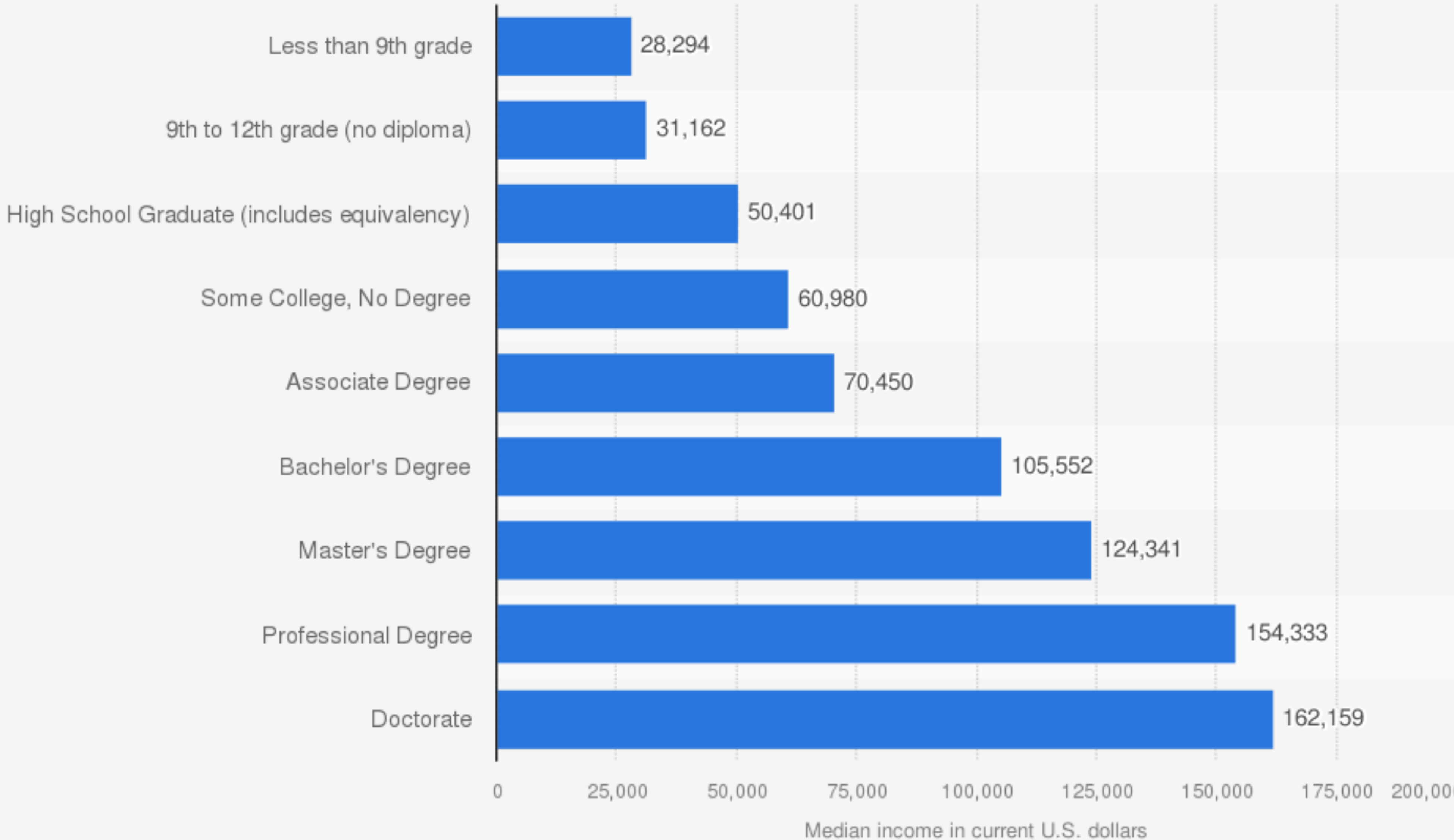
U.S. median household income 2021, by education level

