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臺灣年輕女性經期健康與其經期貧窮：影響因素和衝擊

Menstrual Health and Period Poverty:

Related Factors and the Impact on Taiwanese Young Women

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Menstrual Health and Period Poverty: Related Factors and the Impact
on Young Taiwanese Women

本論文係羅立珊君（學號 R10853007）在國立臺灣大學全球衛生碩士學位學程完成之碩士學位論文，於民國 112 年 6 月 2 日承下列考試委員審查通過及口試及格，特此證明。

This Thesis is written by Alexandra Lombardo (R10853007) studying in the graduate program in the Global Health Program. The author of this thesis is qualified for a Master's degree through the verification of the committee.

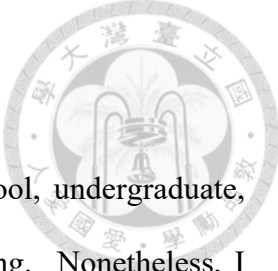
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I was pleased to discover that with every thesis I write (high school, undergraduate, Master's), the process becomes slightly easier and no less gratifying. Nonetheless, I would not consider myself an easy undertaking for my advisor, Dr. Ling-Yin Chang. Working on this project with her guidance has been the greatest learning experience of this program, bestowing me with hard skills to rival the innumerable soft skills gleaned from simultaneously trying to survive daily life as a foreign graduate student. From preparing a Research Ethics Committee application entirely in Chinese to hosting the With Red CEO as a guest speaker, I am grateful for the help of the College of Public Health research assistants, Joy and Betty. I am grateful to every Taiwanese person who was brave enough to befriend a foreigner and, in essence, become my life-abroad research assistant. These past two years have been marked by enormous personal growth, and for that I am indebted to my strong community of friends in Taipei and my family across the world. I hope I can use my powers for good.



摘要

背景

全球有數百萬人面臨經期健康不足的困擾。所謂的「經期健康」係指人在月經週期中達到完全健康的狀態。若月經者 (menstruator) 缺乏經期健康，則會對其身心健康、就業狀況、教育成果和社交造成危害。然而，在東亞地區，有關經期健康、其相關因素和影響的資訊相對缺乏。故本探索性研究欲填補此研究缺口，針對易因經期而在工作和學校出缺勤方面有所影響之年輕族群作探討。

方法

分析樣本為 121 名 15 至 21 歲，完成本研究所規劃之橫斷性網路調查者。所調查之影響因素包括個人因素 (如原住民身份、收入、地區和月經知識)、社會因素 (如汙名或自在討論月經的程度)，和物理因素 (如經期特徵或生理用品)。另外，本研究亦針對環境因素進行探討，以了解研究樣本對洗手間設施的看法。本研究將自覺經期健康和月經貧窮作為主要研究變項，並以出缺勤、生產力損失和社交脫節作為其影響結果。在分析方法方面，本研究使用 Stata 進行統計分析，以概述統計量 (summary statistics)、雙變項分析 (bivariate analysis) 與線性迴歸 (linear regression) 探討自覺經期健康、月經貧窮之相關因素與影響。

結果

本研究結果顯示，僅有 11.6% 的研究對象曾經歷月經貧窮。另外，年齡、居住地區和汙名，與經期健康有顯著相關。本研究亦發現，絕大多數的研究對象「相信月經是生活中正常且健康的一部分 (95.9%)」。在生理用品方面，多數研究樣

本使用衛生棉（97.5%），且曾經歷過月經副作用（99.2%）。最後，因月經引起的情緒失調和洗手間設施的品質，為經期健康的重要影響因素。



討論

本研究發現，臺灣的經期健康問題複雜且獨特，並對出缺勤、生產力損失及社交脫節有所影響。本研究結果不僅可作為未來相關介入和研究之參考，亦有助於改善月經汙名及經期健康不平等的情況，並能對經期管理提供幫助。

關鍵詞：

經期健康、青少年、年輕成年人、臺灣、月經貧窮、缺勤



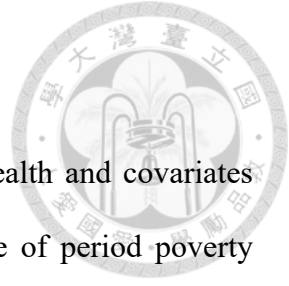
Abstract

Background

Globally, millions of girls, women, and others suffer from inadequate menstrual health. Menstrual health is the state of complete well-being in relation to one's menstrual cycle. When menstrual health is lacking, menstruators suffer from worse physical and psychological health, employment status, education outcomes, and social engagement. There is a paucity of information on menstrual health, related factors, and their impact in East Asia. This exploratory study fills this gap and focuses on youth, a group especially vulnerable to school and work absenteeism.

