

Menstrual Product Insecurity Resulting From COVID-19–Related Income Loss, United States, 2020

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Objectives. To identify key effects of the pandemic and its economic consequences on menstrual product insecurity with implications for public health practice and policy.

Methods. Study participants (n = 1496) were a subset of individuals enrolled in a national (US) prospective cohort study. Three survey waves were included (March–October 2020). Menstrual product insecurity outcomes were explored with bivariate associations and logistic regression models to examine the associations between outcomes and income loss.

Results. Income loss was associated with most aspects of menstrual product insecurity (adjusted odds ratios from 1.34 to 3.64). The odds of not being able to afford products for those who experienced income loss was 3.64 times (95% confidence interval [CI] = 2.14, 6.19) that of those who had no income loss and 3.95 times (95% CI = 1.78, 8.79) the odds for lower-income participants compared with higher-income participants.

Conclusions. Pandemic-related income loss was a strong predictor of menstrual product insecurity, particularly for populations with lower income and educational attainment.

Public Health Implications. Provision of free or subsidized menstrual products is needed by vulnerable populations and those most impacted by pandemic-related income loss. (*Am J Public Health.* 2022;112(4):675–684. <https://doi.org/10.2105/AJPH.2021.306674>)

By March 23, 2021, the United States had experienced approximately 29.9 million COVID-19 cases and 544 131 deaths.¹ The negative impacts of COVID-19 across the United States range from illness to significant economic impact. Unemployment has grown substantially; millions lack access to basic goods and services, such as health care, food, and housing.^{2,3} The pandemic has had gendered implications, including women's increased vulnerability to the social and economic repercussions of lockdowns and expanded caretaking roles.⁴ A key

aspect of the gendered experience of COVID-19 has remained inadequately explored—that of how the pandemic affected the experience of managing menstruation, including access to menstrual products.

Recently, there has been growing attention globally to “period poverty” or the inability to afford menstrual products as needed.^{5,6} Although minimal evidence exists across the United States, it is likely that more people struggle to afford menstrual products than is documented.^{6–8} During the pandemic, US women's economic security

has significantly decreased, with women more likely to have become unemployed than men.⁹ Food bank dependence increased significantly, with some organizations reporting a 60% increase in users,^{10,11} and there has been an increased reliance on support services for other essential necessities.¹² Menstrual products are not included within most US public assistance programs and cannot be purchased under the Supplemental Nutrition Assistance Program or the Special Supplemental Nutrition Program for Women, Infants, and Children.

However, in March 2020, with the passage of the Coronavirus Aid, Relief, and Economic Security Act, the US government classified menstrual products as medical expenses, enabling the use of flexible spending accounts or health savings accounts and health reimbursement arrangements to purchase products.¹³ While this indicates progress, only certain segments of the population will benefit, as it still requires knowing that funds can be used for menstrual products and having the funds to purchase them.

Those who menstruate may have faced noneconomic COVID-19–related barriers to accessing menstrual products, including being unable to leave home because of underlying health conditions, transportation challenges, or an inability to purchase online because of lack of Internet access or credit. An added barrier was the depleted stocks because of shortages.¹⁴ Menstruation also continues to be perceived as something to be kept hidden, and a matter of personal, not societal, responsibility.¹⁵ People may thus feel embarrassed or ashamed seeking products from free sources, like foodbanks,^{6,16} or may be suffering from menstrual leaks because of inadequate access to products. Challenges may be greater for those newly menstruating who may lack access to peer groups as sources of menstrual products given the shift to virtual learning.¹⁷ Understanding if the pandemic has contributed negative experiences in managing menstruation is essential to devise appropriate policy and social support solutions.¹⁸

We identified key effects of the pandemic and its economic consequences on the ability to manage menstruation and explored what characteristics increase risk of menstrual product

insecurity, both having implications for public health practice and policy.

