

# Race, Youth, & the Digital Divide

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Center for  
Justice, Tolerance  
& Community  
University  
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# Research Topics and Funding

- Race, Youth and the Digital Divide – W.T. Grant Foundation



WILLIAM T. GRANT FOUNDATION

- Immigrants and Access in California – Community Technology Foundation of California



# Outline of Presentation

- Review of current data and trends
  - Some initial statistical results
  - Some initial qualitative findings
  - Special Supplement on California



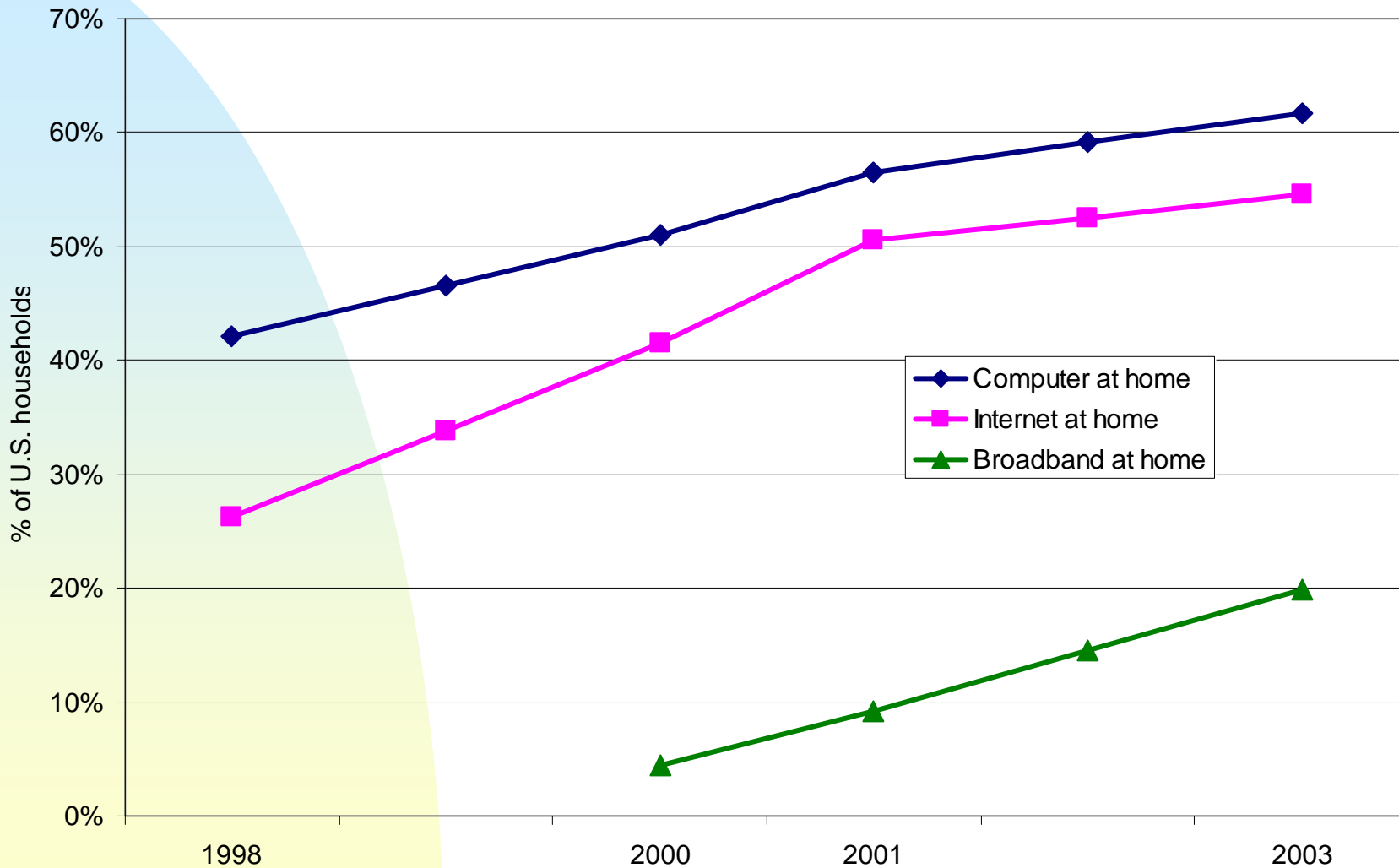
# The Big “News” for the Digital Divide



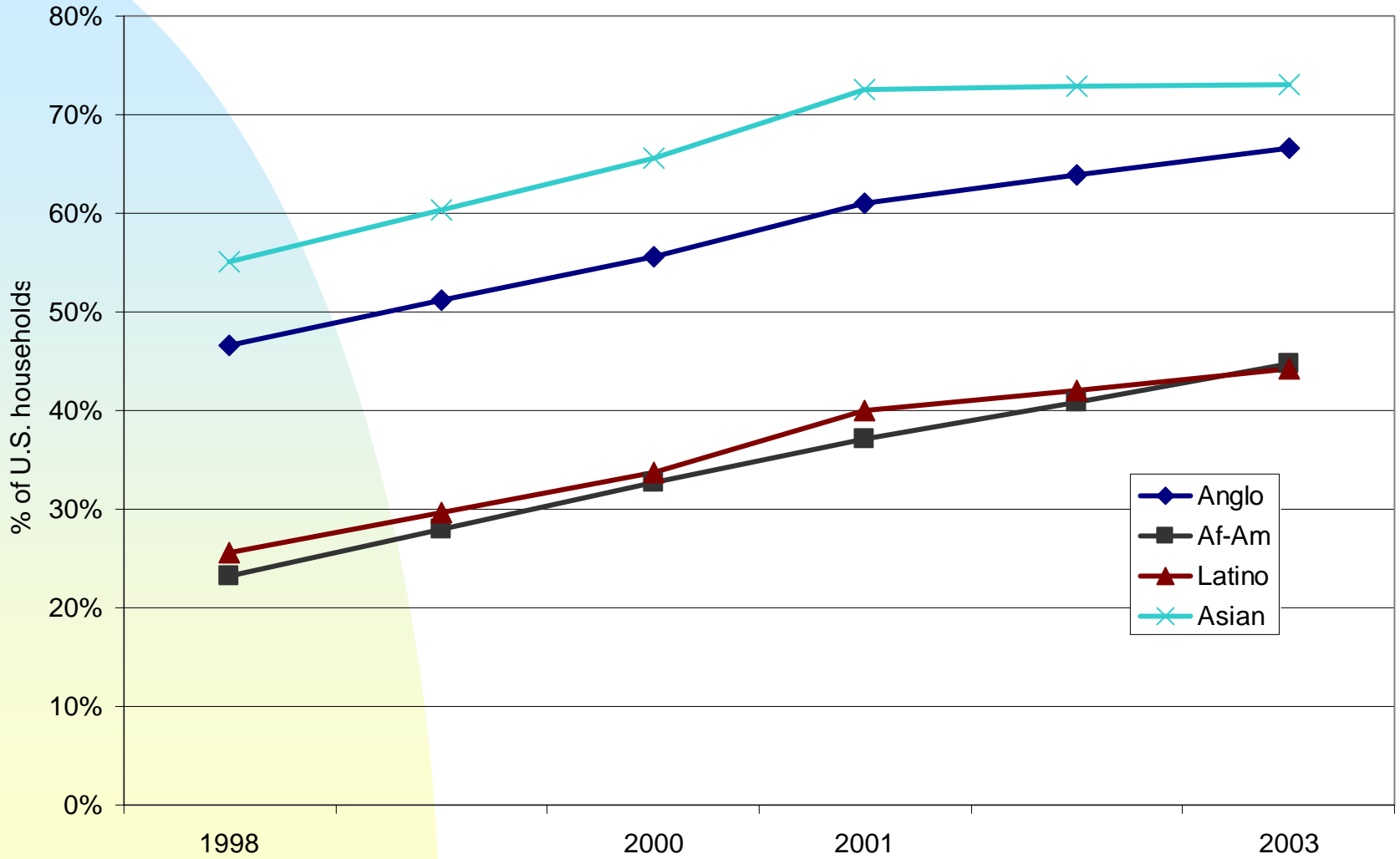
- Falling Through the Net
  - A Nation Online?
  - Access Remains an Issue
    - Broadband is Unequal



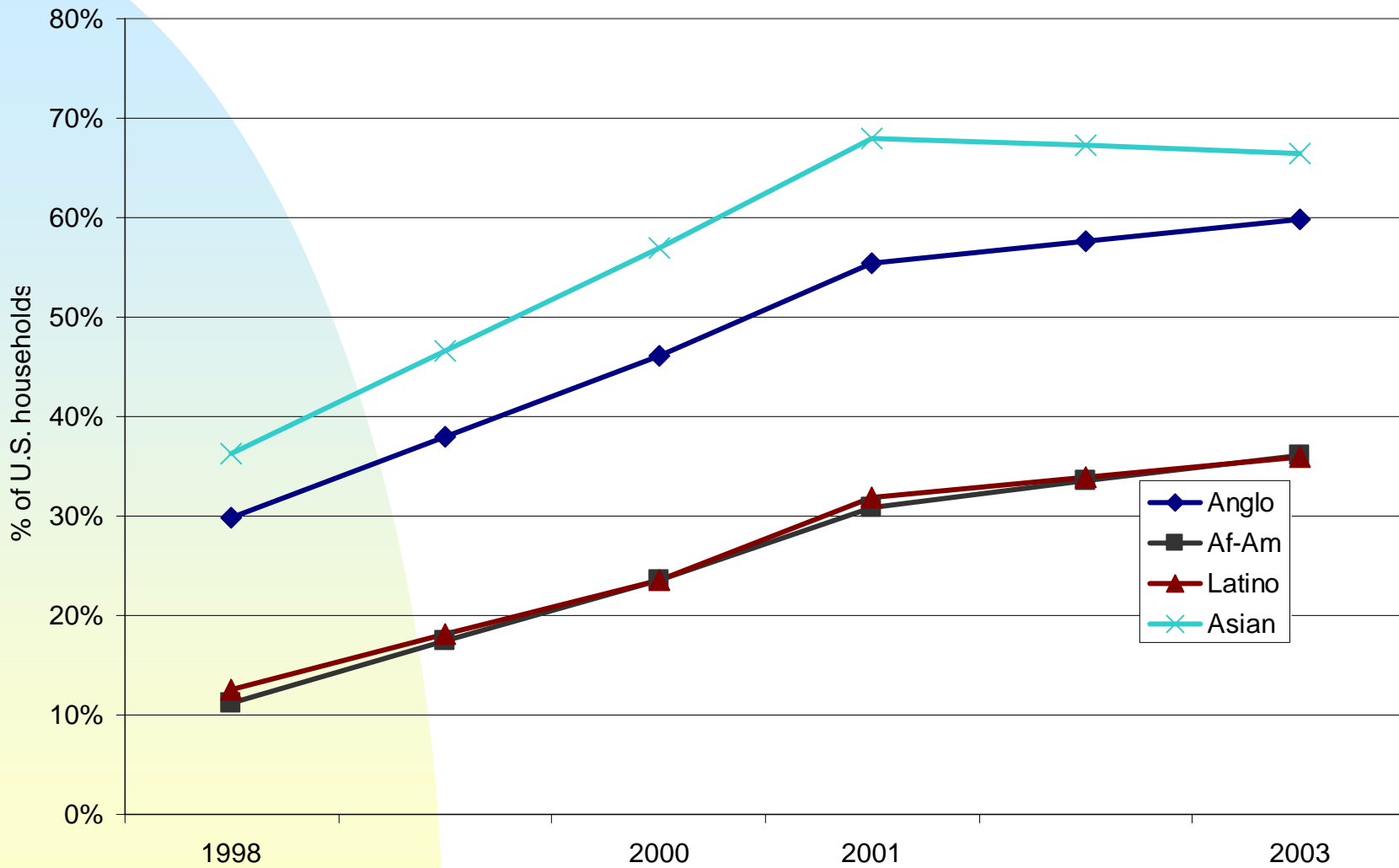
# Percent of Households with Computers and Internet Connections, 1998-2003



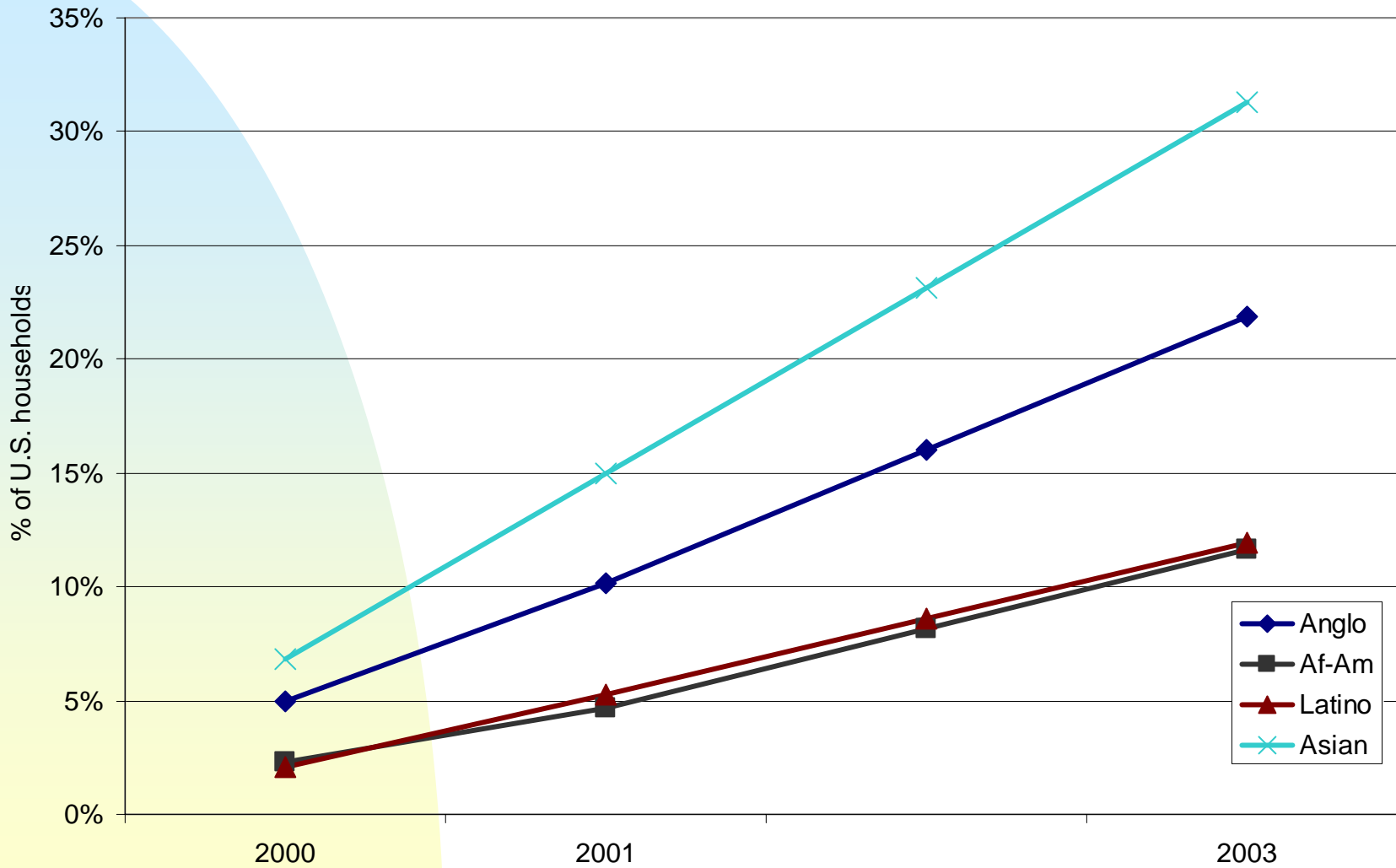
# Percent of Households with Computers, 1998-2003



