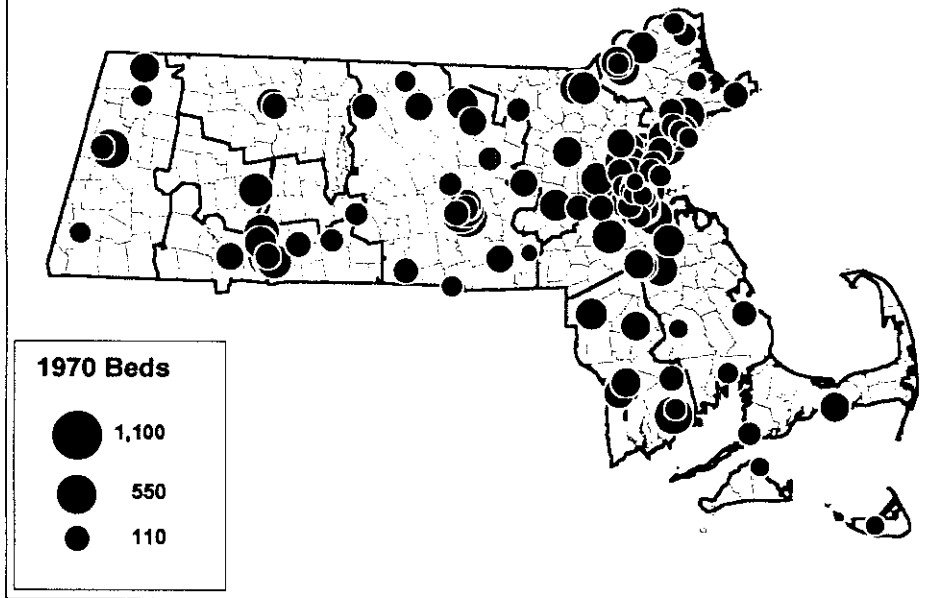
2010 beds reflect the number that would be used in Massachusetts, assuming that the state used beds at the aged-adjusted rate achieved in 1995 by two HMOs designated as "best practice" by the Advisory Board Company.

2010 hospitals are those that we project would be necessary to hold the 4,300 beds.

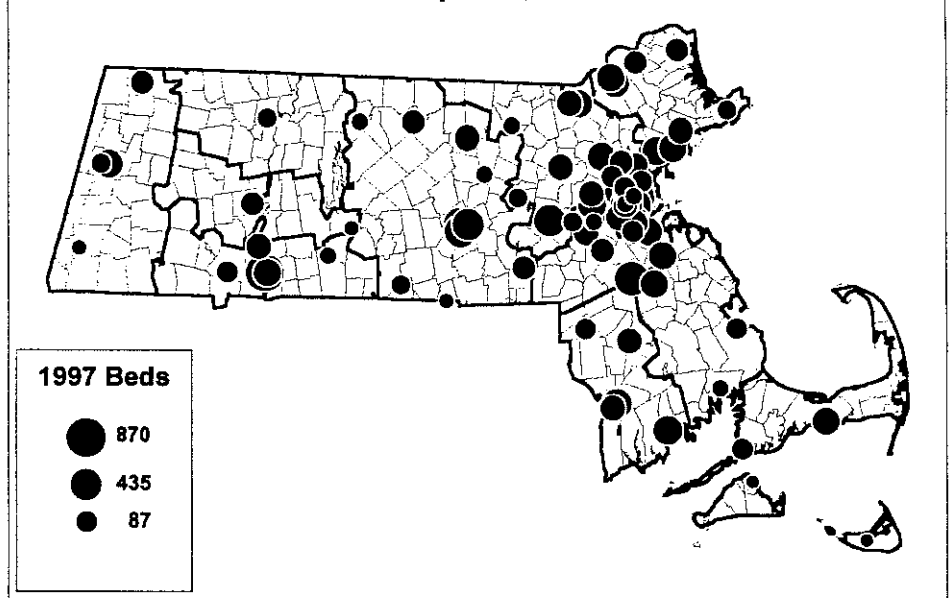
- MAP 3 (in color, at front of report) suggests locations where hospital beds might survive in 2010. It distributes those 4,330 beds among 20 sites, in proportion to counties' share of the 1990 statewide bed total. With so few beds demanded, all hospitals would shrink, but many would also close. (The accompanying MAP 4, for greater clarity, presents the same illustrative locations for four eastern Massachusetts counties.)
- This, we hope, is a worst case prediction, both because it uses the radically-lower bed demand standards that now prevail in some California HMOs, and it again assumes that no action is taken to slow the dehospitalization trend or to preserve vital services. Again, these projections should be used with caution. And again, they are not our view of what is inevitable or desirable. These are illustrative predictions: if use is forced down to 4,330 beds, then roughly 15 to 20 hospitals would survive.