METHODS

Study participants were a subset of individuals enrolled in the Communities, Households, and SARS-CoV-2 Epidemiology (CHASING COVID) Cohort Study. CHASING COVID is a national prospective cohort study of 6753 adults launched on March 28, 2020, to understand the spread and impact of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, detailed in a previous publication.¹⁹ Study visits (completion of online questionnaires) occur every 1 to 3 months and will continue through December 2021. Eligibility was determined during cohort screening enrollment. To be eligible for inclusion in the cohort, individuals had to (1) reside in the United States or a US territory, (2) be aged 18 years or older, (3) provide a valid e-mail address, and (4) demonstrate early engagement in longitudinal study activities. Study participants were recruited via advertisements in both English and Spanish on social media platforms (e.g., Facebook, Instagram, and Scruff), Qualtrics Panel, or via referral to the study (anyone with knowledge of the study was allowed to invite others). Study staff systematically monitored cohort demographics and proactively adjusted advertisement strategies to balance geographic and sociodemographic characteristics of respondents. Data were collected by using Qualtrics (Qualtrics, Provo, UT).

For inclusion in this analysis, participants (1) could not be currently pregnant and (2) answered “yes” to the question “Since March 2020, have you menstruated?”

Variable Definitions

Menstrual product insecurity outcomes.

All menstruation-related variables were from the third wave of surveys (completed by 75% of the CHASING COVID cohort participants), executed between October 15 and November 19, 2020. The questions were asked of all female, nonbinary, or transgender male participants who were not currently pregnant and had menstruated since March 2020 (a total of 1496 participants). Six outcome variables were designed to understand the impact of the COVID-19 pandemic on challenges around managing menstruation and specific causes of difficulties related to acquiring menstrual products, including affordability and accessibility. Additional variables sought to capture coping mechanisms if participants were unable to afford or access products. Lastly, we sought to explore the emotional impact of not being able to access or afford products by exploring levels of stress around managing menstruation.

We assessed “change in menstrual management” with “Since March 2020, you have not experienced change related to your sanitary product.” In models, coding was reversed so that “yes” indicated that there were changes (i.e., the participant’s menstrual management was affected), and “no” indicated that there were no changes. This variable is designed to capture overall impact. We assessed “not affordable” with “Since March 2020, I have not been able to buy the sanitary product I normally use because I could not afford it.” We assessed “not available” with “Since March 2020, I have not been able to buy the sanitary product I normally use because it was not available in the store.” We assessed “change

products less often” with “Since March 2020, I have to change my used sanitary product less often to make each one last longer.” We assessed “use makeshift materials” with “Since March 2020, I have had to use makeshift materials because I ran out of my sanitary product.” We assessed “increased stress” with “Compared to before the pandemic, getting my sanitary product is more stressful.”

Exposure variable. The exposure variable of interest captures personal loss of income during the COVID-19 pandemic. This was collected at waves 1, 2, and 3. If the participant answered “yes” at any wave, “loss of income” was coded as “yes” (i.e., any reported loss of income during the pandemic). The “loss of income” question was “Have you experienced a personal loss of income in the past month as a result of the new coronavirus?”

Individual-level factors. The following basic demographics were collected: age, gender, race/ethnicity, educational attainment, employment, and annual income at baseline. We assessed “food insecurity” with “In the past month, the food that we bought just didn’t last, and we didn’t have money to get more.” Participants chose 1 of 3 responses (1 = never true; 2 = sometimes true; 3 = always true). The highest value reported at any wave was retained. We assessed “housing insecurity” with the question “In the past month, how often would you say you were worried or stressed about having enough money to pay your rent/mortgage?” Participants chose 1 of 5 possible responses (from 1 = never to 5 = always). The highest-value response at any wave was retained.

Contextual factors. We assigned Zip Code Tabulation Area–level “locale” (city, suburb or town, or rural) based on the participant’s home zip code, which was obtained from the Education Demographic and Geographic Estimates Program.²⁰ To assess (1) COVID-19 death rate and (2) SARS-CoV-2 case rate, we used county- or county-equivalent–level cumulative COVID-19 death and SARS-CoV-2 case rates per 100 000 residents on the day the participant began the survey to quantify COVID-19 burden in each participant’s county. We obtained case and death data from *New York Times* data repository.²¹ We used American Community Survey 2018 5-year estimates via the National Historic Geographic Information System as the denominators.²²