Less than 9th grade	$28,294
9th to 12th grade (no diploma)	$31,162
High School Graduate	$50,401
Some College, No Degree	$60,980
Associate Degree	$70,450
Bachelor's Degree	$105,552
Master's Degree	$124,341
Professional Degree	$154,333
Doctorate	$162,159

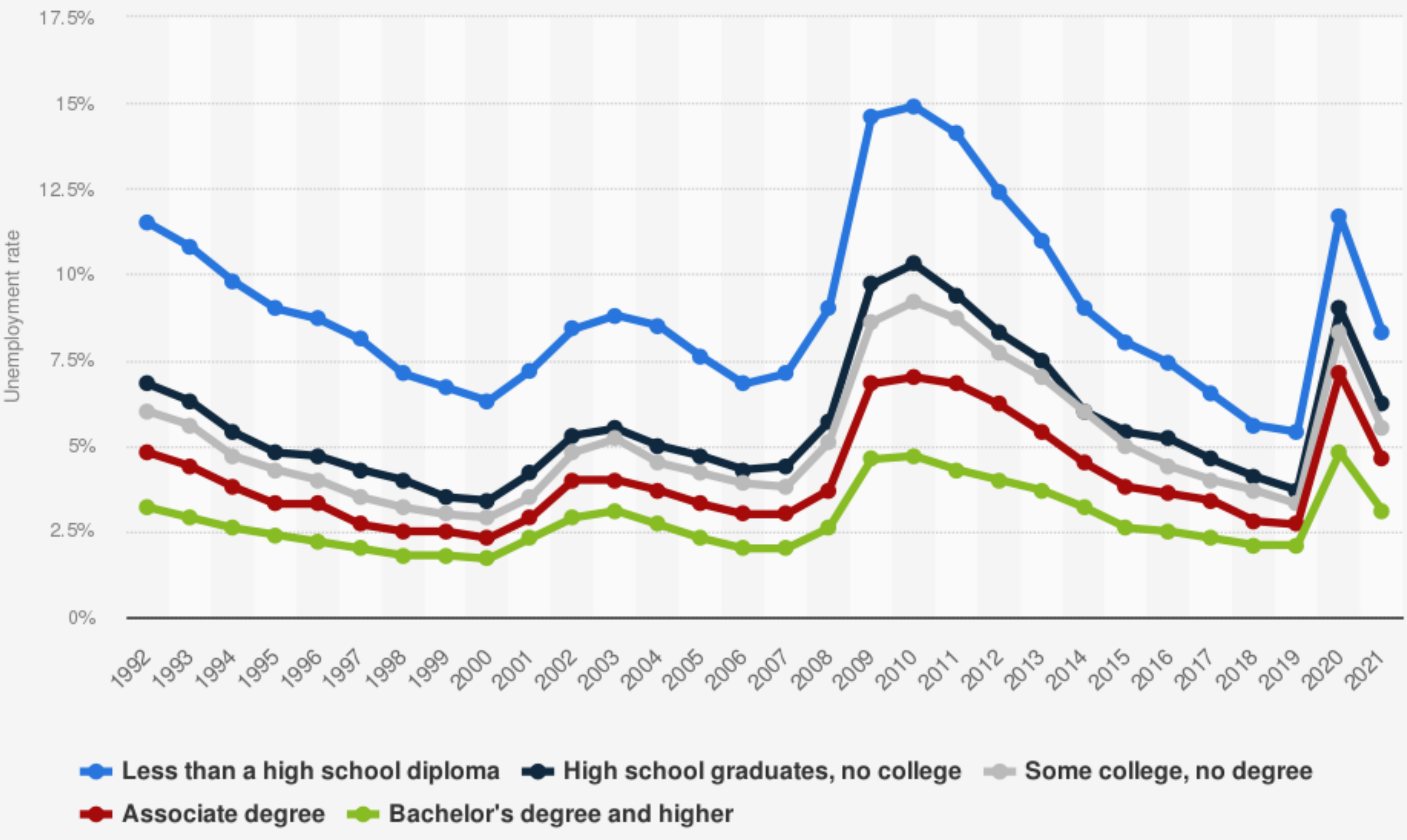
Median household income in the United States in 2021, by educational attainment of householder (in U.S. dollars)