Methods

One hundred and twenty-one participants, aged 15 to 21 years, completed a cross-sectional electronic survey in Mandarin. Sampled characteristics included individual factors such as indigenous status, income, region, and menstrual knowledge. Additionally, social factors, like perceived stigma and comfort discussing menstruation, and physical factors, like menstrual characteristics and period product usage, were assessed. Furthermore, the study explored environmental factors by examining participants' perception of bathroom facilities. Perceived menstrual health and period poverty were investigated as key variables, and absenteeism, productivity loss, and social disengagement as other outcomes. All analysis was conducted using Stata. Summary statistics and the results of bivariate analysis and linear regressions were used to examine the associations between covariates, perceived menstrual health, period poverty, and other outcomes.



Results

The results showed meaningful relationships between menstrual health and covariates such as age, region of residence and stigma and a low prevalence of period poverty (11.6%). The belief that menstruation is a normal and healthy part of life (95.9%), menstrual pad usage (97.5%), and the presence of menstrual side-effects (99.2%) were all overwhelming. Emotional dysregulation of menstruation and quality of bathroom facilities were especially important in models predicting menstrual health and outcomes.

Discussion

In conclusion, menstrual health in Taiwan is complex and unique, with significant implications for absenteeism, productivity loss, and social disengagement. This study lends support for possible future interventions and research into countering specific menstrual stigmas, correcting regional disparities, and providing adequate menstruation management support.

Key Words

menstrual health, adolescents, youth, Taiwan, period poverty, absenteeism



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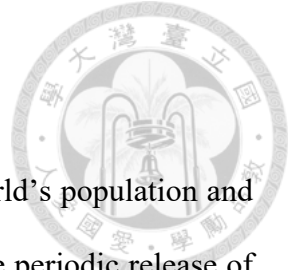
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Introduction

The biological process of menstruation occurs in nearly half the world's population and is necessary for the reproduction of our species. Menstruation is the periodic release of the endometrial layer of the uterus. Within global health, it has become increasingly apparent that this biological process is not experienced equally by all. Globally, millions of people suffer from inadequate menstrual health, which is the state of complete well-being in relation to one's menstrual cycle.^{1,2} When menstrual health is lacking, girls, women, and other menstruators suffer from worse physical and psychological health, employment status, education outcomes, and social engagement.³ While menstruators can be of all gender identities—if female terms are used in this paper, it is only because the cited studies have regrettably not featured any non-cis participants—this topic is undoubtedly gendered.

The United Nations Development Program's Sustainable Development Goals (SDG) lend a framework to conceptualize menstrual health as a human right.⁴ It could be argued that SDG 1 (no poverty), SDG 3 (good health and well-being), SDG 4 (quality education), SDG 5 (gender equality), SDG 6 (clean water and sanitation), SDG 10 (reduced inequalities), and SDG 12 (responsible consumption and production) all have some relationship with menstrual health.

The nascent field of menstrual health has thus far mostly concentrated on low- and middle-income countries (LMICs), where the impact of inadequate menstrual hygiene is especially salient, due to inadequate clean supplies or a safe space to wash, change, and dispose of those supplies.⁵ Inadequate menstrual hygiene management has shown to disrupt education by affecting school attendance, participation, and mental health,^{6–10} as well as pose a risk to urogenital health.^{11,12} Even beyond hygiene, a systematic review

and qualitative metanalysis of women's and girls' experiences in LMICs revealed other complex aspects to menstrual health, such as “knowledge, social support, restrictive behavioral expectations, and the physical and economic environment.”³ Also relevant is the concept of period poverty, or the financial challenge of affording acceptable period products.