Statistical Analysis

We calculated descriptive statistics to assess the prevalence of menstrual product insecurity outcomes, income loss, and distribution of characteristics in our study sample. We compared demographic, economic, and contextual characteristics by the exposure and outcome variables of interest in bivariate analyses to screen for potential explanatory variables for subsequent multivariate analyses. We calculated crude odds ratios (ORs) and adjusted ORs (AORs) with 95% confidence intervals (95% CIs) in logistic models. We examined the associations between income loss and menstrual product insecurity outcomes, accounting for selected demographic, economic, and contextual factors, in adjusted logistic regression models. We selected control variables based on the findings from bivariate analyses as well as existing evidence of the impact of race/ethnicity, education, income, and geography on

period poverty.^{6–8} Gender identity was not included because of the relatively small number of transgender or nonbinary participants who menstruated during the study period ($n = 47$; 3.1%) as compared with female participants ($n = 1449$; 96.9%). We determined statistical significance at the P less than .05 level. We conducted all analyses by using R version 3.6.1.²³

RESULTS

Inclusion restrictions resulted in a study population of 1496 participants whose characteristics are shown in [Table 1](#). All age groups were represented, with the plurality falling between 25 and 34 years (36%). There was variation in locale, with 42% living in cities, 26% in suburbs or towns, and 32% in rural areas. The majority of participants were employed at baseline (62%), had a college degree (58%), and were non-Hispanic White (55%). Vulnerable or marginalized groups were also well represented with nearly one third (31%) having a baseline income below \$35 000, 15% having a high-school education or less, and 20% identifying as Hispanic/Latinx. Nearly half the participants (49%) reported income loss at least once. Housing and food insecurity were also highly prevalent, with 33% reporting housing insecurity “usually” or “often” and 35% reporting food insecurity “sometimes” or “often” at least once.

Income Loss

Participants’ characteristics stratified by income loss can be seen in [Table 2](#). Income loss was associated with those who were younger (aged 18–24 years; $P = .033$), those who were out of work at baseline, those who earned less than \$35 000 per year, those who had lower

TABLE 1— Study Sample Characteristics: CHASING COVID Cohort Study, United States, March–October 2020 (n = 1496)

Characteristic	No. (%) or Mean \pm SD	Missing
Age group, y		1
18–24	315 (21.1)	
25–34	540 (36.1)	
35–44	438 (29.3)	
\geq 45	202 (13.5)	
Employment		0
Employed	922 (61.6)	
Homemaker	162 (10.8)	
Out of work	178 (11.9)	
Student	234 (15.6)	
Income, \$		66
< 35 000	445 (31.1)	
35 000–49 999	163 (11.4)	
50 000–99 999	446 (31.2)	
\geq 100 000	376 (26.3)	
Education		0
High school or less	219 (14.6)	
Some college	410 (27.4)	
College	867 (58.0)	
Race/ethnicity		5
Non-Hispanic White	814 (54.6)	
Asian/Pacific Islander	174 (11.7)	
Non-Hispanic Black	147 (9.9)	
Hispanic	300 (20.1)	
Other	56 (3.8)	
Income loss		17
No	762 (51.5)	
Yes	717 (48.5)	
COVID-19–related housing anxiety		0
Never	313 (20.9)	
Rarely	295 (19.7)	
Sometimes	401 (26.8)	
Usually	201 (13.4)	
Always	286 (19.1)	
COVID-19–related food anxiety		0
Never	980 (65.5)	
Sometimes	313 (20.9)	
Often	203 (13.6)	
Locale		11
Rural	471 (31.7)	
Suburb or town	385 (25.9)	
City	629 (42.4)	
Cumulative case rate per 100 000 residents	2532 \pm 1047	11
Cumulative death rate per 100 000 residents	86.20 \pm 81.11	11

educational attainment, those who were non-Hispanic Black or Hispanic/Latinx, and those with either food or housing insecurity (all $P < .001$). Locale (city, suburb or town, or rural) and cumulative death and case rates were not associated with income loss.

Menstrual Product Insecurity Outcomes

When we compared the 6 outcome variables with the other factors, certain trends could be identified (Tables A–F, available as supplements to the online version of this article at <http://www.ajph.org>). Income loss, the exposure of interest, was associated with all of the menstrual product insecurity outcomes other than “not available.” Similarly, lower income and educational attainment at baseline were both consistently associated with all of the outcomes other than “not available.” All outcomes were associated with housing and food insecurity—those who had more menstrual product insecurity also suffered from higher insecurities around other basic needs.