Source
US Census Bureau

Additional Information:
United States; US Census Bureau; 2021

Unemployment rate in the United States from 1992-2021, by level of education



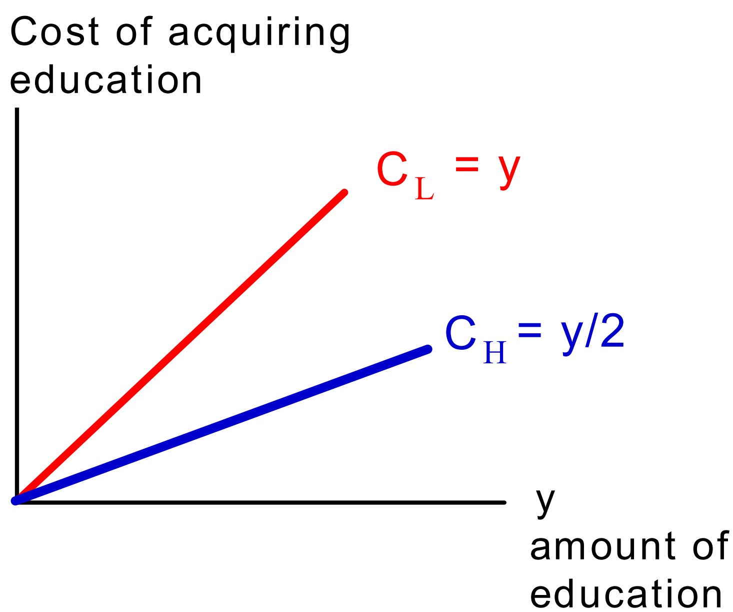
Source
Bureau of Labor Statistics

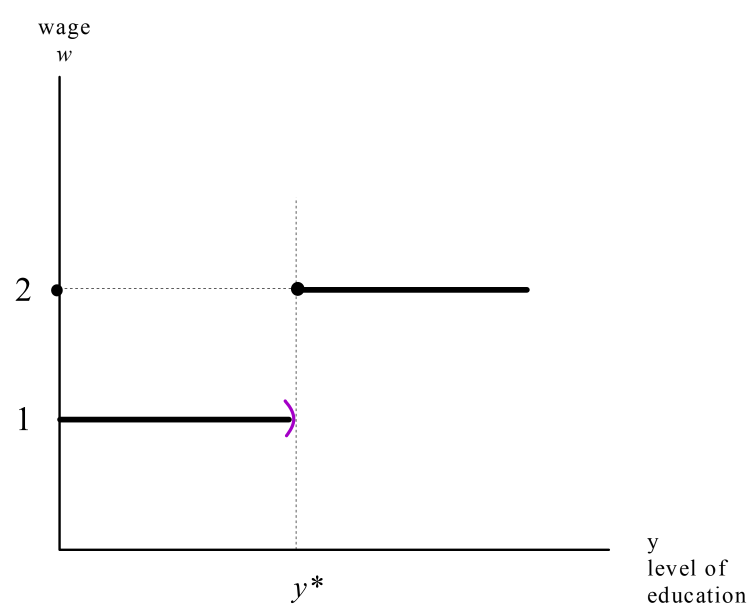
Additional Information:
United States; 1992 to 2021; 25 years and older

Suppose that there are two groups of individuals:

Group L	Group H
Marginal productivity = **1**	Marginal productivity = **2**
Proportion in population: q_L	Proportion in population: $1-q_L$

with $0 < q_L < 1$.