# MASSACHUSETTS HOSPITAL SURVIVAL, 1970-2010

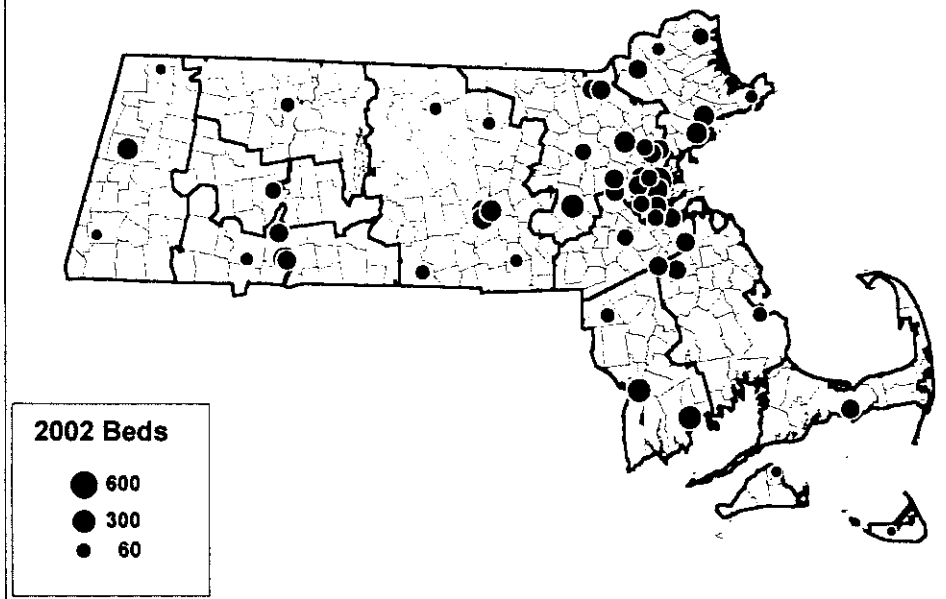
Map 6: Massachusetts Hospitals, 1970



Map 7: Massachusetts Hospitals, 1997