Other factors were not as consistently associated with menstrual product insecurity outcomes as those listed previously. Employment was only correlated with “not affordable,” “change products less often,” and “use makeshift materials,” where the participants who were out of work tended to have the most challenges. Identifying as Hispanic/Latinx was associated with “change in menstrual management,” “not affordable,” and “change products less often,” whereas those who identified as non-Hispanic Black were associated with “not affordable,” and participants who did not fall in predefined racial/ethnic category were associated with both “not affordable” and “change products less often.”

TABLE 2— Distribution of Selected Participant Characteristics by Income Loss: CHASING COVID Cohort Study, United States, March–October 2020

Characteristic	Had Income Loss (n = 717), No. (%) or Mean ±SD	No Income Loss (n = 762), No. (%) or Mean ±SD	P
Age group, y			.033
18–24	167 (23.3)	139 (18.3)	
25–34	249 (34.7)	289 (38.0)	
35–44	216 (30.1)	218 (28.6)	
≥ 45	85 (11.9)	115 (15.1)	
Missing	0	1	
Employment status			<.001
Employed	405 (56.5)	515 (67.6)	
Homemaker	68 (9.5)	92 (12.1)	
Out of work	129 (18.0)	44 (5.8)	
Student	115 (16.0)	111 (14.6)	
Missing	0	0	
Income, \$			<.001
< 35 000	286 (41.8)	149 (20.4)	
35 000–49 999	86 (12.6)	76 (10.4)	
50 000–99 999	189 (27.6)	256 (35.0)	
≥ 100 000	123 (18.0)	250 (34.2)	
Missing	33	31	
Education			<.001
High school or less	142 (19.8)	72 (9.4)	
Some college	223 (31.1)	180 (23.6)	
College	352 (49.1)	510 (66.9)	
Missing	0	0	
Race/ethnicity			<.001
Non-Hispanic White	366 (51.3)	442 (58.2)	
Asian/Pacific Islander	70 (9.8)	100 (13.2)	
Non-Hispanic Black	76 (10.6)	70 (9.2)	
Hispanic	167 (23.4)	127 (16.7)	
Other	35 (4.9)	21 (2.8)	
Missing	3	2	
COVID-19–related housing anxiety			<.001
Never	58 (8.1)	252 (33.1)	
Rarely	90 (12.6)	201 (26.4)	
Sometimes	195 (27.2)	201 (26.4)	
Usually	134 (18.7)	64 (8.4)	
Always	240 (33.5)	44 (5.8)	
Missing	0	0	
COVID-19–related food anxiety			<.001
Never	359 (50.1)	609 (79.9)	
Sometimes	193 (26.9)	116 (15.2)	
Often	165 (23.0)	37 (4.9)	
Missing	0	0	

Continued

Living in rural zip codes was associated with both “changes in menstrual management” and “not affordable,” and SARS-CoV-2 case rates were not associated with any outcomes. Counterintuitively, COVID-19 death rates were inversely associated with 3 of the outcomes (“not affordable,” “not available,” and “use makeshift materials”).

Models

Unadjusted logistic regression models show the crude associations between the menstrual product insecurity outcome variables and income loss (Table 3). All outcome variables, other than “not available,” were significantly associated with the exposure. Participants who suffered economic loss had more than 5 times the odds of not being able to afford menstrual products (OR = 5.26; 95% CI = 3.20, 8.64) compared with those who did not experience income loss. They had 3.5 times the odds of using makeshift materials to manage menstruation (OR = 3.51; 95% CI = 2.07, 5.94), more than 3 times the odds of changing menstrual products less often (OR = 3.43; 95% CI = 2.00, 5.91), and more than 2 times the odds of experiencing increased stress when acquiring products (OR = 2.45; 95% CI = 1.83, 3.28) and to have experienced a general change in menstrual management (OR = 2.44; 95% CI = 1.93, 3.09) when compared with those who did not experience income loss. Participants who experienced income loss had increased odds of experiencing a lack of availability of menstrual products, but this was not statistically significant (OR = 1.38; 95% CI = 0.97, 1.96).