### Percent of Households with Internet Access, 1998-2003

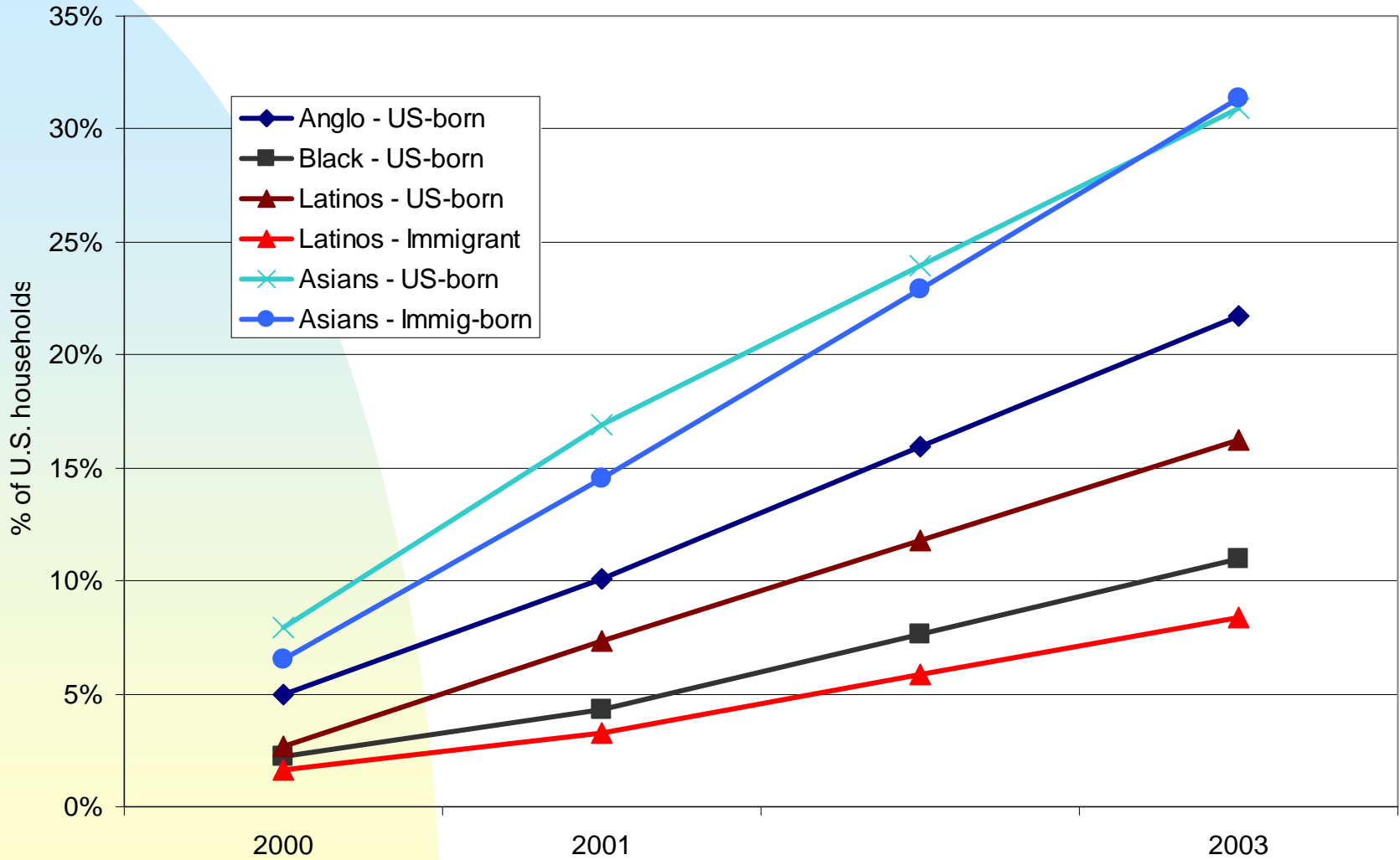


# Percent of Households with Broadband Access, 2000-2003

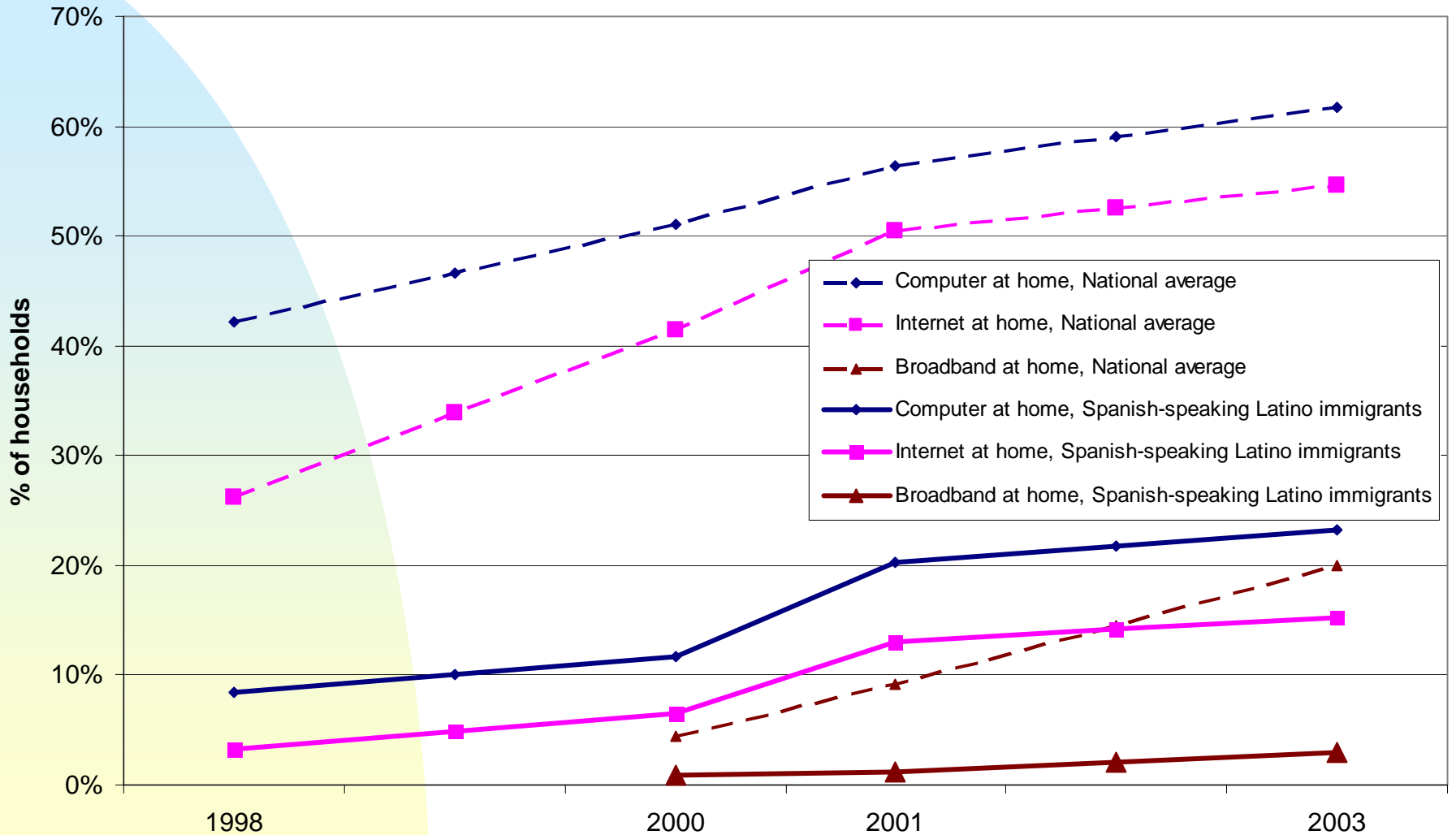




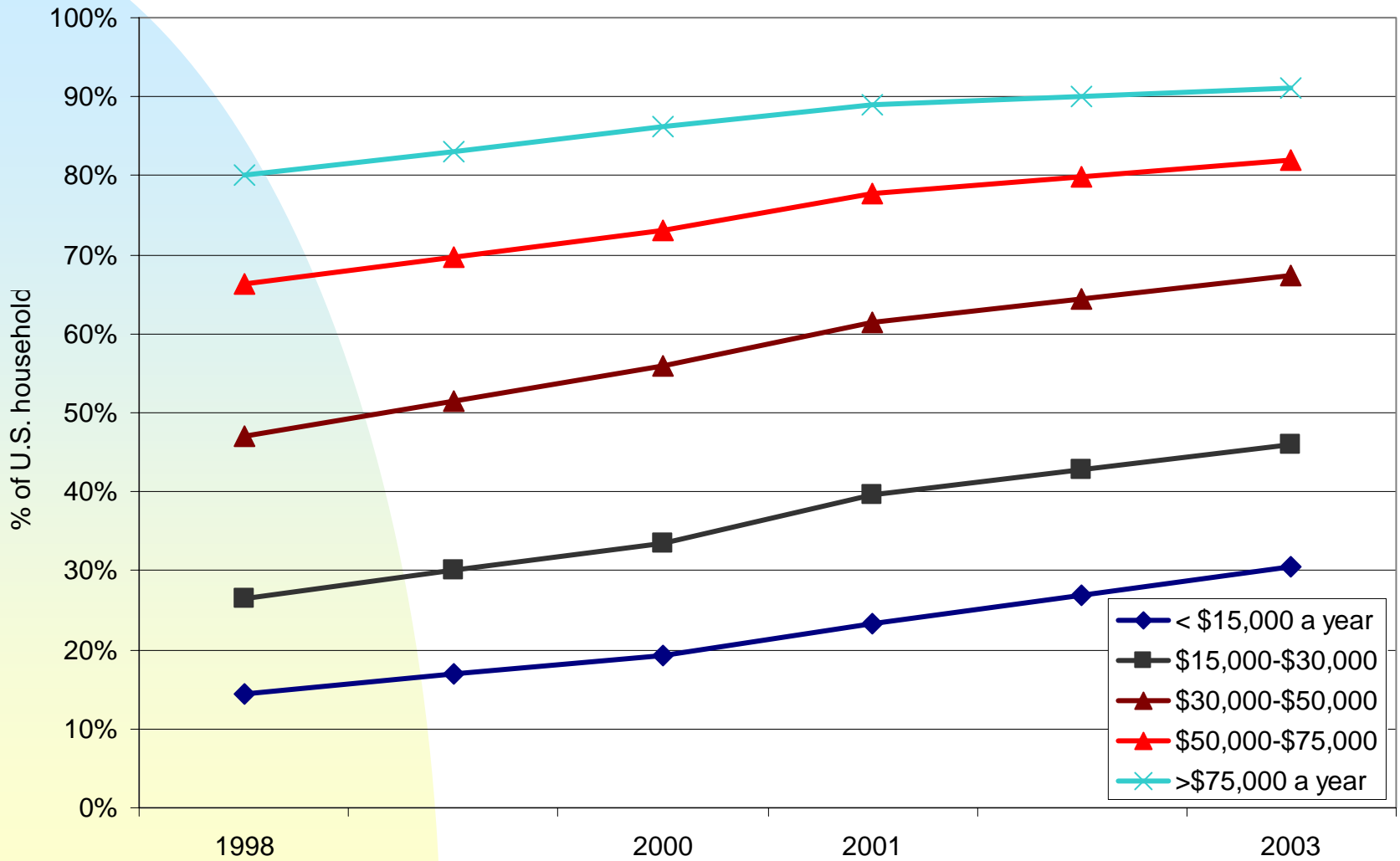
# Percent of Households with Broadband, 1998-2003