Employers' wrong beliefs

$C_L(y) = y$

For a GROUP L individual

If choose $y = 0$

get $w =$ 1

pay C = 0

net wage = $1 - 0 = 1$

If choose $y = y^*$

get $w =$ 2

pay C = y^*

net wage = $2 - y^*$

$C_H(y) = \frac{y}{2}$

For a GROUP H individual

If choose $y = 0$

get $w =$ 1

pay C = 0

net wage = $1 - 0 = 1$

If choose $y = y^*$

get $w =$ 2

pay C = $\frac{y^*}{2}$

net wage = $2 - \frac{y^*}{2}$

Want L types to choose $y=0$: $1 > 2 - y^*$ $\quad y^* > 1$

Want H types to choose $y = y^*$: $2 - \frac{y^*}{2} > 1$

$4 - y^* > 2$ $\quad y^* < 2$

if $1 < y^* < 2$ then L choose $y=0$ paid 1 (= true prod.)

H " $y = y^*$ " 2 (=)

Before (assuming $1 < y^* < 2$) $<$ L $y=0$ net wage $= 1$; H $y = y^*$ net wage $= 2 - \frac{y^*}{2}$

Can a signaling equilibrium be Pareto inefficient?

On average employers were paying

$q_L \cdot 1 + (1-q_L)2$ per employee

Government closes down all schools, instructs employers to pay $q_L + (1-q_L)2$ to everybody

L people "choose" $y=0$.

net wage: $q_L + (1-q_L)2 = 2 - q_L > 1$ since $q_L < 1$

L people are better off

H people "choose" $y=0$, net wage is

$$2 - q_L$$

They are better off if $\cancel{2} - q_L > \cancel{2} - \frac{y^*}{2}$

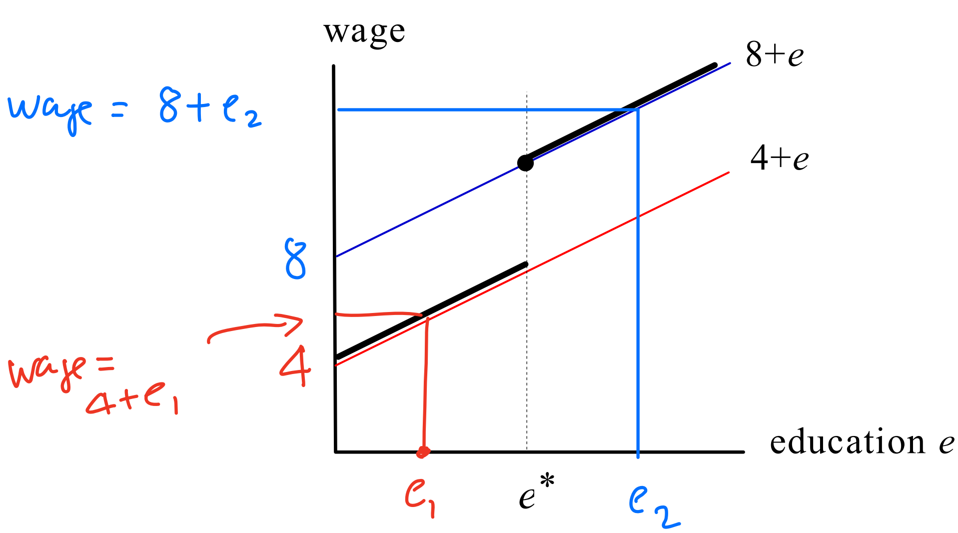
$$\frac{y^*}{2} > q_L$$

Example: $y^* = 1.5$ $\quad q_L = 0.5$ $\quad \frac{y^*}{2} = \frac{1.5}{2} =$

0.75

Example of a signaling equilibrium when education does increase productivity

Type *L*: $\begin{cases} \text{productivity: } 4+e \\ \text{cost: } C_L(e) = 4e \end{cases}$ and **Type *H*:** $\begin{cases} \text{productivity: } 8+e \\ \text{cost: } C_H(e) = 2e \end{cases}$



For a signaling equilibrium we need:

for Type L:
- if $< e^*$ then $e = 0$ net $= 4 - 0 = 4$
- if $\geq e^*$ then $e = e^*$ net $= 8 + e^* - 4e^*$

for Type H:
- $e = 0$ 4
- $e = e^*$ net $8 + e^* - 2e^*$