Based on the findings from bivariate analyses, adjusted models did not

TABLE 2— Continued

Characteristic	Had Income Loss (n = 717), No. (%) or Mean ±SD	No Income Loss (n = 762), No. (%) or Mean ±SD	P
Locale			.62
Rural	223 (31.3)	242 (32.0)	
Suburb or town	193 (27.1)	188 (24.9)	
City	296 (41.6)	326 (43.1)	
Missing	5	6	
Cumulative case rate per 100 000 residents	2570 ±1041	2510 ±1046	.27
Missing	5	6	
Cumulative death rate per 100 000 residents	86.62 ±81.16	86.61 ±81.26	.99
Missing	5	6	

include type of employment or SARS-CoV-2 case rate variables because of lack of association or duplication of included variables. Housing and food insecurity were also not included as they were viewed as “outcomes” of financial loss or hardship, similar to menstrual product insecurity. When models were adjusted for individual (i.e., age, race/ethnicity, education, income at baseline) and contextual-level factors (i.e., locale, cumulative COVID-19 death rate), the associations between income loss and menstrual product security outcomes were attenuated but remained significant for all models other than product availability (AOR = 1.34; 95% CI = 0.92, 1.96; [Table 3](#); [Figure 1](#)). Generalized variance inflation factors, a collinearity diagnostic designed to accommodate categorical variables, were less than 2.0 in all models, suggesting that there was not excessive collinearity among the independent variables.

Participants who experienced income loss, compared with those without income loss, had more than 3.5 times the odds of being unable to afford menstrual products (AOR = 3.64; 95% CI = 2.14, 6.19), nearly 3 times the

odds of changing products less often or using makeshift materials to manage menstruation (AOR = 2.88; 95% CI = 1.61, 5.15 and AOR = 2.58; 95% CI = 1.47, 4.53, respectively), and more than 2 times the odds of experiencing more stress when acquiring products and experiencing overall changes in menstrual management (AOR = 2.2; 95% CI = 1.66, 2.77 and AOR = 2.14; 95% CI = 1.61, 3.02, respectively). Having lower income at baseline (e.g., < \$35 000) compared with those who made more than \$100 000 also showed significant associations in all of the adjusted models other than changing products less often and increased stress when acquiring products. The strength of association was greatest with participants’ inability to afford products (AOR = 3.95; 95% CI = 1.78, 8.79).

Lower educational attainment (e.g., high school or less) also showed significant associations in adjusted models when compared with those with college degrees for all outcomes other than product availability, and again the strongest association was with product affordability (AOR = 2.72; 95% CI = 1.48, 5.00).

The only racial/ethnic characteristics that maintained significance in adjusted models were participants who identified as Hispanic/Latinx, who had more than 2 times the odds of changing products less often (AOR = 2.01; 95% CI = 1.09, 3.69) when compared with non-Hispanic White participants. The only locale category that showed significance in the models was those living in rural areas, who had higher odds of not being able to afford products (AOR = 1.79; 95% CI = 1.05, 3.03) when compared with those living in cities, and those living in areas with higher COVID-19 cumulative death rates having fewer issues with product availability (AOR = 1.00; 95% CI = 0.99, 1.00).

DISCUSSION

This study’s key finding was that income loss was a strong predictor of menstrual product insecurity. Half of the study population reported economic loss during the pandemic, most of whom also reported having lower income and educational attainment at baseline. Among the outcomes reported, the odds of not being able to afford products were higher among participants with pandemic-related income loss and for lower-income participants. We use “menstrual products” in reference to the questionnaire items regarding “sanitary products” given the evolving terminology.