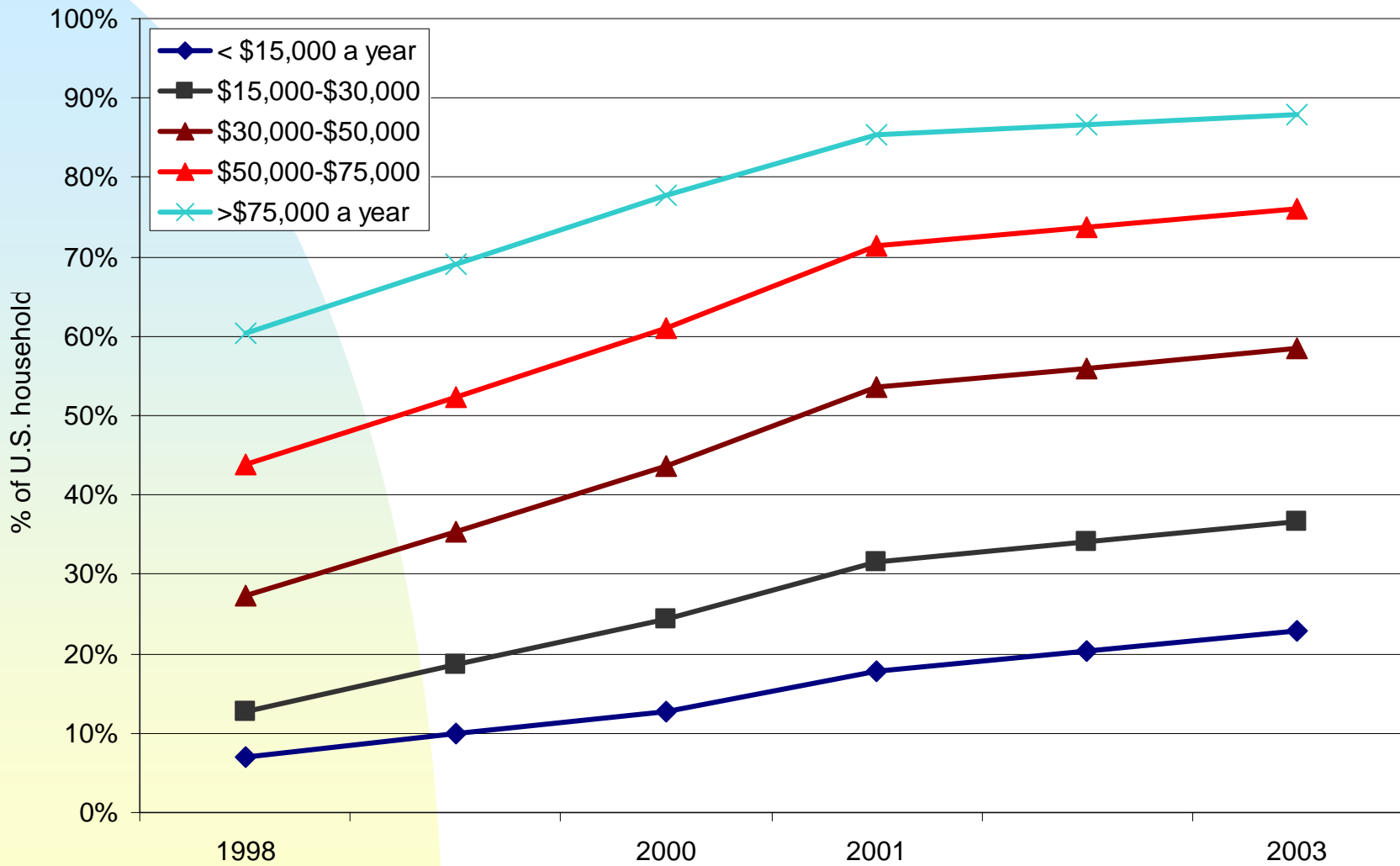
# Computer and Internet at Home, National Average and Spanish-speaking Latino Immigrant Households, 1998-2003



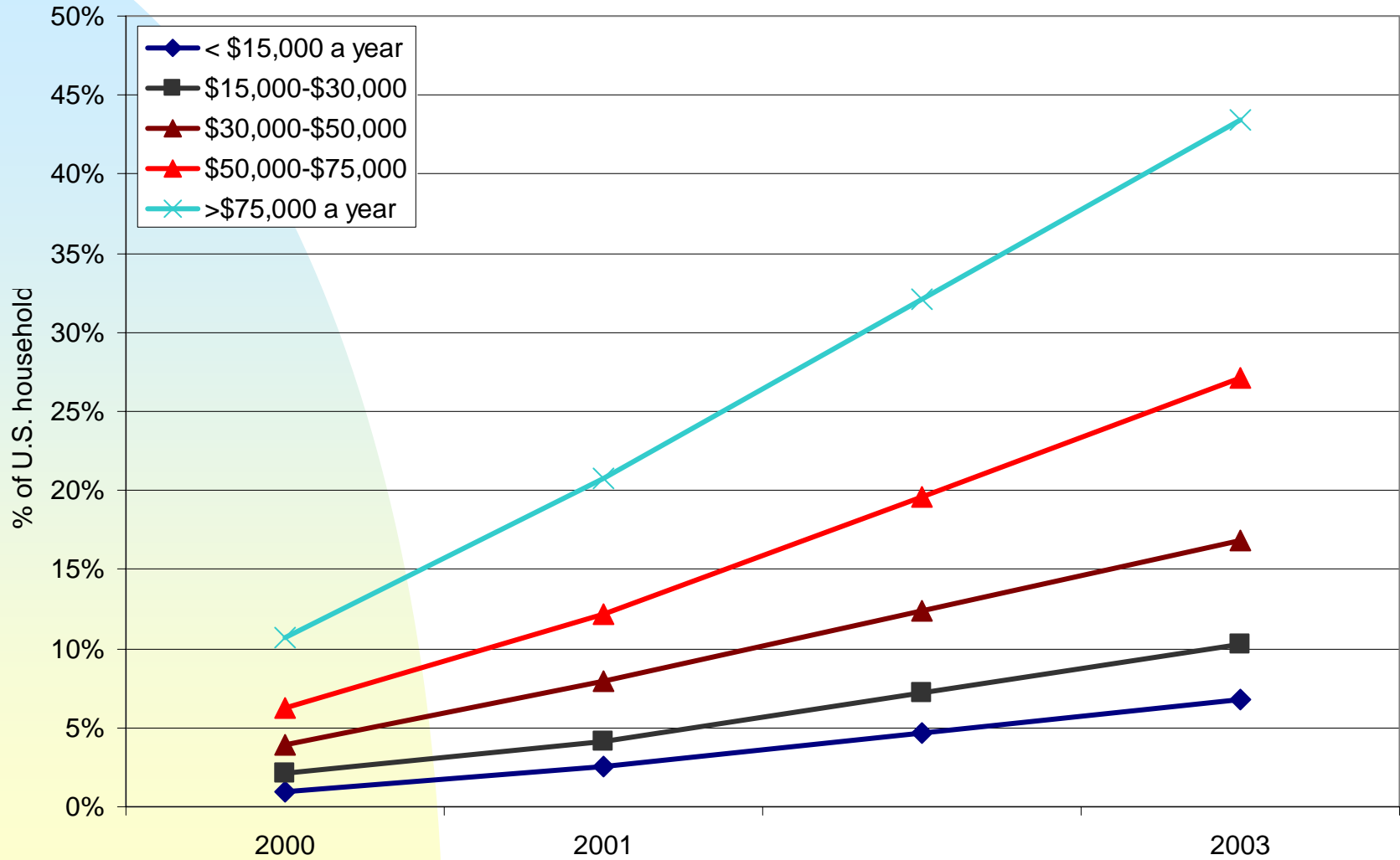
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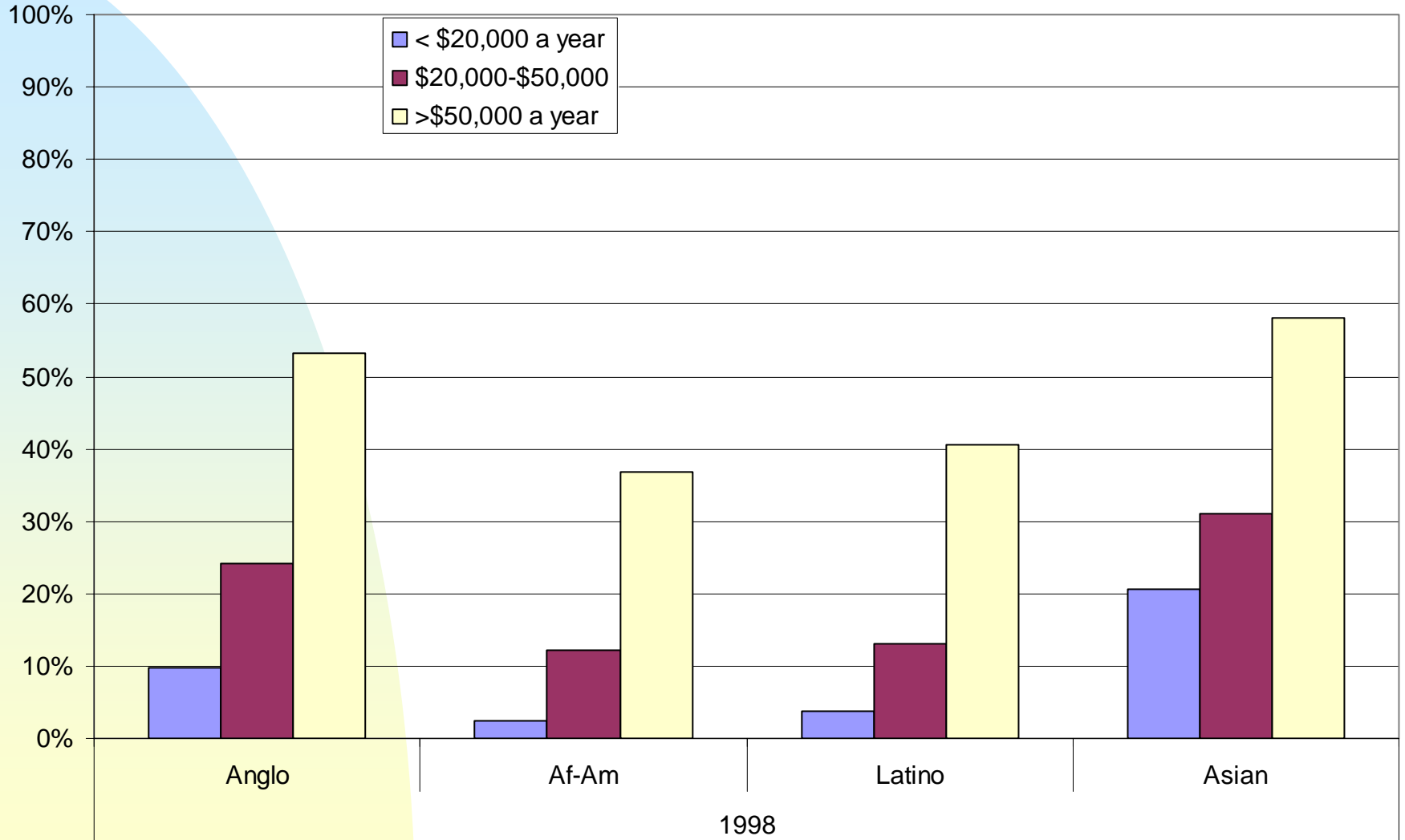
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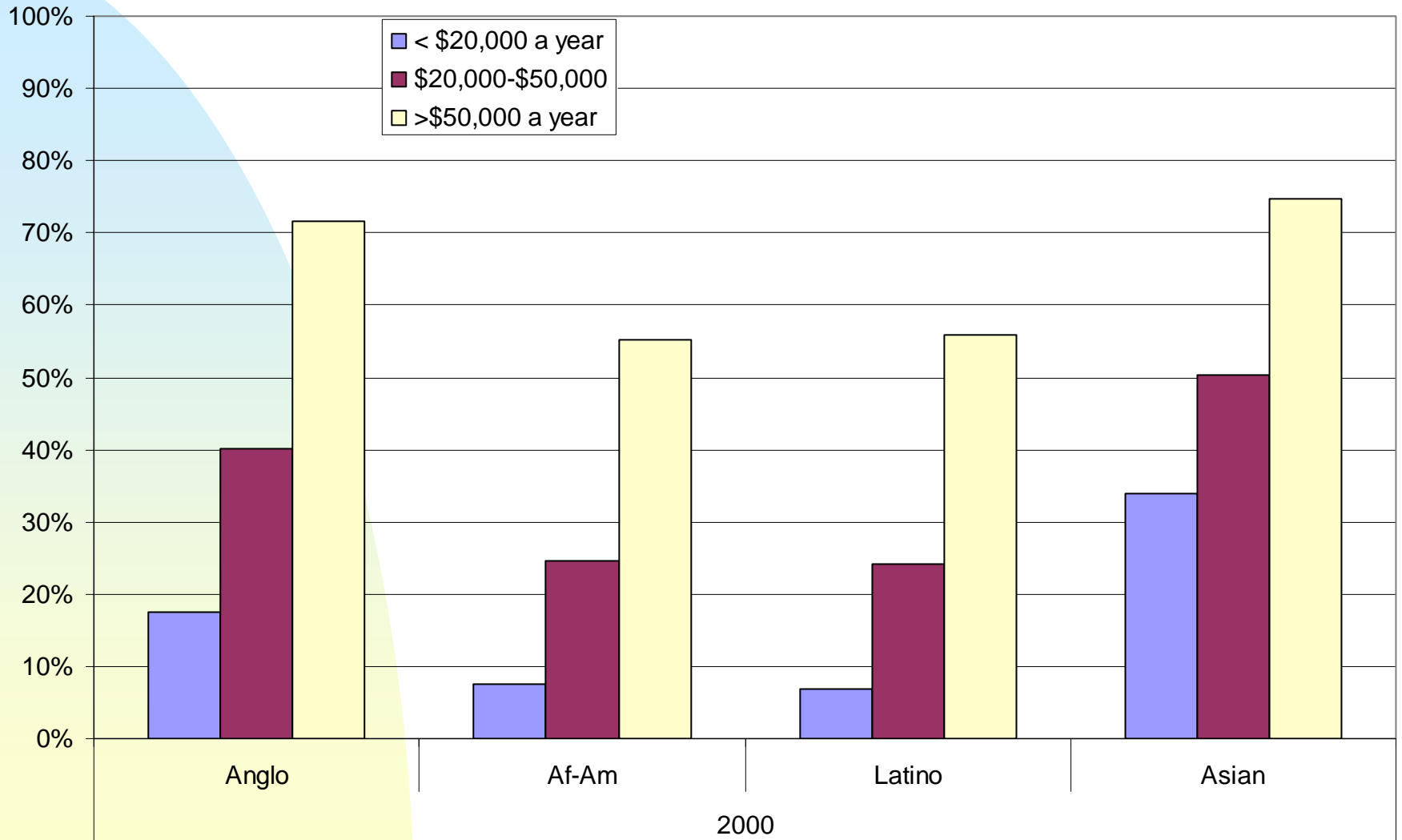
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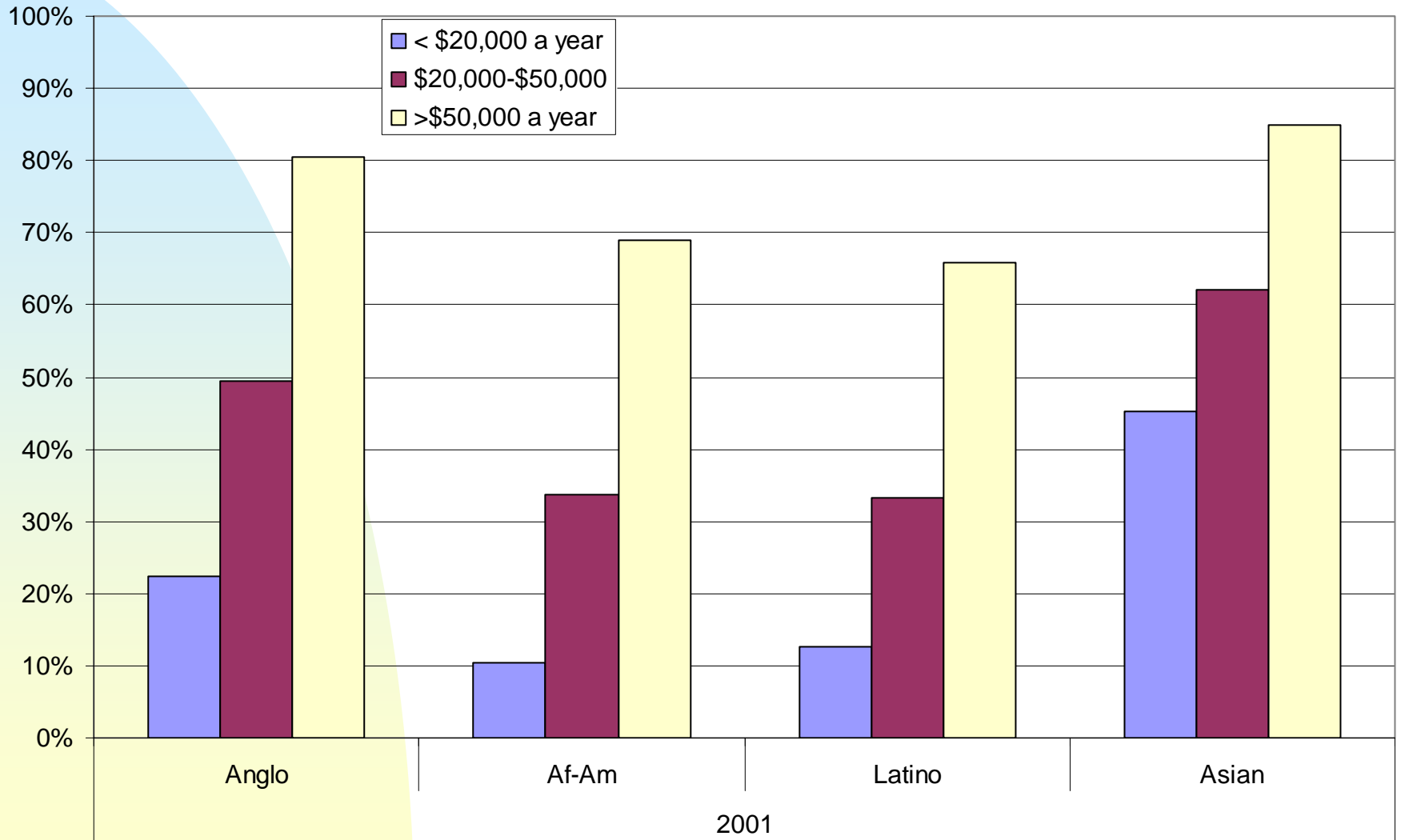
# Home Internet by Ethnicity and Income