Map 8: Hospitals That Might Survive to 2002



Map 9: Hospitals That Might Survive to 2010 -- Worst Case

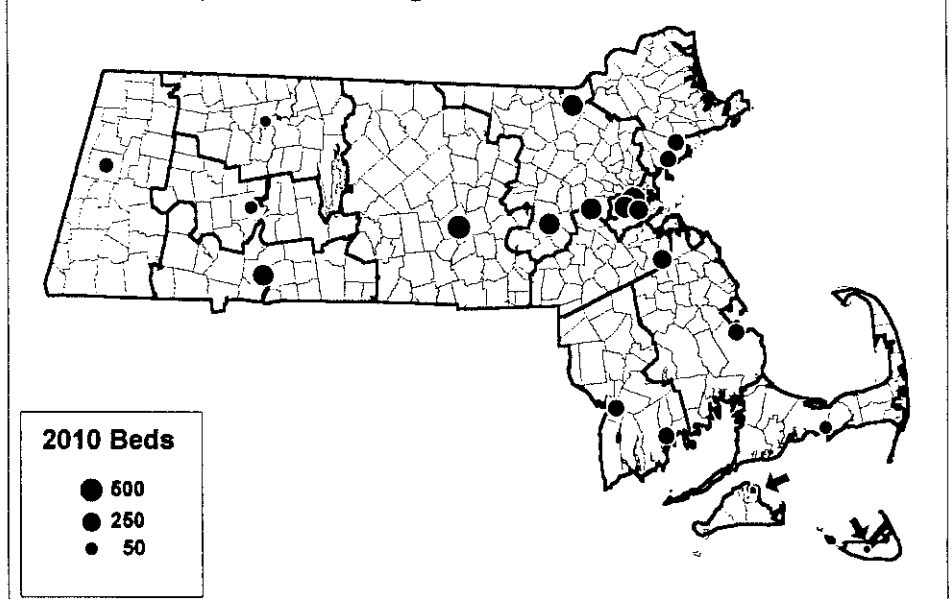


Figure 2  
BEDS/1000 PEOPLE, MASSACHUSETTS + U.S.  