Some of the reported menstrual product insecurity outcomes measured individual mitigation strategies, such as changing menstrual products less often or using makeshift materials. Both approaches have important health and social implications. An inability to change as needed or to use products that are sufficiently absorbent may lead to vaginal irritation or anxiety and stress around

TABLE 3— Associations Between Income Loss and Menstrual Product Security Outcomes: CHASING COVID Cohort Study, United States, March–October 2020

	Change in Menstrual Management	Not Affordable	Not Available	Change Products Less Often	Use Makeshift Materials	Increased Stress
Crude OR (95% CI)						
(Intercept)	0.23 (0.19, 0.28)	0.03 (0.02, 0.04)	0.09 (0.07, 0.11)	0.02 (0.02, 0.04)	0.03 (0.02, 0.04)	0.12 (0.09, 0.15)
Income loss ever						
No (Ref)	1	1	1	1	1	1
Yes	2.44 (1.93, 3.09)	5.26 (3.20, 8.64)	1.38 (0.97, 1.96)	3.43 (2.00, 5.91)	3.51 (2.07, 5.94)	2.45 (1.83, 3.28)
AOR (95% CI)						
(Intercept)	0.17 (0.09, 0.32)	0.01 (0.00, 0.02)	0.1 (0.04, 0.25)	0.04 (0.01, 0.15)	0.02 (0.01, 0.09)	0.16 (0.08, 0.35)
Income loss ever						
No (Ref)	1	1	1	1	1	1
Yes	2.14 (1.66, 2.77)	3.64 (2.14, 6.19)	1.34 (0.92, 1.96)	2.88 (1.61, 5.15)	2.58 (1.47, 4.53)	2.20 (1.61, 3.02)
Income, \$						
< 35 000	1.87 (1.30, 2.71)	3.95 (1.78, 8.79)	1.94 (1.09, 3.47)	0.60 (0.28, 1.28)	2.57 (1.11, 5.93)	0.95 (0.62, 1.44)
35 000–49 999	1.46 (0.93, 2.29)	1.44 (0.51, 4.04)	2.33 (1.21, 4.49)	0.90 (0.37, 2.18)	1.42 (0.49, 4.12)	1.10 (0.66, 1.82)
50 000–99 999	1.09 (0.76, 1.55)	1.32 (0.55, 3.18)	1.51 (0.87, 2.62)	0.79 (0.38, 1.65)	1.43 (0.60, 3.41)	0.50 (0.33, 0.77)
≥ 100 000 (Ref)	1	1	1	1	1	1
Age	1.00 (0.99, 1.02)	1.01 (0.98, 1.03)	1.00 (0.97, 1.02)	0.98 (0.95, 1.01)	0.99 (0.97, 1.02)	0.99 (0.98, 1.01)
Education						
High school or less	1.52 (1.05, 2.22)	2.72 (1.48, 5.00)	0.86 (0.49, 1.51)	2.54 (1.18, 5.48)	1.97 (1.00, 3.88)	1.74 (1.12, 2.71)
Some college	1.13 (0.83, 1.54)	2.41 (1.38, 4.19)	0.74 (0.47, 1.18)	2.85 (1.52, 5.35)	1.60 (0.87, 2.94)	1.28 (0.88, 1.85)
College (Ref)	1	1	1	1	1	1
Race/ethnicity						
Non-Hispanic White (Ref)	1	1	1	1	1	1
Asian/Pacific Islander	0.74 (0.47, 1.16)	0.56 (0.21, 1.51)	0.45 (0.20, 1.01)	1.18 (0.46, 3.01)	0.42 (0.12, 1.40)	1.22 (0.76, 1.96)
Non-Hispanic Black	0.76 (0.49, 1.19)	0.97 (0.49, 1.91)	0.64 (0.32, 1.31)	0.78 (0.29, 2.15)	0.58 (0.23, 1.46)	0.57 (0.32, 1.02)
Hispanic	1.26 (0.92, 1.73)	0.94 (0.54, 1.64)	1.05 (0.66, 1.67)	2.01 (1.09, 3.69)	1.16 (0.64, 2.09)	0.93 (0.63, 1.38)
Other	1.35 (0.74, 2.48)	1.59 (0.69, 3.69)	1.40 (0.62, 3.15)	2.11 (0.74, 5.99)	0.94 (0.31, 2.83)	0.98 (0.46, 2.06)
Locale						
City (Ref)	1	1	1	1	1	1
Suburb or town	0.88 (0.63, 1.21)	1.20 (0.65, 2.19)	0.99 (0.61, 1.59)	0.91 (0.47, 1.77)	0.80 (0.41, 1.59)	1.02 (0.70, 1.48)
Rural	1.13 (0.83, 1.55)	1.79 (1.05, 3.03)	1.07 (0.68, 1.68)	1.09 (0.58, 2.04)	1.12 (0.63, 2.00)	0.95 (0.65, 1.39)
Cumulative death rate	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	1.00 (0.99, 1.00)	1.00 (0.99, 1.00)	1.00 (0.99, 1.00)	1.00 (1.00, 1.00)