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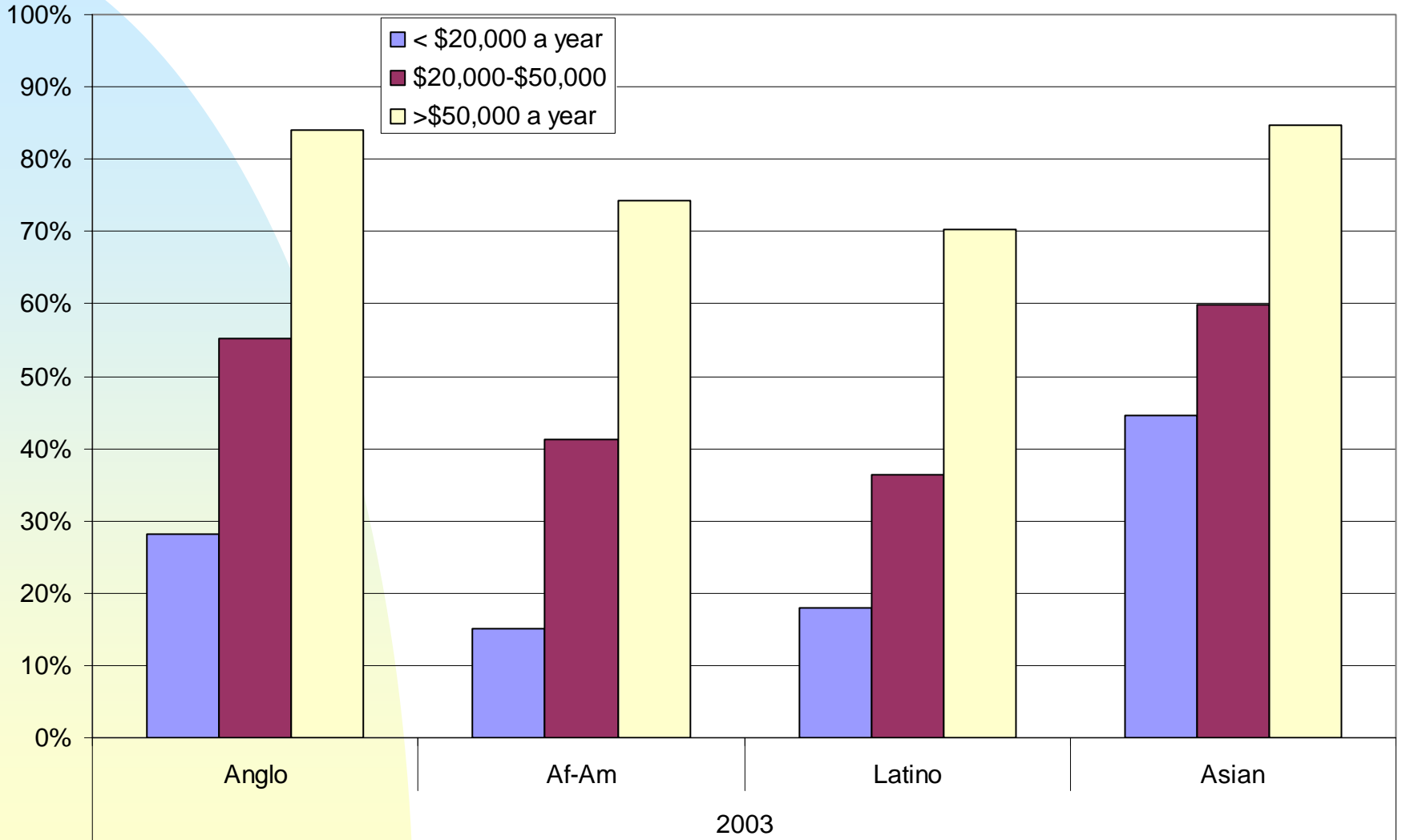


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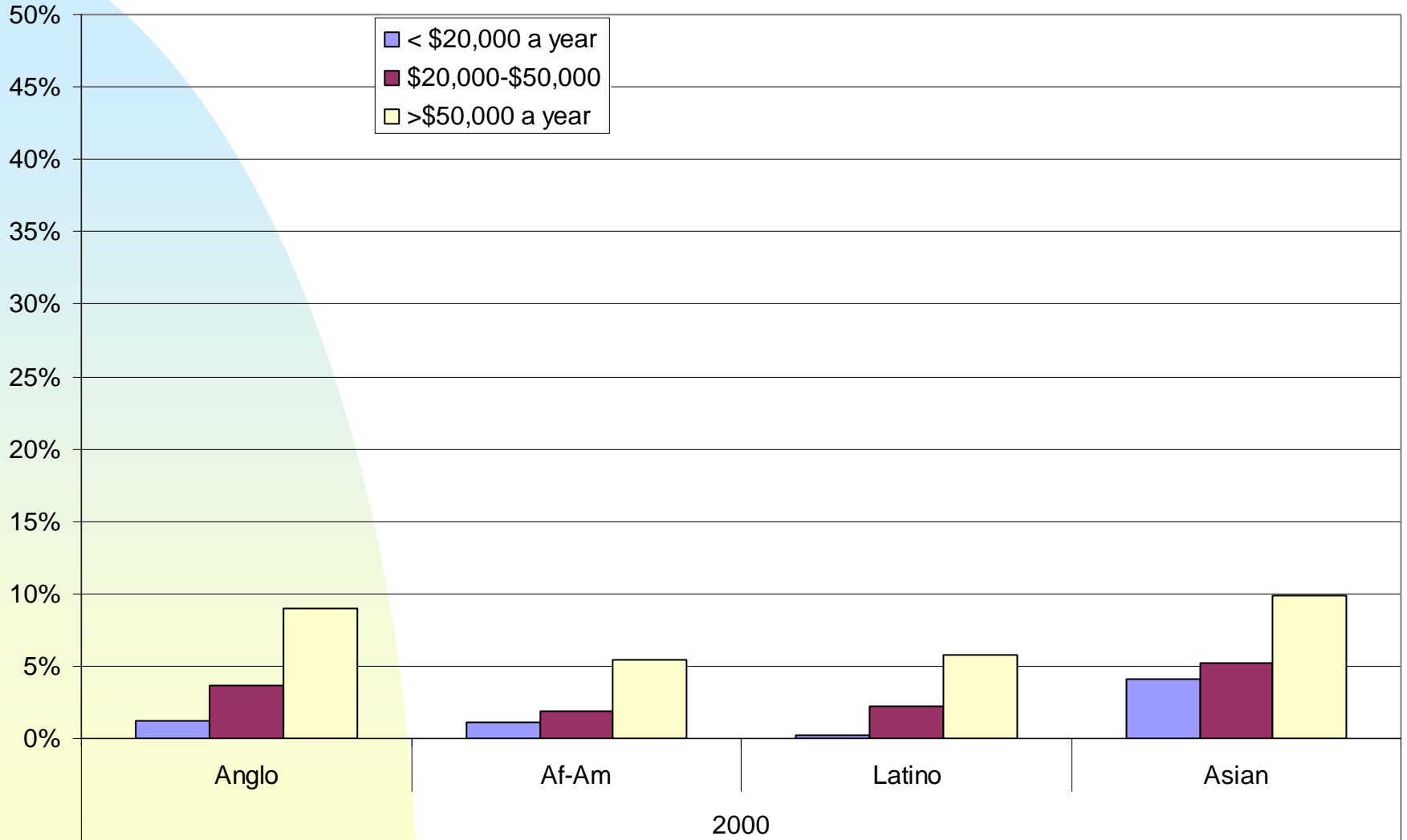