1960 - 1995

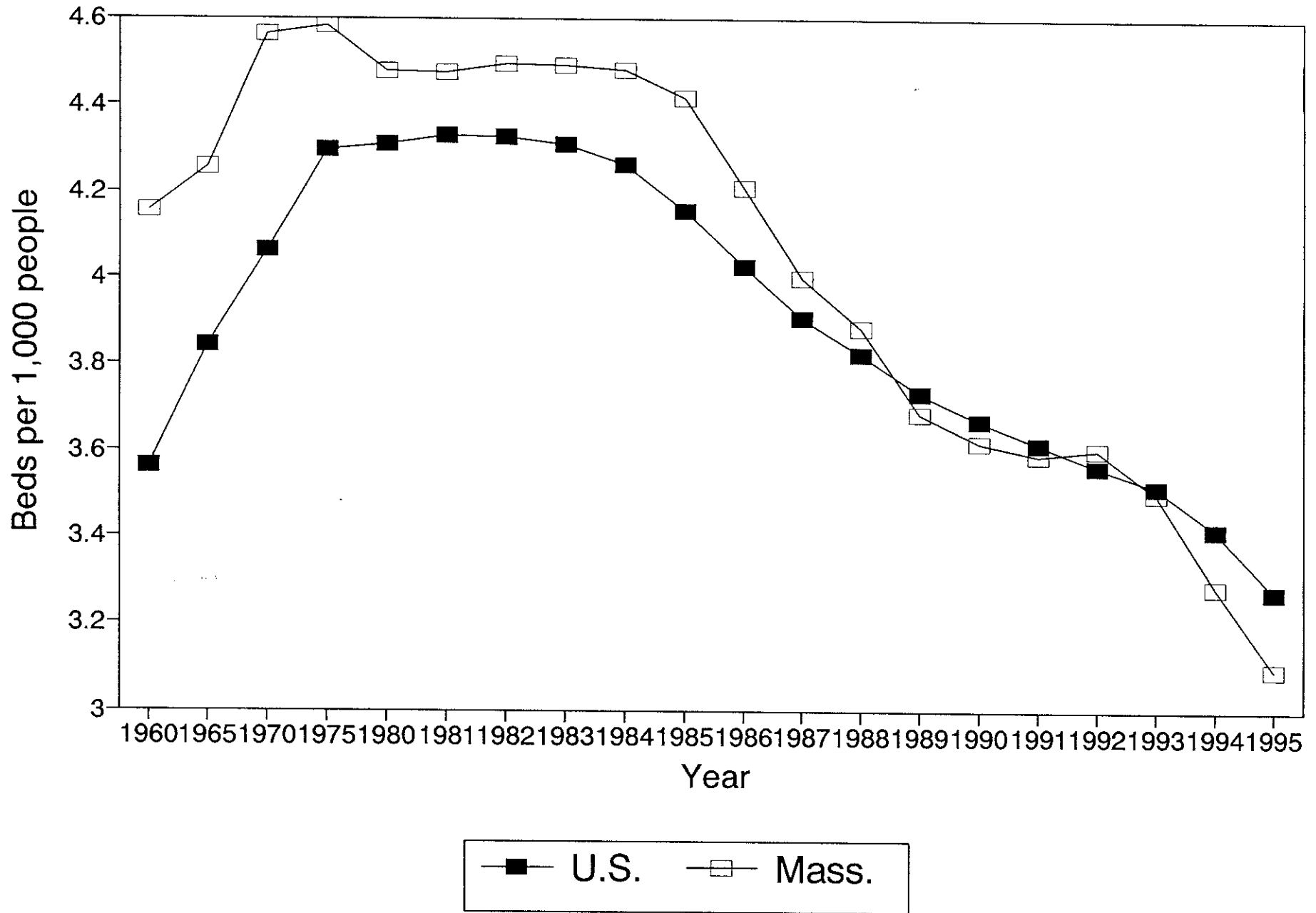




Figure 3

# MASSACHUSETTS ACUTE HOSPITALS 1970 - 1997

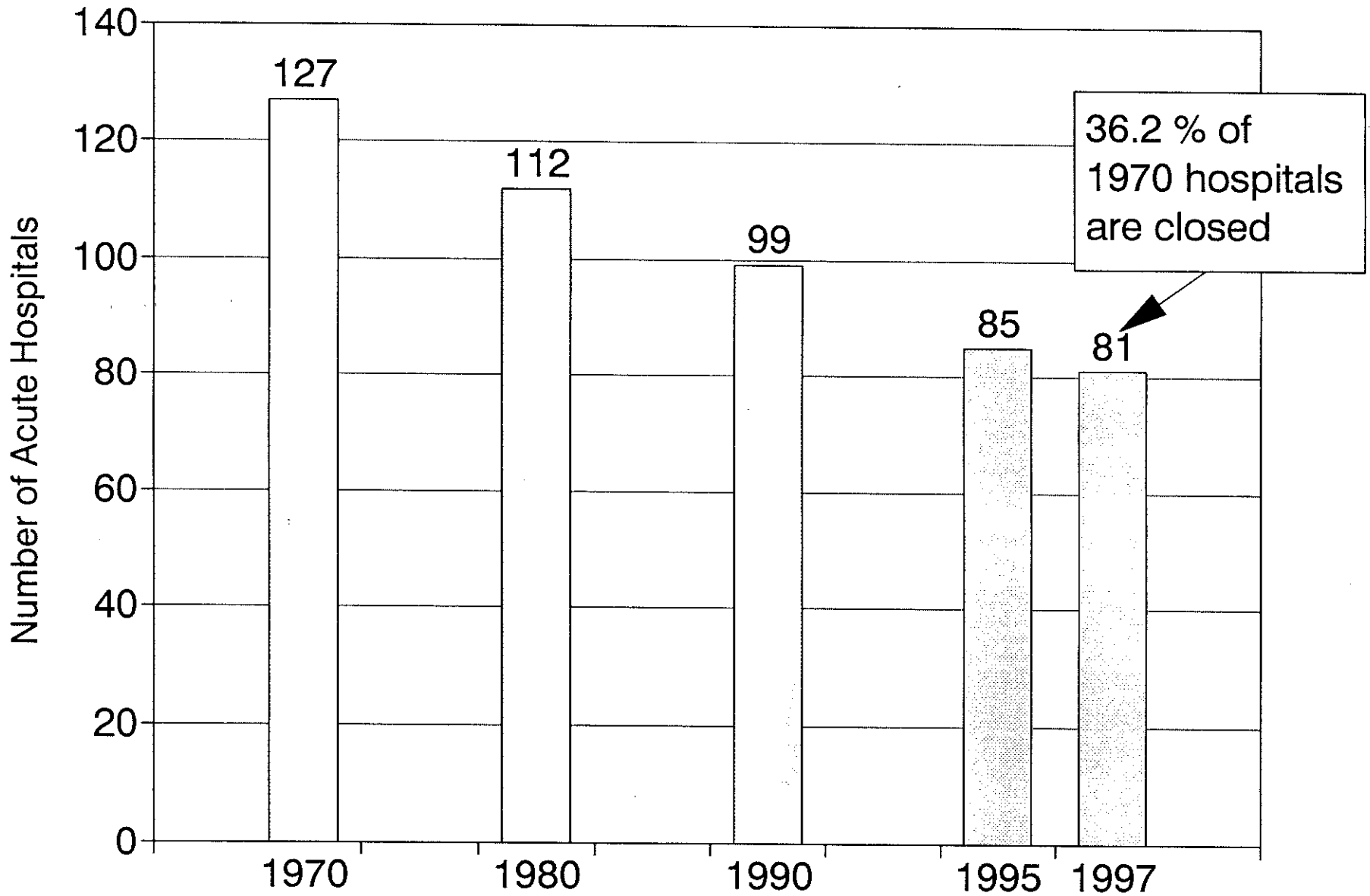