Note. AOR = adjusted odds ratio; CI = confidence interval; OR = odds ratio. Crude models: n = 1479; adjusted models: n = 1402. Additional descriptive statistics provided in tables available as supplements to the online version of this article at <http://www.ajph.org>.

potential odors or menstrual leaks onto clothing.^{24–29} This in turn may impact the ability to go about activities of daily living, ranging from household chores to employment or caregiving.²⁶ There may also be social implications, including a loss of dignity or

confidence.⁸ Study findings suggested that the need for individual mitigation strategies was not only associated with COVID-19–related income loss but changing products less often was also associated with lower educational attainment and being Hispanic, while

resorting to makeshift materials was associated with lower income and educational attainment.

The availability of menstrual products was not found to be associated with income loss, but may be linked to broader structural issues rather than

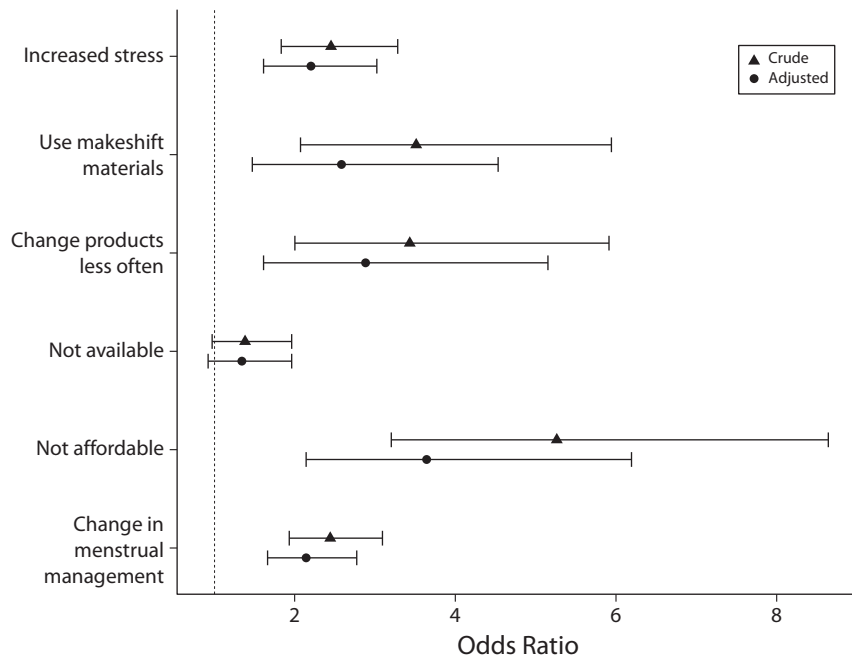


FIGURE 1— Associations Between Income Loss and Menstrual Product Security Outcomes: CHASING COVID Cohort Study, United States, March–October 2020

Note. Whiskers indicate 95% confidence intervals. Values are provided in Table 3.

associated with COVID-19 (e.g., lower-income participants tended to live in areas with less product availability). However, to fully study this relationship, a different project design may be in order; this may similarly explain the significant negative association with higher COVID-19 death rates. There did not appear to be any age-specific effect in relation to menstrual product insecurity during the pandemic, with age-related associations disappearing when we controlled for other characteristics.