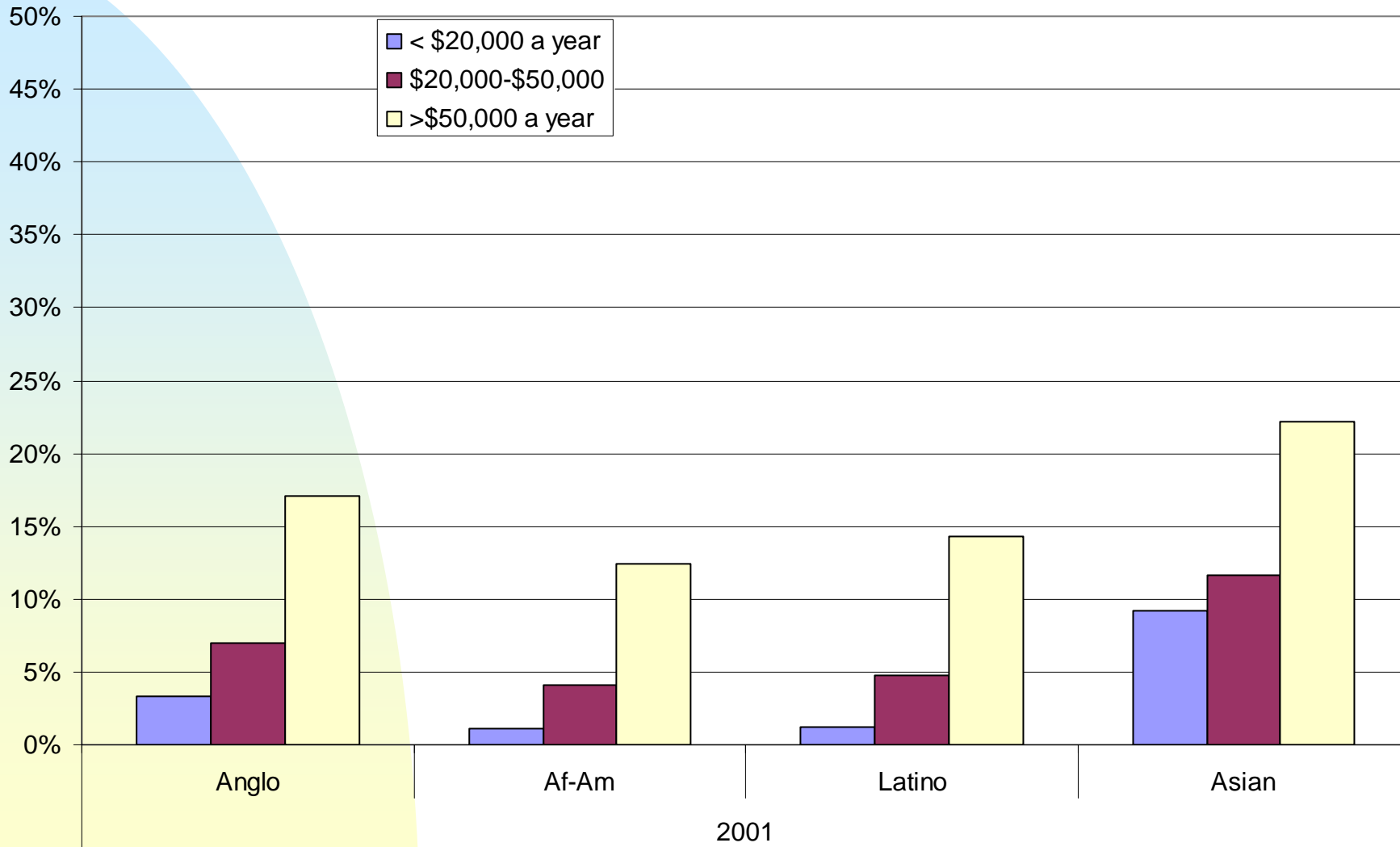
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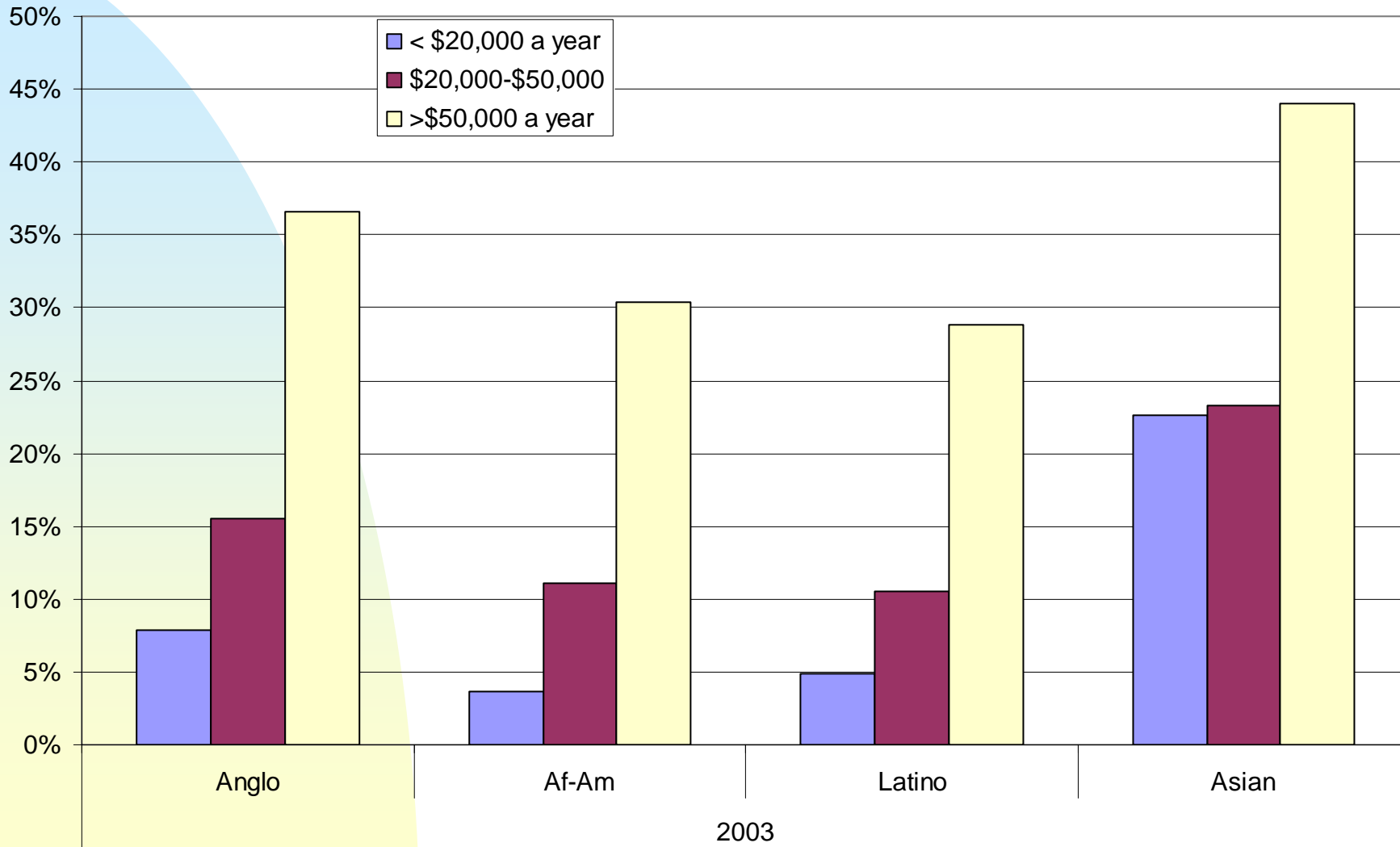
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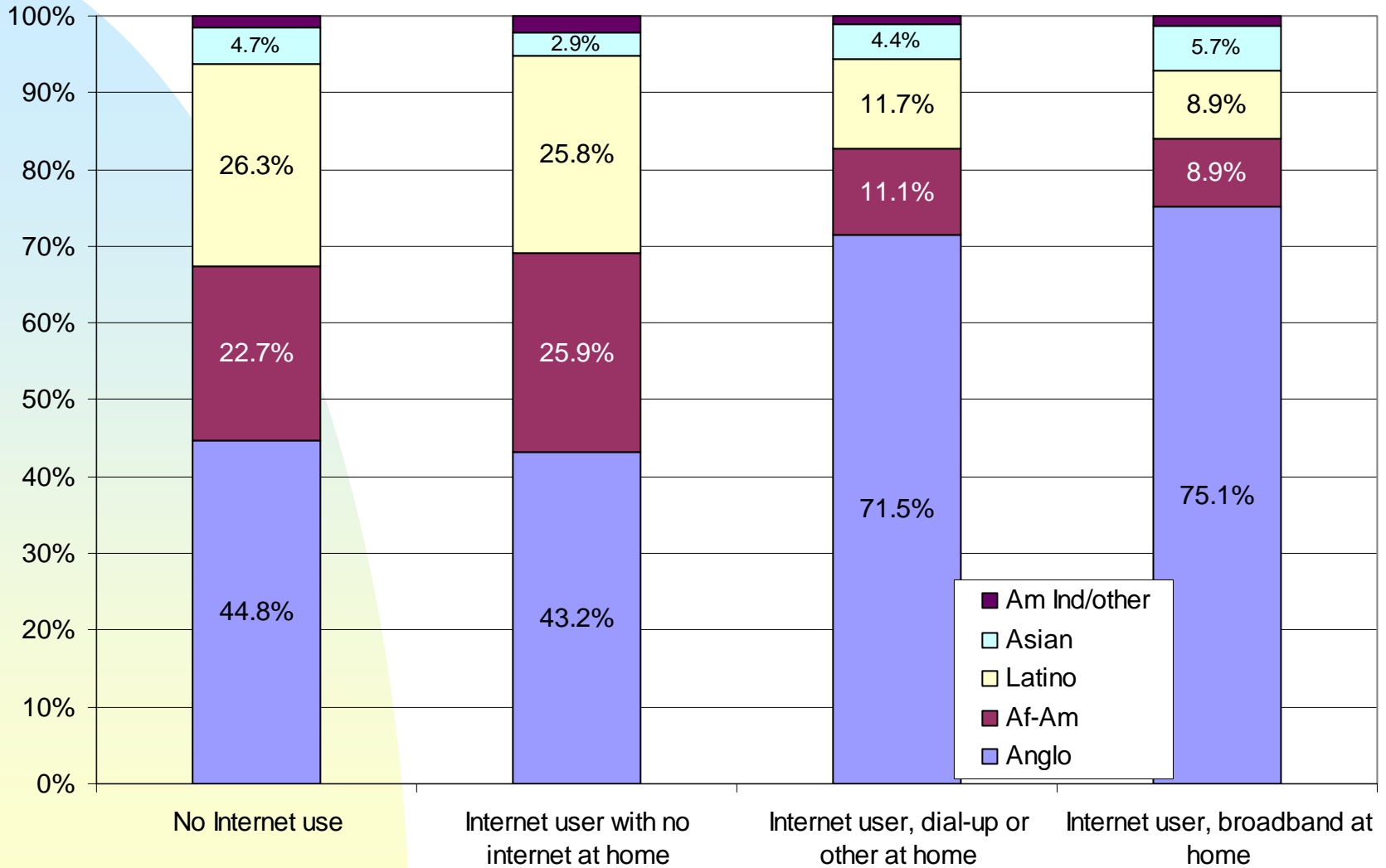
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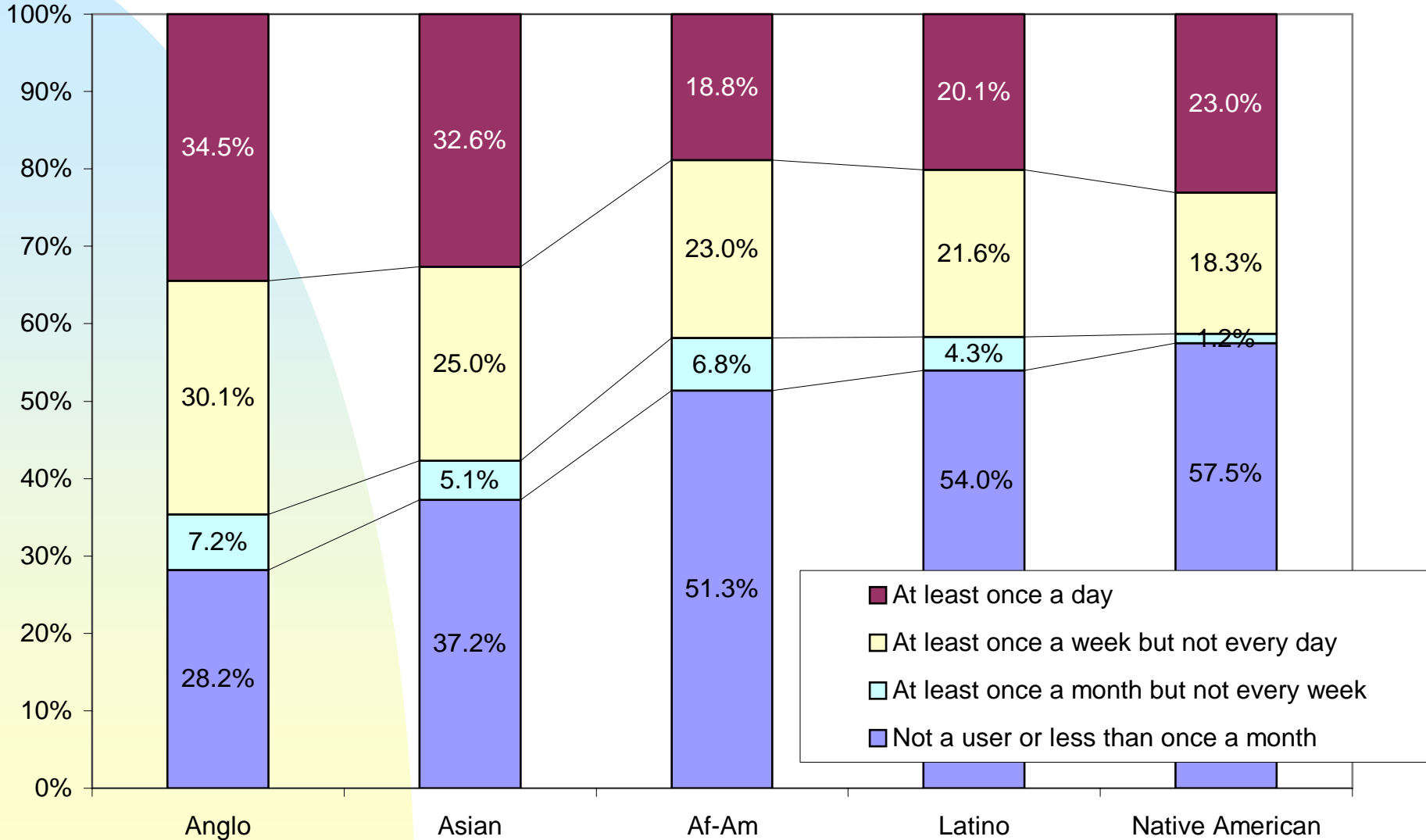
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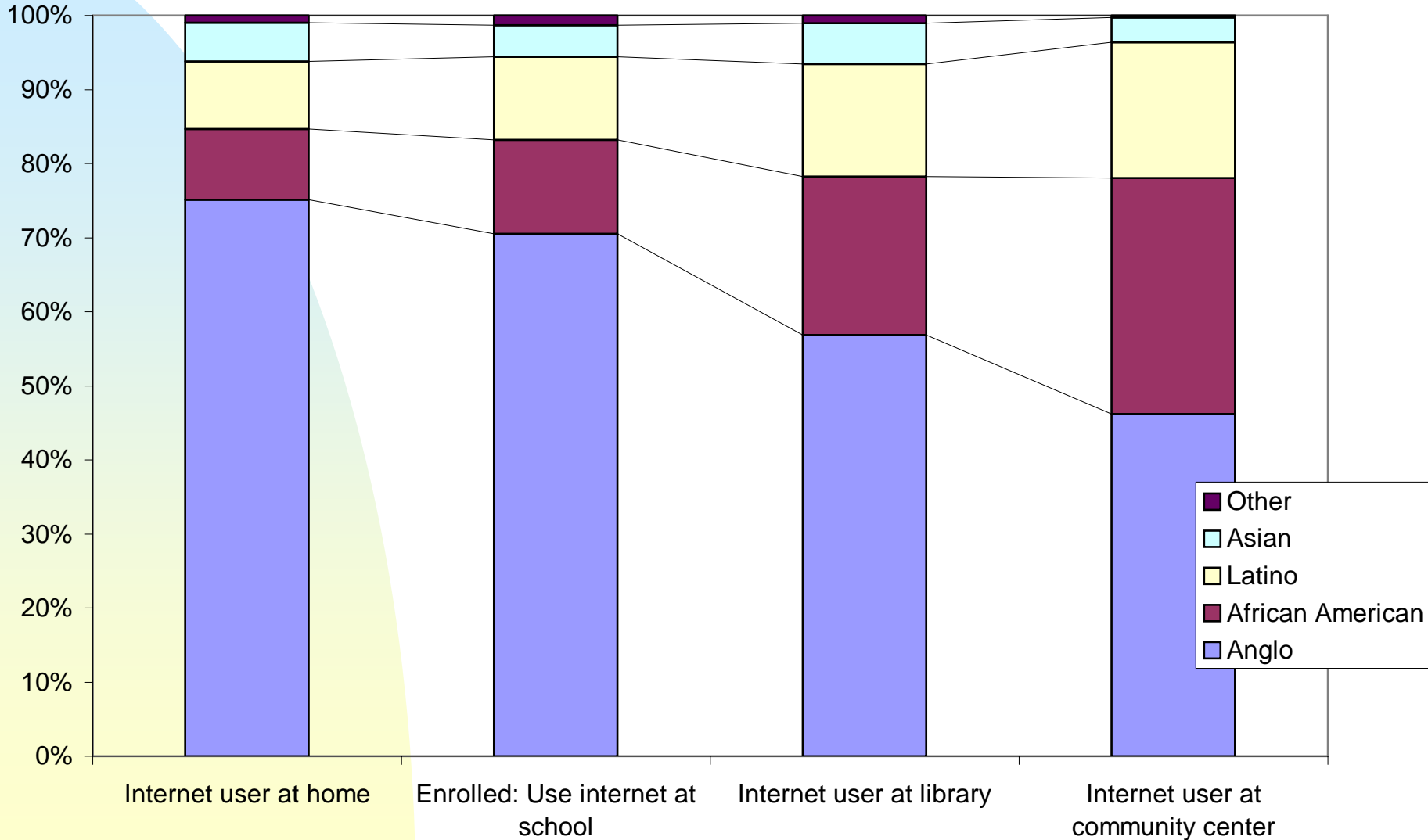
## Internet Access by Ethnicity, Youth 7 to 17, 2003



# Non-use and Frequency of Use of Internet, Youth 7-17, 2003



## Ethnicity and Computer of Use Locations, Age 7 to 17, Last Two Years of Available Data Pooled



# Considering the Pattern

- Still very sharp disparities that go unemphasized by *A Nation Online*
- Race matters but education, income, and language matter and should be tested in regression strategies
- Despite popular opinion, problems of access persist for youth by race





# Do Home Computers Improve Educational Outcomes?

## Evidence from Matched Current Population Surveys and the National Longitudinal Survey of Youth 1997

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Kuntal K. Das

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April 5, 2005



# Introduction

- The impact of computers in schools has been hotly debated.
- Meta-analyses and literature reviews find widely varying estimates of the effects of school computers (Noll, et, al. 2000 and Kirkpatrick and Cuban 1998).
- Quasi-experiment in Israel schools indicates no improvement in math test scores (Angrist and Lavy 1999).
- Random experiment suggests that a popular language program does not improve broader language acquisition and reading skills (Rouse and Krueger 2004).
- School principals and teachers overwhelmingly support the use of educational technology.
  - Nearly all principals report that educational technology will be important for increasing student performance in the next few years (SRI 2002).
  - Majority of teachers report that the use of technology is essential to their teaching practices (SRI 2002).
- Ninety-two percent of all instructional classrooms in U.S. public schools have computers with Internet access, with an average of 3.5 computers per classroom (U.S. Department of Education 2003).