Furthermore, recent research has shown high-income countries (HICs) are not exempt from menstrual health inequities,^{13,14} and those inequities have been exacerbated by the COVID-19 pandemic.¹⁵ HICs are defined by the World Bank as those with a per capita gross national income over 13,205 USD for the 2023 fiscal year, such as Taiwan.¹⁶ Various HICs, as well as certain states of the United States and provinces of Canada, have eliminated taxes previously levied on period products, as well as mandated the provision of free period products in schools.¹⁷⁻²⁰ In 2021, Scotland became the first country to provide entirely subsidized period products to its population.²¹

In contrast, even though East Asia is the fastest growing region in the world, parallel gains in menstrual health cannot be assumed. This study takes place in Taiwan, thus adding dimension to the emerging literature on menstrual health in developed nations. Taiwan, officially the Republic of China, is an island nation of nearly 24 million people at the junction of the South China Sea and the East China Sea.²² Ninety-nine percent of that population is covered by the National Health Insurance (NHI), a single-payer system purposefully designed by experts in 1995 to be efficient and socially just with widespread coverage.²³ Total health expenditure is 6.7 percent of the GDP.²⁴ Taiwan is 80 percent urban, with most of that population density centered around Taipei.²² The population is majority Han Chinese originally immigrating from China, with 2.5% indigenous peoples

and 2.4% new residents, as well as a strong cultural Japanese influence remaining from the period of colonialization from 1895 to 1945.^{22,25}



Ever since the 2002 Act of Gender Equality in Employment, three days of menstrual leave from work and school (beyond the statutory 30 days of sick leave) have been formalized as a right in Taiwan; the same has been done in South Korea, Japan, some provinces of China, Indonesia, Zambia, and Spain.^{26–29} However, menstrual leave as a policy is controversial. It has been critiqued by the Western feminist perspective as failing to address more fundamental problems of workplace gender equality and menstrual equity, like “the working conditions and rights of all employees, plus access to good quality reproductive health information and medical treatment.”³⁰ Domestically, Taiwanese menstrual leave policy has been critiqued as impractical for employees to use in their workplaces, and that many female employees felt unsupported by male supervisors and colleagues to utilize the leave.³¹

In fact, menstrual stigma exists worldwide. In East Asia, it limits both what period products menstruators are willing to use and what activities they are willing to do during their periods.^{32,33} Products that insert into the vagina, such as tampons and the menstrual cup, have been associated with loss of virginity in traditional East Asian societies.^{33,34} Tampons were first introduced to the Taiwanese market in 2010, and menstrual cups in 2017—these products are available but not utilized.^{34,35} Pad usage has been cited as 90 percent of the local market, with tampons at 0.02 percent (publicly available advertising research does not elaborate on the remaining fraction of the market);³⁴ for reference, it is estimated 70 percent of American menstruators use tampons.^{13,33,36,37}

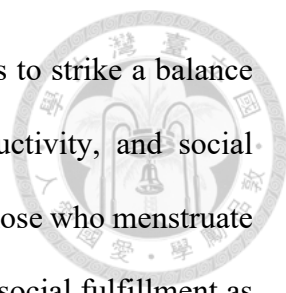
Menstrual health is gradually gaining prominence in Taiwan, largely because of the efforts of grassroots organizations and other student-led initiatives acting on their unmet

needs.^{38,39} Of particular prominence, the nongovernmental organization (NGO) With Red, or 小紅帽, was started by a young Taiwanese woman who wanted to draw attention to menstrual health stigma locally.⁴⁰ The organization provides menstrual education to students, teachers, and social workers, indirectly reaching over 300,000 people, in addition to creating educational YouTube videos.^{40,41} They also provide long-term, monthly support of period products to over 650 adolescents in 22 cities around the country, as well as short-term support for over 1,000 families affected by COVID-19.^{40,41}

In August of 2021, the Taipei city government announced plans to provide free menstrual products in five junior high schools.⁴² Taipei is the first city in Asia to launch this sort of trial project, in this case with the support of the American company Kotex.⁴² A city council spokesperson said menstrual health was considered from five perspectives: period poverty, period inequality, period stigma, menstrual education, and menstrual hygiene rights.⁴² The Tainan city government has since launched a similar initiative, called the Luna Period Project, to distribute free menstrual products to disadvantaged students.⁴³

This study focuses on youth, an age group defined by the World Health Organization (WHO) as 15 to 24 years old.⁴⁴ Youth are at a particularly vulnerable crossroads in their lives where unmet menstrual health needs can cause absenteeism or distractedness and have a huge potential impact on the rest of their lives.^{45,46} By studying the associated factors and impacts of menstrual health in youth in Taiwan, I hope to pave the way for evidence-based policy, guided by the needs of the rising generation.