Figure 4

# PERCENTAGE REDUCTION IN ACUTE CARE BEDS

U.S. and Massachusetts, 1990 to 1995

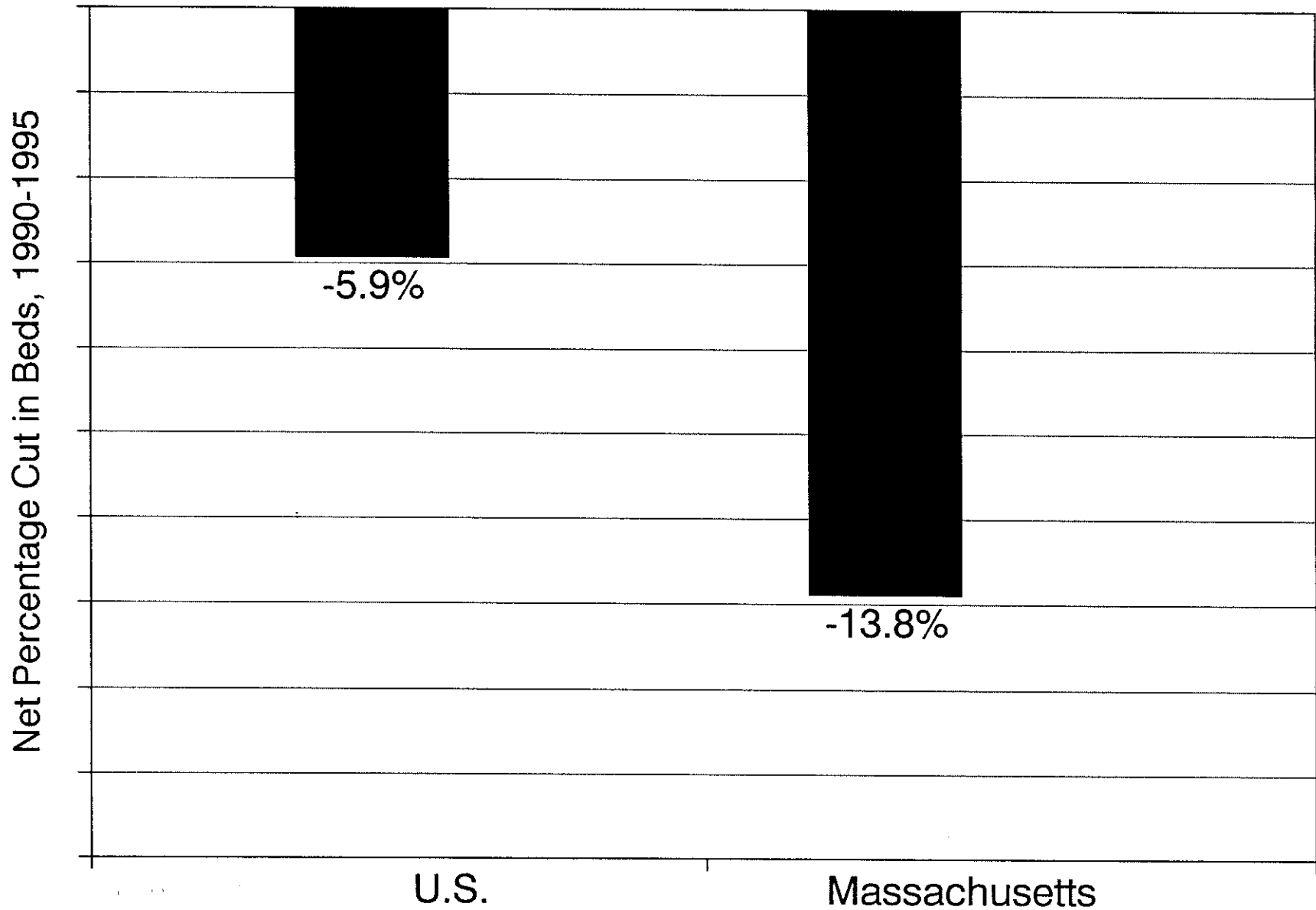
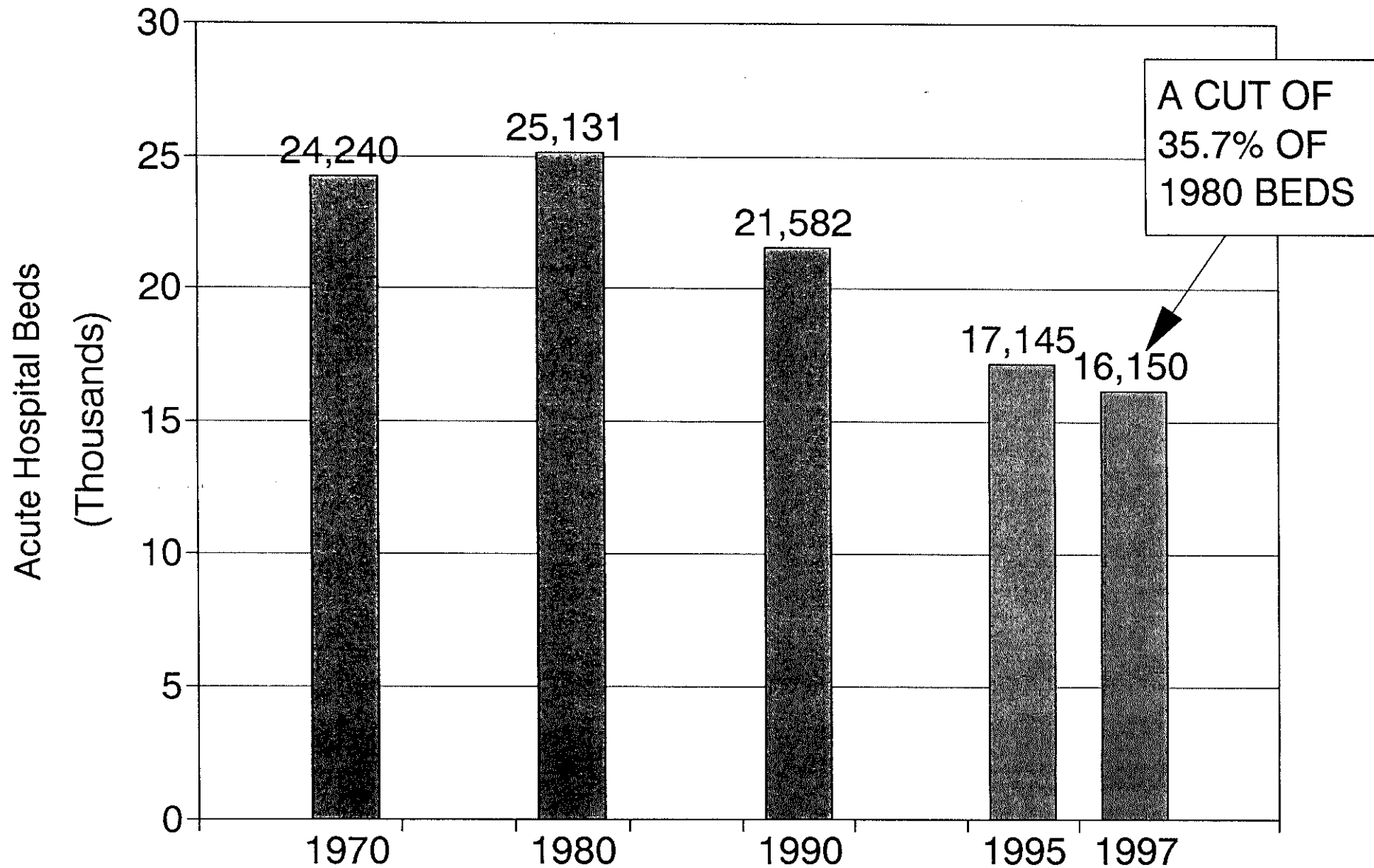