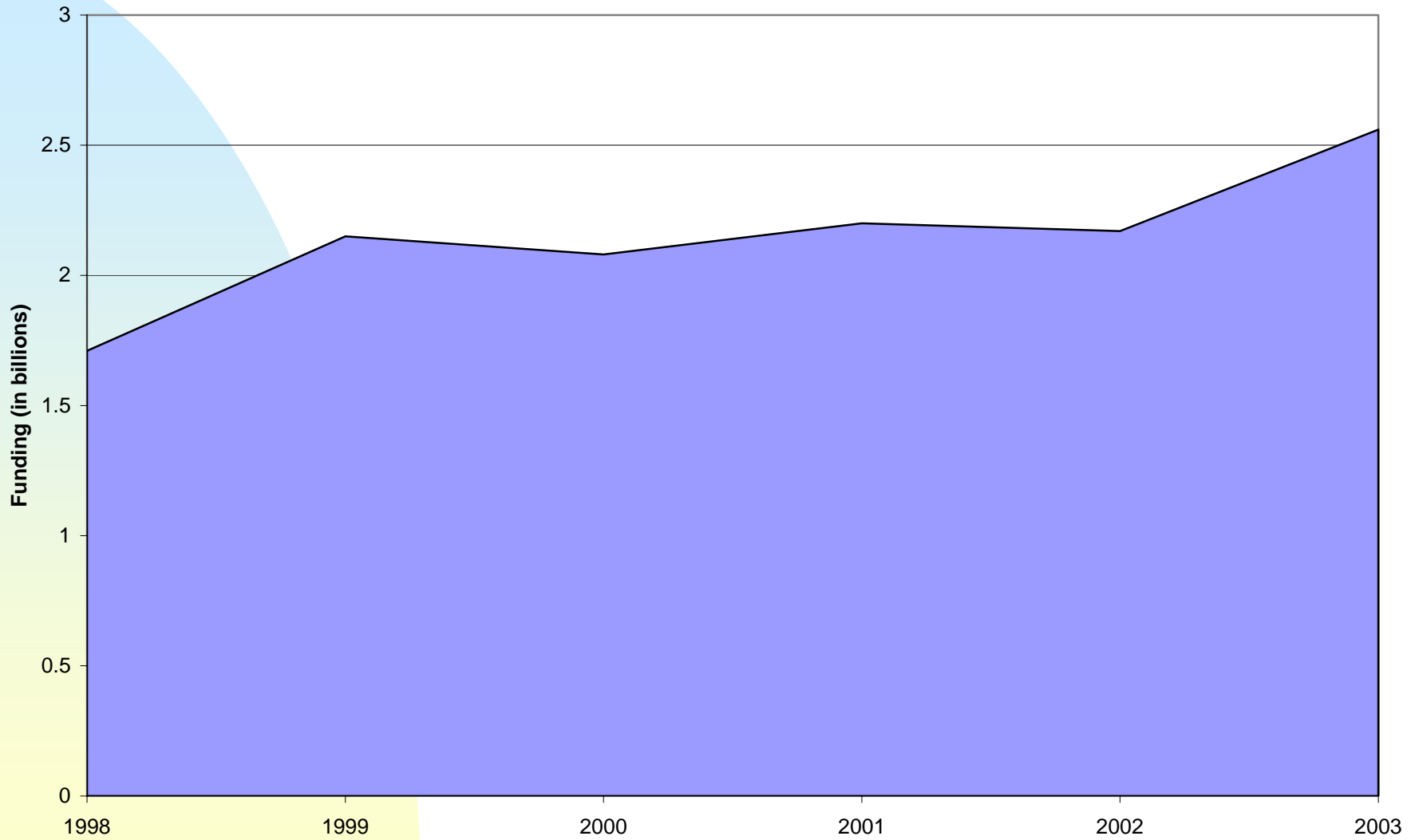


# Introduction

- The federal government has also made the provision of computer and Internet access to all schoolchildren a top priority.
  - E-rate program provides discounts to schools and libraries for the costs of telecommunications services and equipment



# Total Funding to Schools and Libraries from the E-Rate Program



# Introduction

- The U.S. Department of Education also recently released the National Educational Technology Plan calling for:
  - Increased teacher training in technology
  - Increased e-learning opportunities for students
  - Universal access to broadband
  - Expanded digital content
  - Integrated data systems



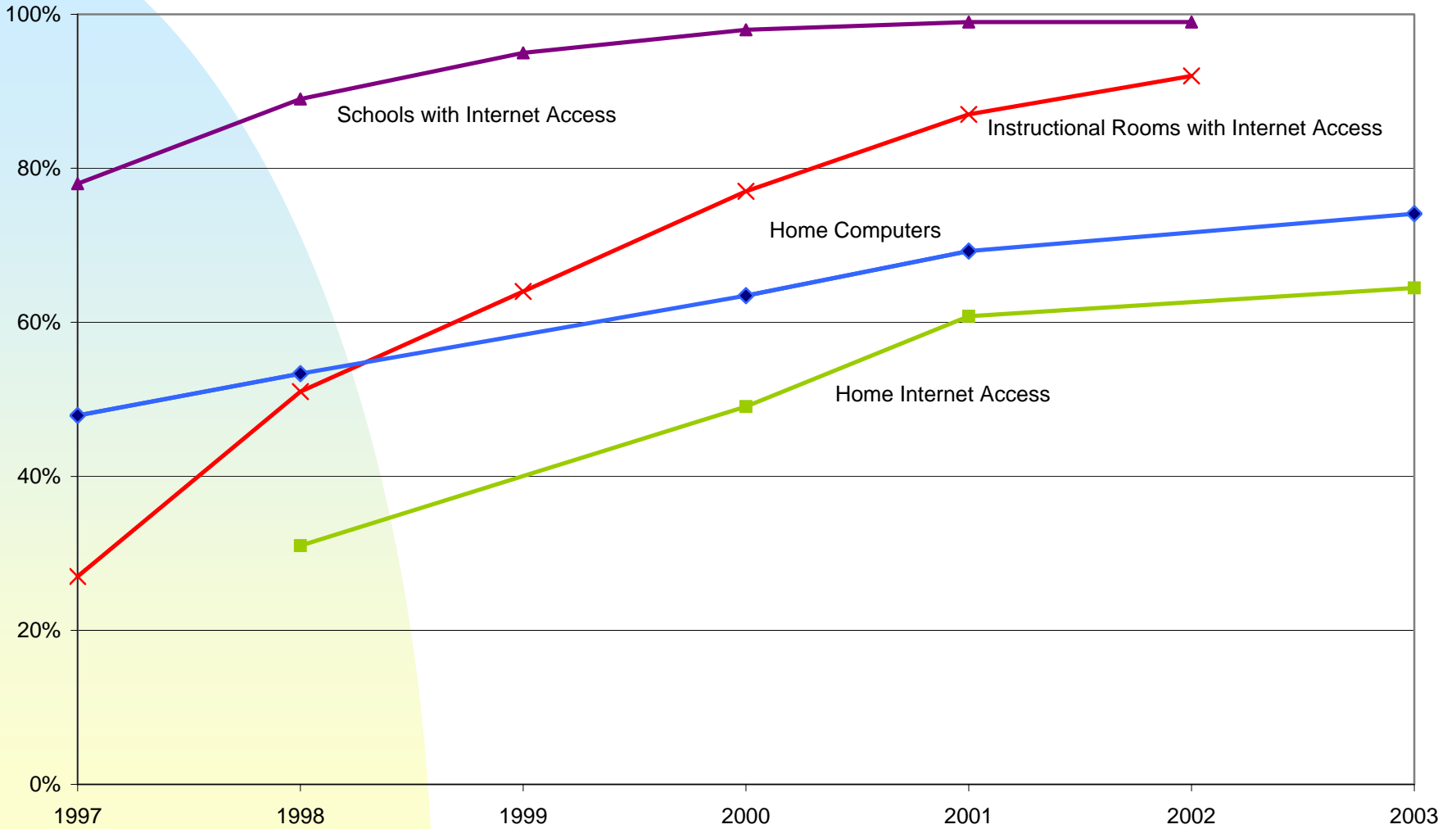
# Home Computers and Educational Outcomes

- The role of *home* computers in the educational process, however, has drawn very little attention in the literature.
- Surprising, because of its potential implications for disparities in access to technology or the so-called Digital Divide.
  - Although computers are universal in the classroom, nearly twenty million children do not have computers in their homes.



# Home and School Access to Computers and the Internet

## Current Population Survey and National Center for Educational Statistics



# Home Computers and Educational Outcomes

- No clear theoretical prediction regarding whether home computers are likely to have negative or positive effects on educational outcomes
  - Positive effects through the use of educational software, facilitating the completion of school assignments, "opening doors to learning," reducing crime, and altering the economic returns to completing high school.
  - Negative effects through providing a distraction for children through video games and the Internet, displacing other more active forms of learning, and plagiarism.
- Empirical question as to which of the two opposing forces dominates.
- The few previous studies examining the relationship between home computers and educational outcomes find somewhat mixed results (Attewell and Battle 1999; Schmitt and Wadsworth 2004; Fuchs and Woessmann 2004; Fairlie 2005).





# Analysis Plan

- Explore the relationship between computer ownership and high school graduation and other educational outcomes using recent panel data.
  - The 2000-2003 CPS Computer and Internet Use Supplements (CIUS) matched to the CPS Basic Monthly Files
  - The National Longitudinal Survey of Youth 1997
- We employ several empirical strategies to identify the causal effects of home computers on high school graduation and other educational outcomes.
- Address concerns regarding the potential effects of unobserved factors.
- Examine other outcomes, such as grades, school suspension, and crime to shed light on underlying mechanisms.



Table 2  
 High School Graduation Rates  
 Matched Current Population Surveys (2000-2004) and NLSY97

	No home computer	Home computer	Difference
High school graduation rate by second survey year CPS	56.7%	73.3%	16.6%
Sample Size	308	1,419	
High school graduation rate by age 19 NLSY97	70.7%	94.2%	23.5%
Sample Size	659	3,280	

Table 3

## Probit Regressions for Probability of High School Graduation - Matched CPS, 2000-2004

Female	0.0649 (0.0267)	0.0648 (0.0267)
Black	-0.0319 (0.0460)	-0.0318 (0.0459)
Latino	-0.0997 (0.0513)	-0.0997 (0.0513)
Immigrant	0.0186 (0.0564)	0.0186 (0.0563)
Family income: \$15,000 to \$30,000	-0.0322 (0.0558)	-0.0323 (0.0558)
Family income: \$30,000 to \$50,000	0.0270 (0.0479)	0.0267 (0.0479)
Family income: \$50,000 to \$75,000	-0.0490 (0.0552)	-0.0494 (0.0550)
Family income: greater than \$75,000	-0.0093 (0.0519)	-0.0097 (0.0518)
Home ownership	0.0899 (0.0405)	0.0900 (0.0405)
Mother-high school graduate	0.0173 (0.0486)	0.0173 (0.0486)
Mother-some college	0.0741 (0.0487)	0.0741 (0.0487)
Mother-college graduate	0.0347 (0.0578)	0.0349 (0.0578)
Father-high school graduate	0.0747 (0.0512)	0.0746 (0.0512)
Father-some college	0.0512 (0.0555)	0.0511 (0.0555)
Father-college graduate	0.0550 (0.0610)	0.0550 (0.0610)

Table 3  
 Probit Regressions for High School Graduation  
 Matched Current Population Surveys, 2000-2004  
 Specification

Explanatory Variables	(1)	(2)	(3)
Home computer	0.0811 (0.0414)		
Mother's occupation controls	Yes		
Father's occupation controls	Yes		
Mean of dependent variable	0.7050		
Sample size	1,711		

Table 3  
 Probit and Bivariate Probit Regressions for  
 High School Graduation and Home Computer  
 Matched Current Population Surveys, 2000-2004

Explanatory Variables	(1)	(2)	Specification	
Home computer	0.0811 (0.0414)	0.0819 (0.0419)		0.0961 (0.1780)
Newest computer purchased in first survey year		-0.0034 (0.0368)		
Father uses Internet at work			0.0610 (0.0232)	
Mother uses Internet at work			0.0454 (0.0212)	
Another teenager present in household			0.0500 (0.0238)	
Mother's occupation controls	Yes	Yes	Yes	Yes
Father's occupation controls	Yes	Yes	Yes	Yes
$\rho$				-0.0248 (0.2855)
Mean of dependent variable	0.7050	0.7050	0.8211	0.7050
Sample size	1,711	1,711		1,711

# NLSY97 Probit Regressions for High School Graduation

- Detailed Controls
  - Living arrangements
  - Whether mother was a teen mom
  - Grandparent went to college
  - Continuous family income
  - Continuous family net worth
  - Religion
  - Private school
  - Home environment
  - Extra Courses



Table 6  
 Probit Regressions for High School Graduation  
 NLSY97

Explanatory variables	Specification			
	(1)	(2)	(3)	(4)
Private school		-0.0230 (0.0152)	-0.0223 (0.0149)	-0.0216 (0.0148)
Other language spoken at home			-0.0228 (0.0154)	-0.0228 (0.0154)
Dictionary present in household			0.0190 0.0152	0.0168 0.0147
Quiet place to study in household			0.0024 0.0095	0.0028 0.0095
Youth attends extra classes				0.0184 (0.0067)
Home computer by age 17	0.0685 (0.0133)	0.0691 (0.0134)	0.0661 (0.0132)	0.0632 (0.0129)
Religion dummies	No	Yes	Yes	Yes
Mean of dependent variable	0.9028	0.9028	0.9029	0.9027
Sample size	3,715	3,673	3,668	3,648

# Additional Educational Outcomes in the NLSY97

- Grade Point Average
- School Suspension



Table 7  
 OLS Regressions for High School GPA  
 NLSY97

Explanatory variables	Specification			
	(1)	(2)	(3)	(4)
Private school		-0.0279 (0.0419)	-0.0309 (0.0420)	-0.0297 (0.0420)
Other language spoken at home			0.0089 (0.0450)	0.0049 (0.0450)
Dictionary present in household			0.0585 (0.0545)	0.0540 (0.0545)
Quiet place to study in household			0.1200 (0.0393)	0.1197 (0.0393)
Youth attends extra classes				0.1517 (0.0264)
Home computer by age 17	0.2163 (0.0329)	0.2153 (0.0330)	0.2063 (0.0332)	0.2031 (0.0331)
Religion dummies	No	Yes	Yes	Yes
Mean of dependent variable	2.8198	2.8252	2.8274	2.8278
Sample size	4,067	4,008	3,998	3,975

Table 8  
 Probit Regressions for School Suspension  
 NLSY97

Explanatory variables	Specification			
	(1)	(2)	(3)	(4)
Private school		0.0271 (0.0107)	0.0274 (0.0108)	0.0279 (0.0108)
Other language spoken at home			-0.0003 (0.0104)	0.0018 (0.0105)
Dictionary present in household			-0.0079 (0.0117)	-0.0067 (0.0117)
Quiet place to study in household			-0.0121 (0.0093)	-0.0126 (0.0093)
Youth attends extra classes				-0.0049 (0.0062)
Home computer by age 17	-0.0281 (0.0058)	-0.0273 (0.0058)	-0.0276 (0.0059)	-0.0278 (0.0059)
Religion dummies	No	Yes	Yes	Yes
Mean of dependent variable	0.1132	0.1126	0.1132	0.1130
Sample size	17,326	17,081	16,914	16,794

# Alternative Regressions using the NLSY97

- Fixed effects
  - Controls for all unobserved individual, parental and family characteristics that do not change over time.
- Future computer ownership
  - Future computer ownership may serve as a good proxy for unobserved characteristics, such as educational motivation, that are correlated with having a home computer and educational outcomes.
  - Future computer ownership, however, cannot have any causal effect on educational outcomes.