The outcomes identified in relation to menstrual product insecurity during the pandemic were closely associated with housing and food insecurity. Although limited evidence on period poverty exists in the United States, a prepandemic survey conducted in 2019 of 183 low-income women in St Louis, Missouri, found that nearly 64%

were unable to afford needed menstrual products in the previous year.⁸ More recently, a survey conducted with 58 female students in St Louis found that nearly half were unable to afford needed menstrual products at least once in the last school year.⁷ Similar challenges have been found among those experiencing homelessness in New York City and Seattle, Washington, who reported resorting to theft or going without food to obtain menstrual products.^{26,28} Although some food banks and other social service organizations do provide menstrual products, stock-outs and intermittent availability often hinder access.^{8,29}

Around the world, there are numerous reports of period poverty, exacerbated by the impacts of the COVID-19 pandemic.^{30,31} However, there have been few quantitative studies designed

to understand the effect and determine who is at greatest risk. Reports of the negative impact of period poverty spurred the government of Scotland to announce new legislation mandating period products be made available to all in need.³² However, insufficient data on the extent of US period poverty, and the ways in which COVID-19 has served to compound menstrual management challenges, have limited the development of appropriate legislation. This study's findings help inform this evidence gap.

The study findings also raise issues about the impact of menstrual product insecurity on people's physical and mental health and underscore the reality of gendered (and sex-based) burdens resulting from the COVID-19 pandemic. While such challenges may have an impact on everyone, those who experienced financial loss or had lower income tended to be the most affected. This suggests that health and social policy strategies are warranted, such as free or heavily subsidized menstrual products, along with more general economic interventions for those struggling with income loss. Of equal importance is raising awareness of the need for menstrual equity, ensuring that those who menstruate are able to manage their menstrual blood flow with dignity, ease, and comfort. This includes removing the remaining taxes on menstrual products in states across the United States³³ and ensuring that menstrual products are considered an essential item to be made available through social providers in times of emergency, both in the United States and globally.

Limitations

There are a number of limitations. First, the study used a panel with a

pre-existing sampling frame and broad-based sociodemographic and economic questions not specifically designed to examine issues associated with menstruation or menstrual product insecurity. However, the range of variables collected were sufficient to support this study. Second, only a limited number of menstruation questions were permitted, restricting our exploration to key themes. Third, there was a limited overall sample size constraining the depth of some of the analyses (e.g., few responses per cell). This also reflects our inability to report on menstrual product insecurity for transgender or nonbinary participants. Fourth, menstrual product insecurity questions were only asked at 1 wave of the larger cohort study, and, as such, lacked longitudinal information. Fifth, the use of self-reported responses, and potential cultural differences within the responses, may under- or overrepresent experiences. Lastly, our study recruited participants primarily online, thereby limiting the potential participation of and generalizability to those without Internet access via a smartphone or desktop computer. While our study is national in scope and sociodemographically diverse, it was not designed to provide representative estimates of seroprevalence and cumulative incidence in the US population.³⁴

There are multiple avenues to be explored in future research, including qualitative studies examining the context and if menstrual product availability can be better modeled and understood within the structural realities of peoples' lives, understanding the impact of menstrual product insecurity with and without housing and food anxiety on mental health, and, finally, examining the impact of mitigation strategies and policies, such

as providing menstrual products at food banks or making them freely available.

Conclusions

Our study demonstrates that income loss was a strong predictor of menstrual product insecurity during the pandemic across the United States thus far. Populations with lower incomes at baseline and with the lowest educational attainment were most vulnerable. Provision of free or subsidized menstrual products, which is not included in the US emergency response, is needed for such populations. **AJPH**

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CONTRIBUTORS

M. Sommer, P. A. Phillips-Howard, and A. R. Maroko conceptualized the study and led on the development of the questions and the writing. C. Gruer and M. L. Schmitt contributed to the conceptualization and drafting of content. A. Berry, S. Kochhar, S. G. Kulkarni, and D. Nash

contributed to the design and analysis of the data and supported the writing of the article. A.-M. Nguyen and A. R. Maroko led the formal analysis of the menstrual-specific data and supported the writing and reviewing of the article draft.

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CONFLICTS OF INTEREST

The authors report no conflicts of interest.

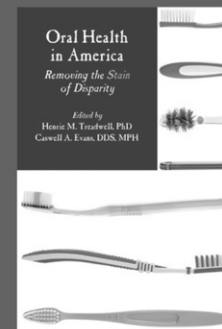
HUMAN PARTICIPANT PROTECTION

The study protocol was approved by the institutional review board at the CUNY Graduate School of Public Health and Health Policy.

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