Figure 5  
MASSACHUSETTS ACUTE HOSPITAL BEDS  
1970 - 1997



Note: 1997 beds are for hospitals surviving to 1997, with 1995 bed values

Figure 9

# MASS. AND U.S. PERSONAL HEALTH SPENDING

Dollars per Person, 1966 - 1993

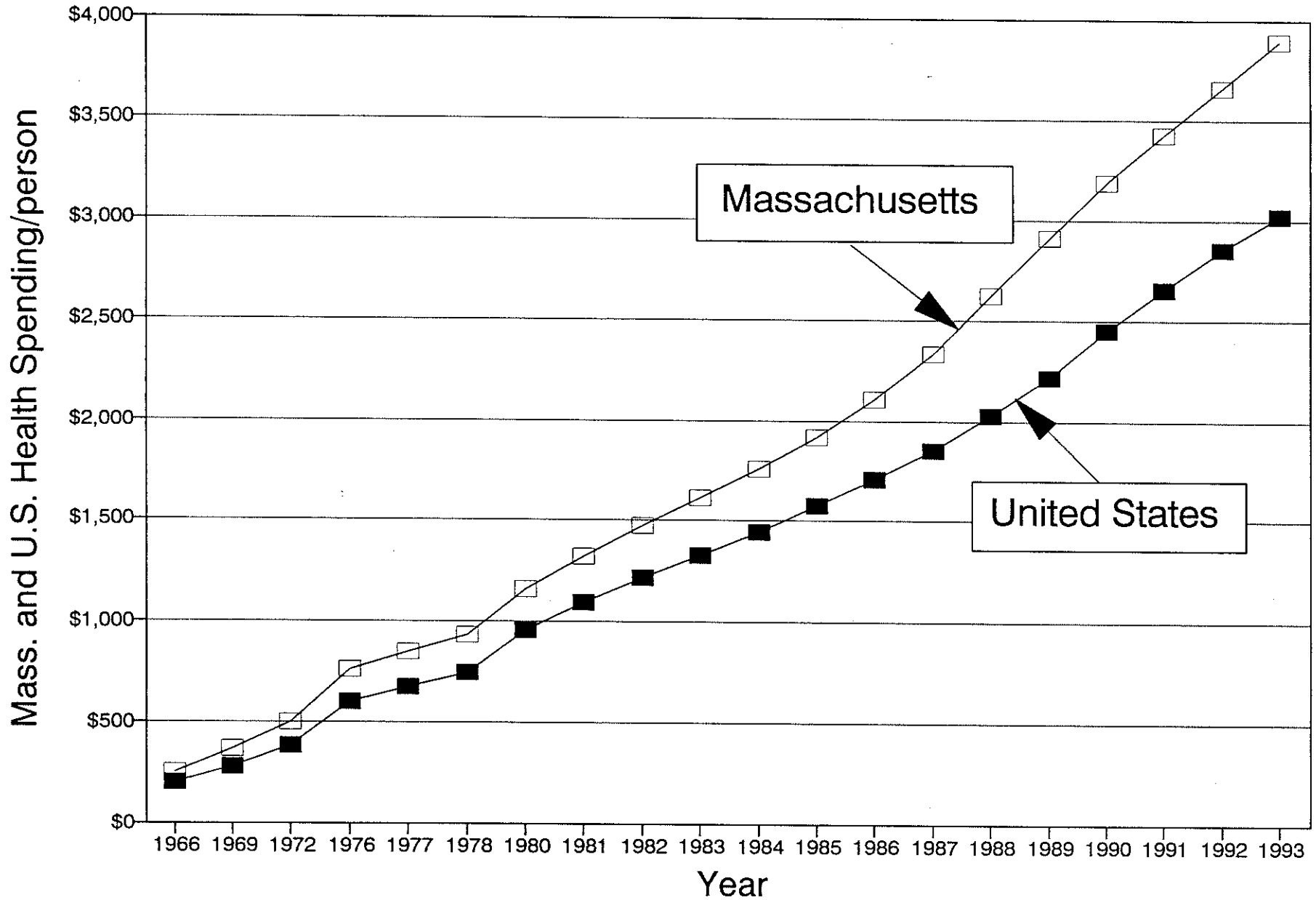
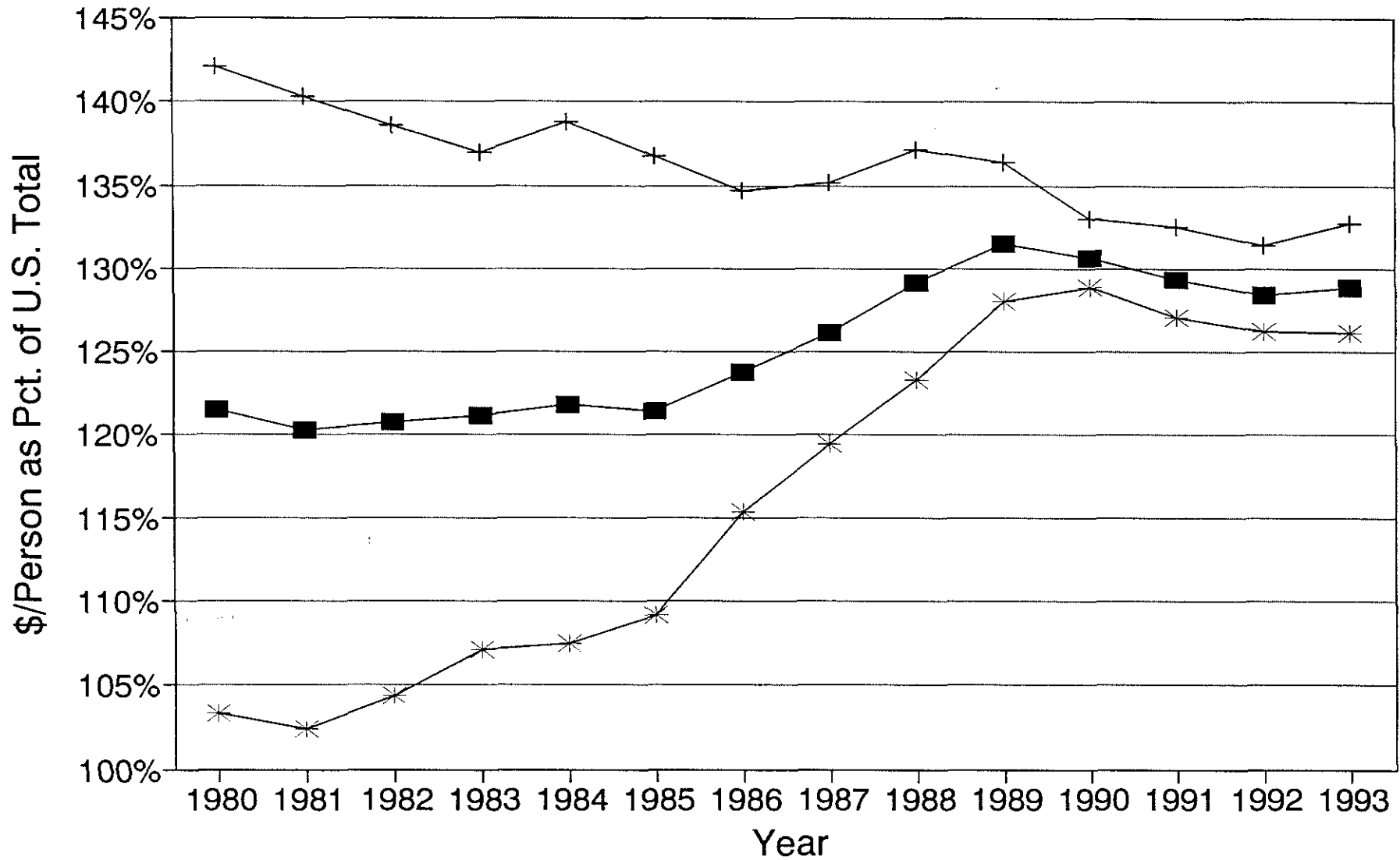