Table 9  
 Additional Regressions for School Suspension  
 NLSY97

Explanatory variables	Specification				
	(1)	(2)	(3)	(4)	(5)
Home computer	-0.0092 (0.0075)	-0.0400 (0.0083)	-0.0387 (0.0084)	-0.0382 (0.0084)	-0.0385 (0.0084)
Future home computer		-0.0162 (0.0074)	-0.0152 (0.0075)	-0.0148 (0.0075)	-0.0154 (0.0075)
Main controls	Time Varying	Yes	Yes	Yes	Yes
Religion / private school	No	No	Yes	Yes	Yes
Home environment	No	No	No	Yes	Yes
Extra classes	No	No	No	No	Yes
Fixed effects	Yes	No	No	No	No
Mean of dep. variable	0.1147	0.1242	0.1235	0.1236	0.1234
Sample size	17,751	13,996	13,801	13,765	13,670

# NLSY97 Probit Regressions for Criminal Activities

- Any criminal activity
  - Negative coefficients in some specifications
  - Statistically insignificant in all specifications
- Arrests
  - Large, negative and statistically significant coefficients in most specifications (30%)
- Gang activity
  - Large, negative and consistent magnitude across specifications (10%)
  - Statistically insignificant in all specifications at conventional levels
- Overall, some evidence of negative relationship between home computers and crime.



# Conclusions

- Strong positive relationship between computer ownership and high school graduation and other educational outcomes
- Consistent evidence using:
  - Two datasets
  - Different measures of home computer ownership
  - Inclusion of different sets of controls in probit regressions
- Causal Interpretation?
  - Timing of computer purchases
  - Bivariate probit results
  - Inclusion of detailed home environment characteristics
  - Fixed effect models
  - Future computer ownership
- Evidence on relationship between home computers and crime is less clear.



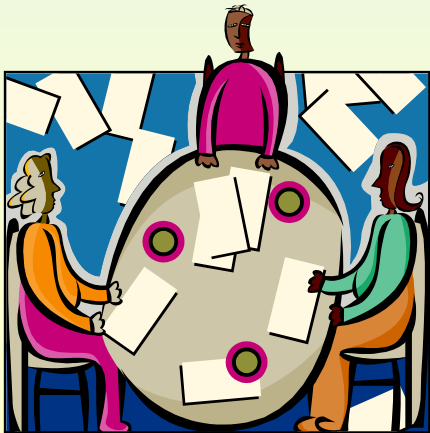
# Policy Implications

- Disparities in access to technology are likely to translate into future disparities in educational and economic outcomes.
- Policies that address the financial, informational and technical constraints limiting the optimal investment in personal computers among disadvantaged families may be needed.
  - For example, tax breaks or special loans for educational computer purchases, training programs, and computer donations.
- The findings also raise concerns about funding cuts for technology-related programs affecting disadvantaged groups, such as community technology centers (Servon 2002).
- Home computers in the educational process may become more important over time as schools are increasingly digitizing content and there is growing momentum for the controversial issue of replacing textbooks with CD ROMs or Internet-based materials.
  - One of the action steps in the new U.S. Department of Education's National Education Technology Plan is to "move away from reliance on textbooks to the use of multimedia or online information (digital content)."



# Studying Community Technology Centers

- Important interventions for key youth populations on the other side of the digital divide
- Visited five centers, one in Seattle, one in Harlem, one in Lowell, one in Los Angeles, one in Central Valley of California





**Figure 1: Community Technology Center Site Locations and Goals**

Site	Goals
Bresee Foundation Los Angeles, CA	Provide community with access to computer technology and job training. Provide access to technological resources often out of reach to low-income community members, teach marketable skills, and enhance job placement opportunities.
Firebaugh Learning Center Firebaugh, CA	Provide social, economic and educational advancement opportunities through technology training and programs.
HarlemLive Harlem, NY	Web magazine journalism program that teaches students ages 13 to 21 how to run an online newspaper. Includes news articles, investigative stories, opinion pieces, personal essays, poetry, photography and video documentaries.
Lowell Telecommunications Corporation Lowell, MA	Provides state of the art training and access to video and computer equipment at low or no cost, as a forum for free speech. Provides opportunities for people to become content providers from various production platforms and through multiple distribution channels, including, but not limited to: radio, television, satellite and digital technologies.
Technology Access Foundation Seattle, WA	Provide intensive skills-building activities and internships to minority youth in order to diversify tech occupations, encourage students to attend college, provide opportunities

**Figure 2: Characteristics of Case Study CTCs**

	<b>Bresee Foundation</b>	<b>Firebaugh CLC</b>	<b>Harlem Live</b>	<b>Lowell Telecomm Corporation</b>	<b>Technology Access Foundation</b>
Public access	Yes	Yes	No	Yes	No
Multi-media	Yes	No	Yes	Yes	No
Homework help	Yes	Yes	No	No	No
Basic computer skills	Yes	Yes	No	Yes	No
Technical skills	Yes	No	Yes	Yes	Yes
Internships/employment	Yes	No	Yes	Yes	Yes
Informal college preparation	Yes	Yes	Yes	Yes	Yes
Formal college preparation	Yes	No	No	No	Yes
Adult mentors	Yes	Yes	Yes	Yes	Yes



## **CTC Environment**

### **Features of Positive Development Settings**

(National Academy of Sciences)

- Physical and psychological safety
- Appropriate structure
- Supportive relationships
- Opportunities to belong
- Positive social norms
- Support for efficacy and mentoring
- Opportunities for skill building
- Integration of family, school, and community efforts

**Figure 3: Features of Positive Developmental Settings**

	<b>Bresee Foundation</b>	<b>Firebaugh CLC</b>	<b>Harlem Live</b>	<b>Lowell Telecomm Corporation</b>	<b>Technology Access Foundation</b>
Physical and psychological safety	Yes	Yes	Yes	Yes	Yes
Appropriate structure (continuity & predictability)	Yes; no enforceable structure or monitoring	No; mostly unstructured access	Yes; enforce by peer expectations	Yes; age-appropriate monitoring	Yes; very structured
Supportive relationships	Strong staff-teen	Strong for some staff-teen	Strong teen-teen, staff-teen	Strong teen-teen, staff-teen	Strong teen-teen, staff-teen
Opportunities to belong	Inclusive, neighborhood identity	Inclusive and integrative with larger community	Space to belong, focus on their issues	Space to belong, sociocultural identity	Opportunity for meaningful inclusion for youth of color
Positive social norms	Clear expectations on values, morals; less on attendance	Emphasis on homework; less on values & morals	Clear expectations on product; less emphasis on values, morals	Unclear expectations; no emphasis on values and morals	Clear expectations on behavior & consequences

**Figure 3: Features of Positive Developmental Settings**

	<b>Bresee Foundation</b>	<b>Firebaugh CLC</b>	<b>Harlem Live</b>	<b>Lowell Telecomm Corporation</b>	<b>Technology Access Foundation</b>
Support for efficacy and mentoring	Youth empowerment & community involvement	Center engaged in community advocacy	Journal enables youth to make a difference	Programs connected to community; youth are challenged	Internships grants responsibility & challenges;
Opportunities for skill building	Intellectual and technical skills building, social and cultural capital	Exposure to technology	Skill building in writing and technology, & interpersonal	Intellectual and social skills, cultural & media literacy, social and cultural capital	Technical skills, employment prep, cultural literacy
Integration of family, school, and community efforts	Integrated into community, less so to family, not to school	Program integrated into family, community and, less so to school	Program not integrated, although journal is an important community product, not integrated to	Strong integration into community, less so with schools & family	Internship connects to business community, not connected with school or family

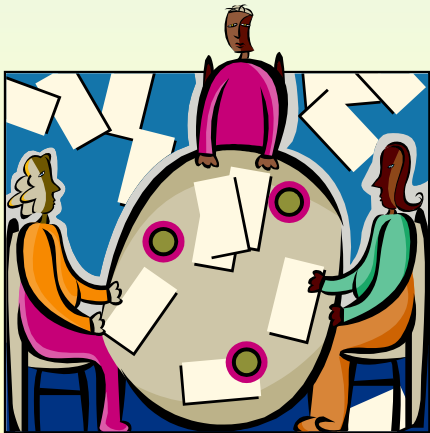
## Emerging Themes from Qualitative Work:

- Some centers fulfill needed access points in community, particularly to overcome challenges to use at school and lack of access at home
- Centers often have a particular role in neighborhood – location, history, and leadership are important
- Centers can build networks – both “bonding” and “bridging” – that can serve youth well in navigating other aspects of life in poor communities
- Youth technology-related skill-building and relationships with adults/organizations can promote youth transformation
- Youth empowerment through “storytelling” – youth discovering their voice and the legitimacy of their stories through digital tools



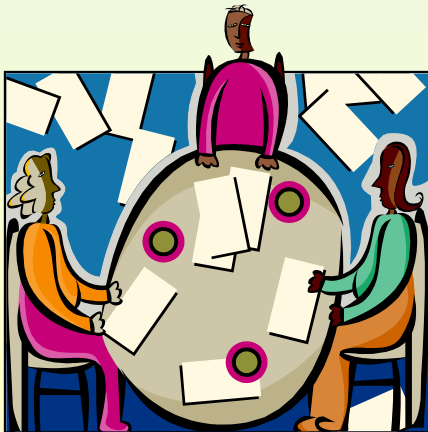
# Emerging Themes of Qualitative Work

- Youth skill-building and transformation as essential component for youth programming
- Centers sit in relation to challenges to use at school, lack of access at home, and need for community entry point



# Emerging Themes of Qualitative Work

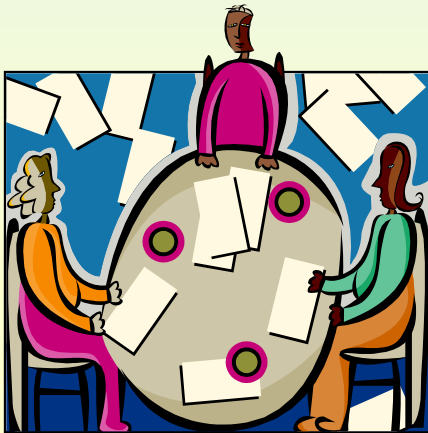
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  - Centers can build networks – both “bonding” and “bridging” – that can serve youth well in navigating other aspects of life in poor communities





# Emerging Themes of Qualitative Work

- Absolutely critical is the role of “story-telling” – youth wanting to have their voices heard and acknowledged and discovering tools for that to happen
- This reinforces statistical findings on importance of language and implicit role of content and broadband



# Interested in more?

Go to <http://cjtc.ucsc.edu/digitaldivide.html>

## *Project Team:*

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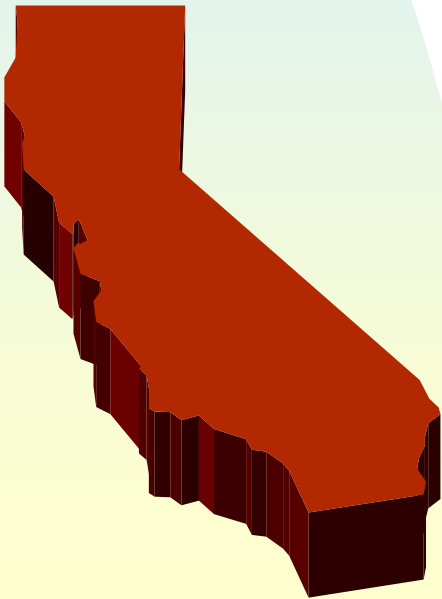
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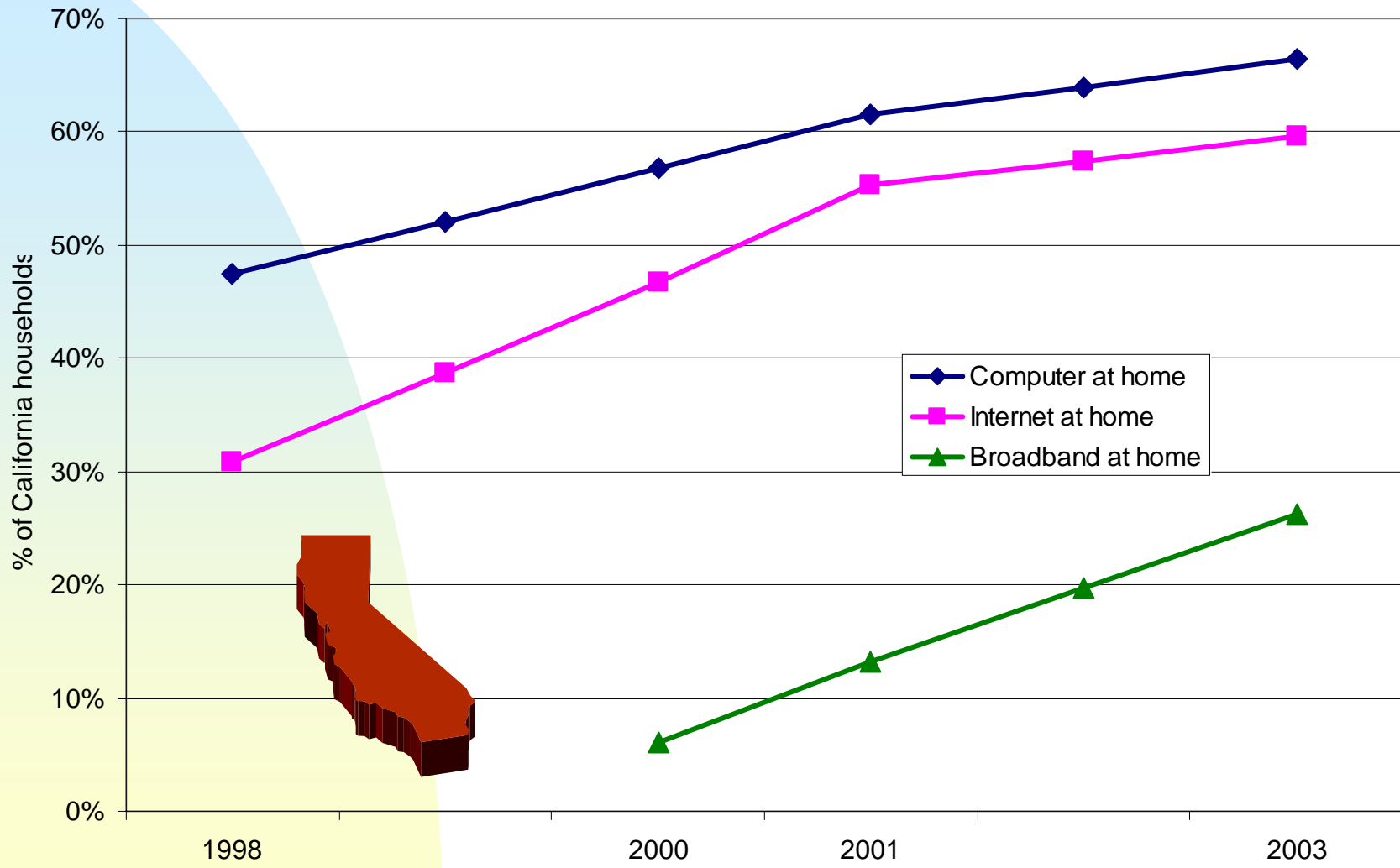


Center for  
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of California  
Santa Cruz

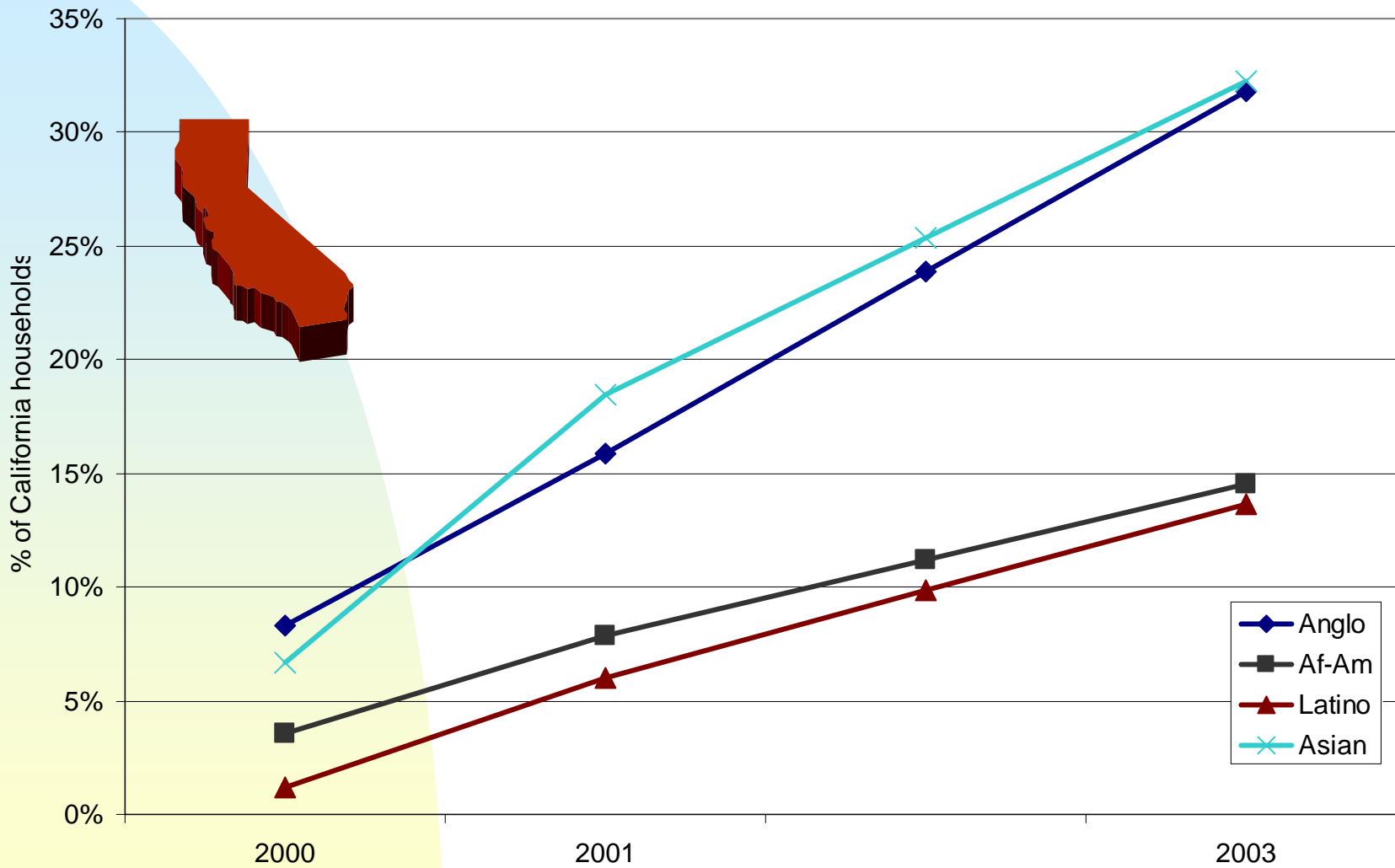
# Supplement: Focus on California



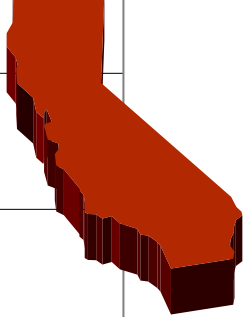
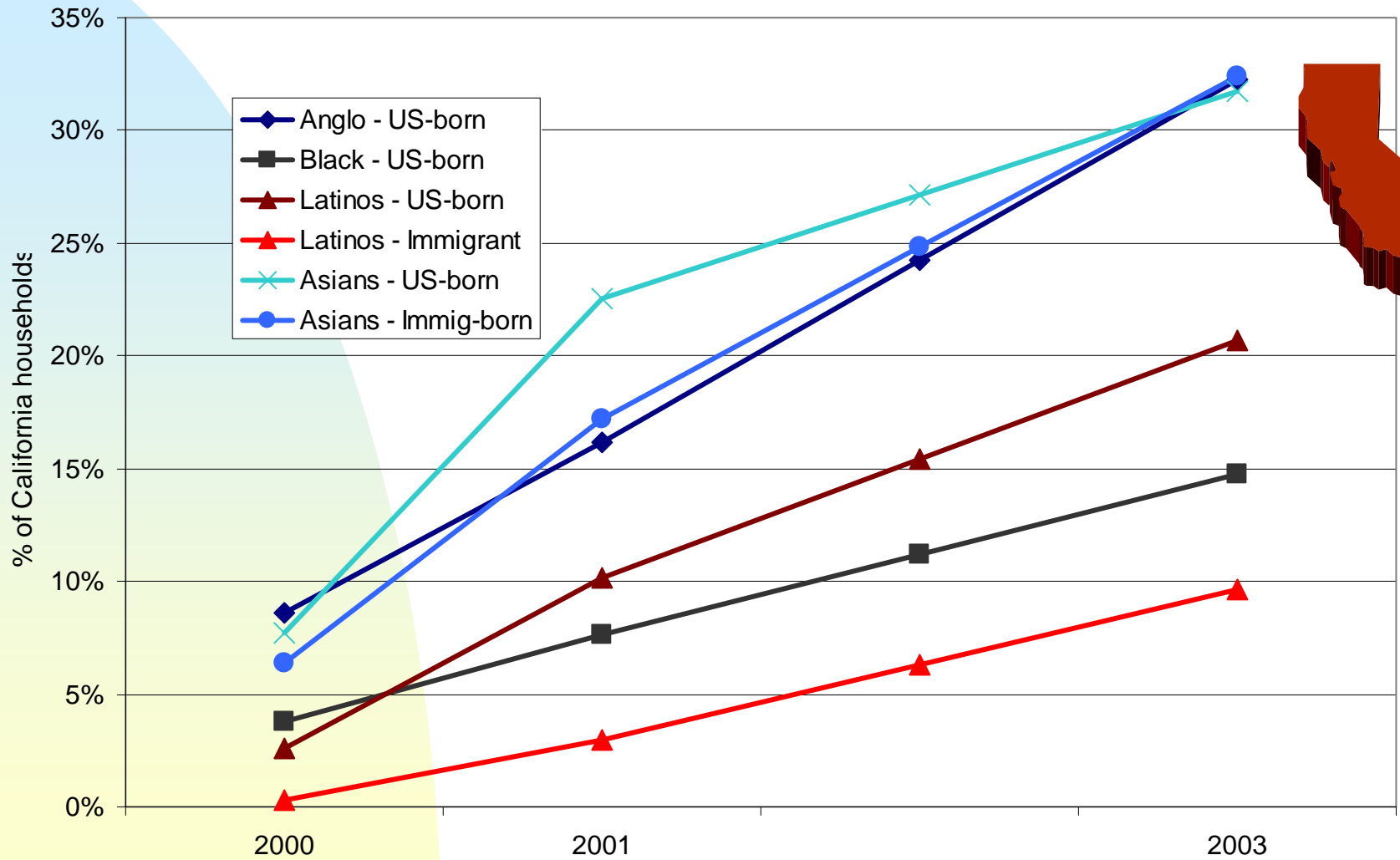
# Percent of California Households with Computers and Internet Connections, 1998-2003



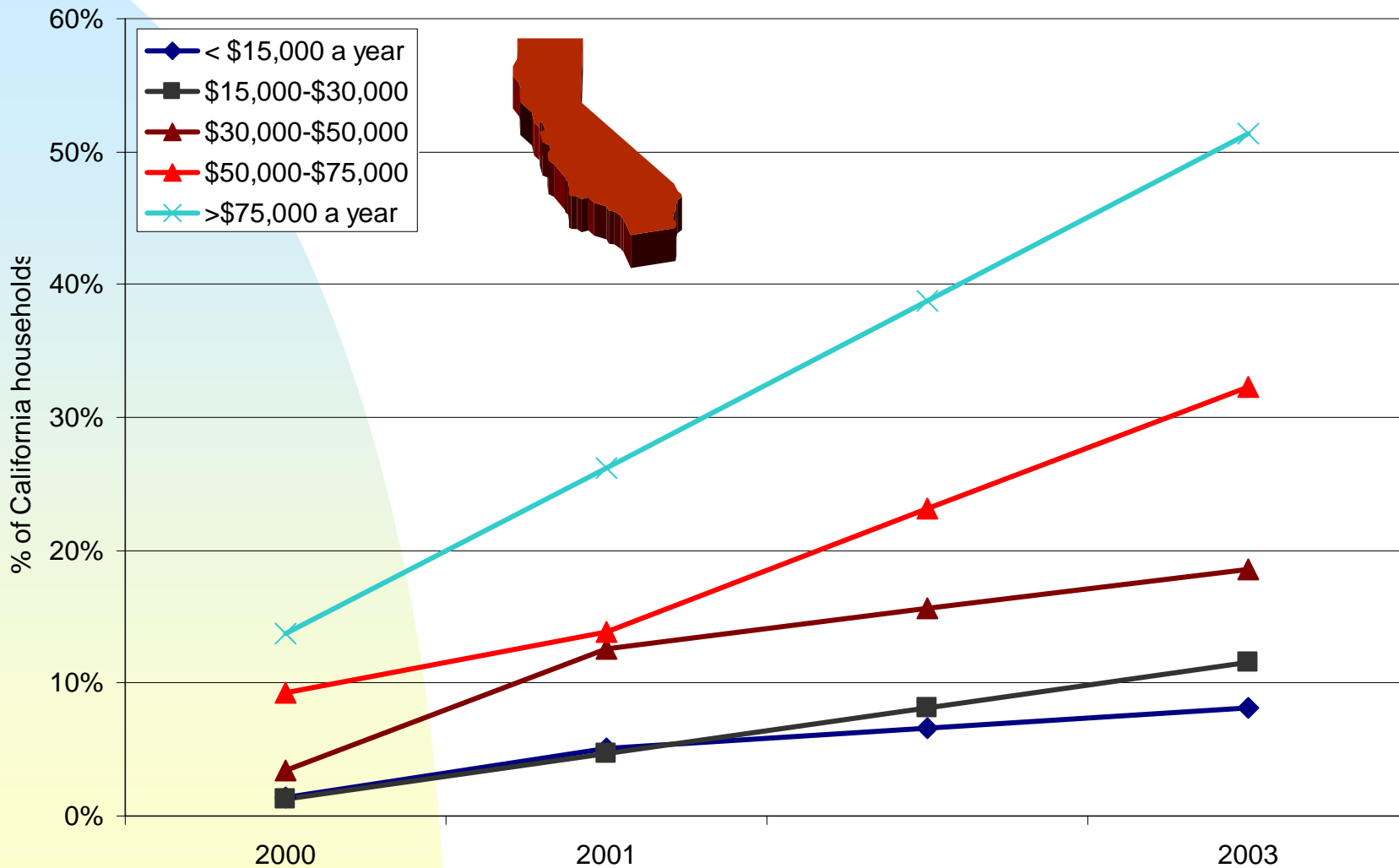
# Percent of California Households with Broadband Access, 2000-2003



# Percent of California Households with Broadband, 1998-2003



# Percent of California Households with Broadband, 2000-2003



# California Home Broadband by Ethnicity and Income