Figure 11

# MASS. HOSPITAL + NON-HOSPITAL \$/PERSON

As Pct. of U.S. Average, 1980 - 1993



■ Pers. Hlth \$/Person    + Hospital \$/Person    \* Non-hosp \$/Person

Figure 12

# DEMAND FOR MASSACHUSETTS HOSPITAL BEDS

Acute Hospitals, Various Use Rates

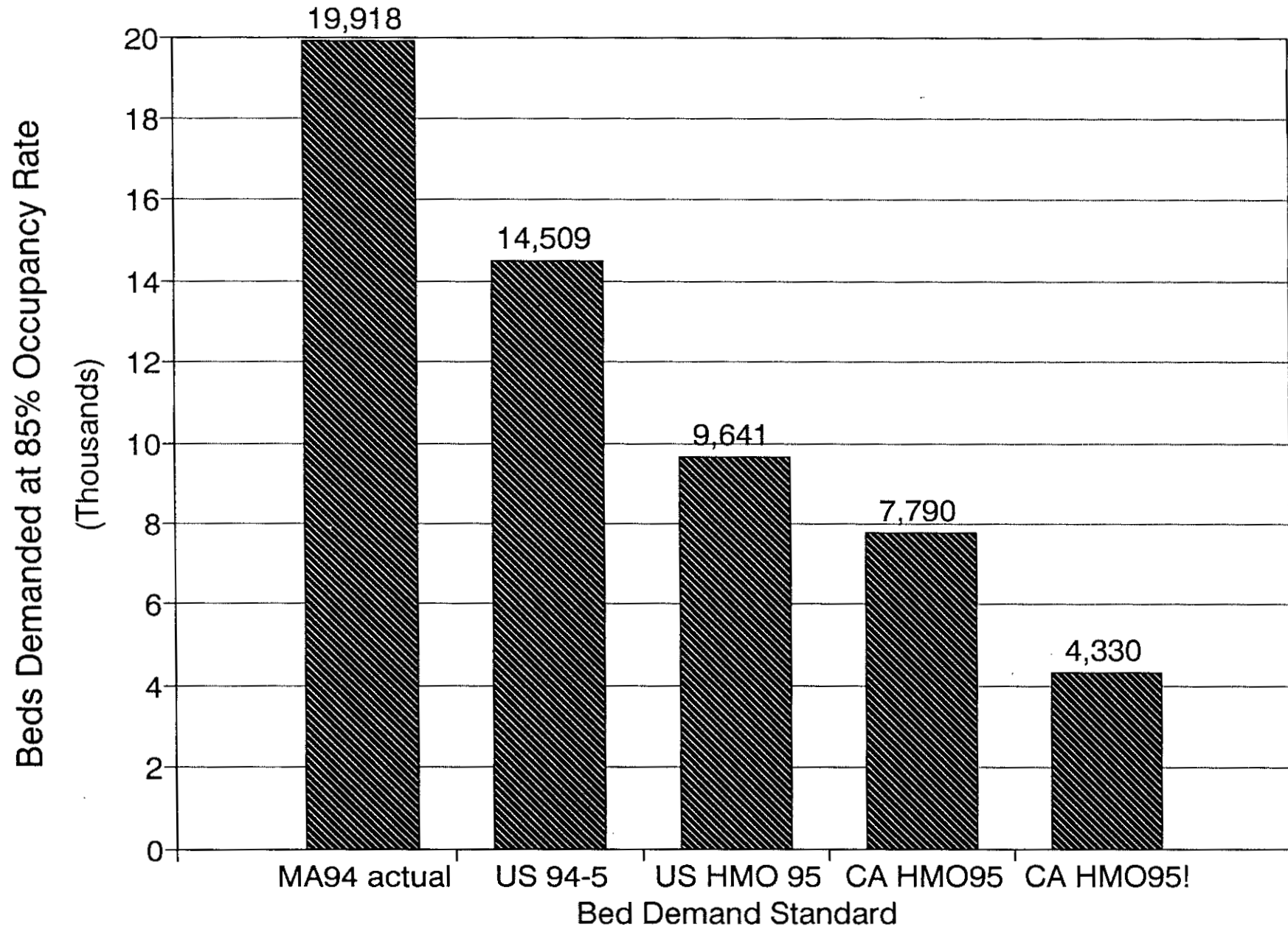
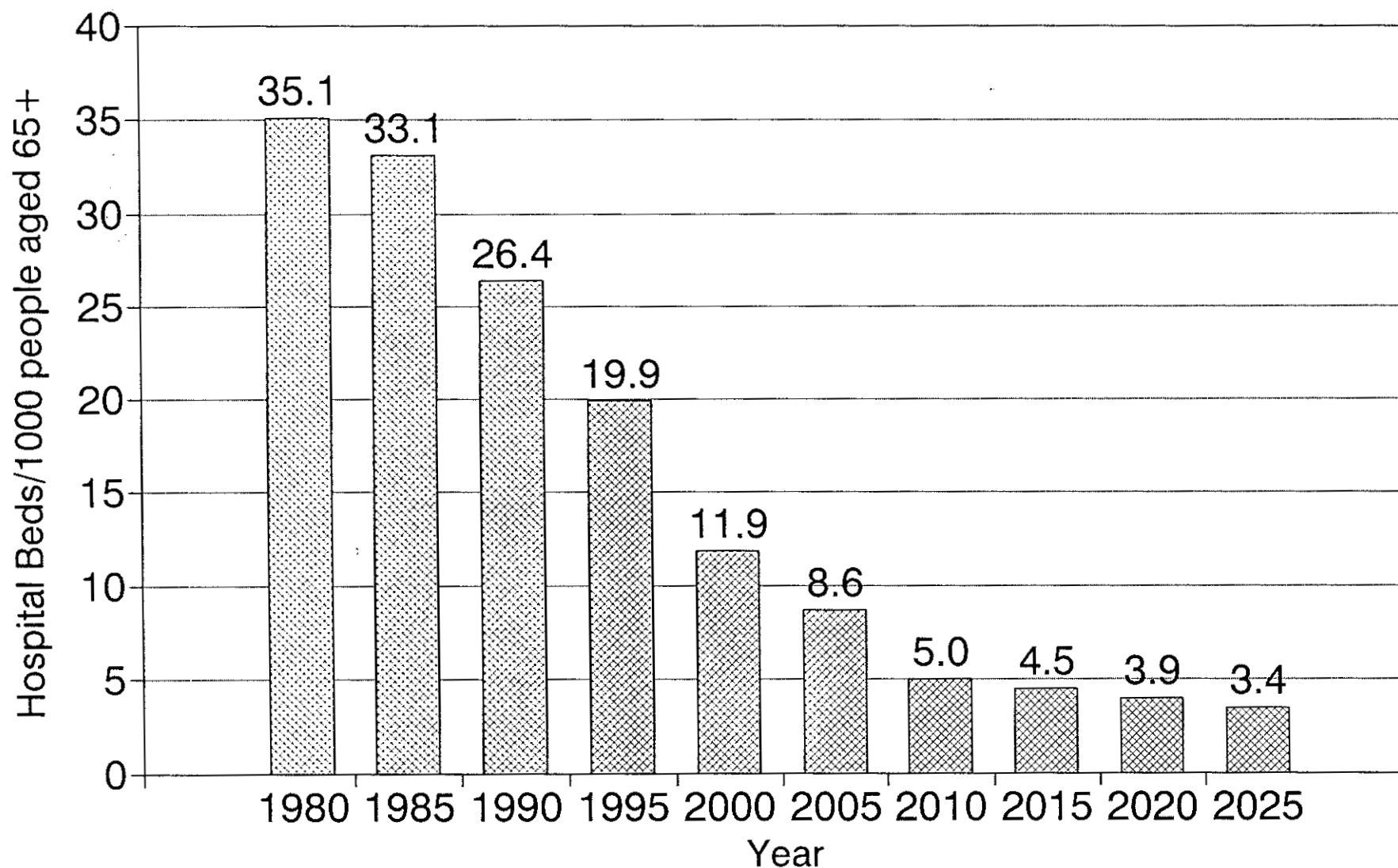


Figure 14

# HOSPITAL BEDS/1000 PEOPLE AGED 65+

Massachusetts, 1980 - 2025



Assumption: Mass. reaches 4,300 beds in 2010 and remains at that level.

AAMP, BUSPH, 1997