A country cannot claim to endorse human rights until girls, women, and others no longer experience a relative lack of health because of their marginalized status as menstruators. To capture overall wellbeing—a right for all people, this study’s key variable is menstrual health. The other outcomes are absenteeism, productivity, and social engagement. While



these terms are couched in capitalism, the study framework attempts to strike a balance between human rights and social relevance. Absenteeism, productivity, and social engagement are indeed part of a human rights perspective, because those who menstruate should have the same access to education, career opportunities, and social fulfillment as those who do not menstruate. These other outcomes also maintain the relevance of this research to health policy. To ensure progress in health equity, research findings must speak in a language understood by the bodies in power. Additionally, these outcomes enjoy special reverence within education-focused Asian culture, so they can illustrate quantitatively and powerfully why Taiwan needs to address this gendered human right.



Literature Review

I will first review the definitions relevant to this proposal. Then I will discuss the impacts of menstrual health as noted in various settings. Finally, I will discuss the associated factors of menstrual health, with particular focus on sociodemographic variables and perceived stigma.

Definition of Menstrual Health and Period Poverty

Menstrual health is an evolving concept. Originally, the focus was on menstrual hygiene management, conclusively defined in 2013 by an article in the American Journal of Public Health as “Women and adolescent girls are using a clean menstrual management material to absorb or collect blood that can be changed in privacy as often as necessary for the duration of the menstruation period, using soap and water for washing the body as required, and having access to facilities to dispose of used menstrual management materials.”⁵

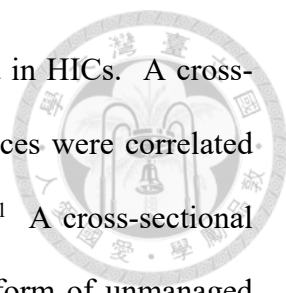
The definition has since been expanded to acknowledge the other needs of menstrual health beyond physical management. In 2021, the Global Menstrual Collective’s Terminology Action Group developed the definition of menstrual health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, in relation to the menstrual cycle.”⁴⁷ This definition encompasses the broader facets to menstrual health: accurate information; materials, facilities, and services; diagnosis, care, and treatment for menstrual discomforts and disorders; a positive and respectful environment; and freedom to participate in all spheres of life.

While this topic has often been explored qualitatively, researchers have begun to use questionnaires to quantify menstrual health. The Menstrual Practice Needs Scale (MPNS-36) was developed and validated to measure menstrual hygiene experience among schoolgirls in rural Uganda.⁴⁸ This tool provides a foundation for menstrual health researchers, but it not appropriate for high-income or East Asian settings; many of the questions are concerned with washing menstrual materials, which is almost never done in modern Taiwan.

While period poverty has yet to be definitively defined, the working definition is being unable to afford menstrual products. There is no standardized tool for the assessment of period poverty. In their recent nationwide assessment of period poverty among college students in the US, Cardoso et al use the questions “In the past 12 months have you struggled to afford menstrual products (such as sanitary pads or tampons)?” Anyone who answered “yes” was presented with the follow-up question, “Do you struggle to afford menstrual products every month?”⁴⁹ In Kuhlmann et al’s survey, they measured period poverty by asking if, at some point in the previous year, participants did not have enough money to purchase needed menstrual hygiene products.¹³ This straightforward financial metric does not capture the entire nuance of menstrual health but should still be part of the overall evaluation, even in a high-income country.

Impact of Menstrual Health

Researchers have shown how, for women and girls living in LMICs, inadequate menstrual health negatively affects physical and psychological health, employment, education, and social engagement.^{3,50}

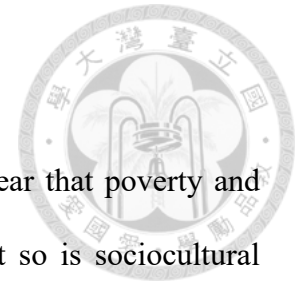


However, these outcomes have not been as thoroughly documented in HICs. A cross-sectional study in Iceland showed that negative menstrual experiences were correlated with lower quality of life, in both the mental and physical realms.⁵¹ A cross-sectional study in the Netherlands found that poor menstrual health, in the form of unmanaged menstrual discomfort, caused women to report a significant loss of productivity through disengagement while at school or work.⁴⁵ Those under twenty-one years old were particularly vulnerable. A small-scale survey among low-income high schoolers in the United States reported that 70% missed school due to menstruation.¹³ A recent nationwide survey of American college students found that period poverty was correlated with greater severity of depression.⁴⁹ Stymied productivity, school absence, and worse mental health are all barriers to gender equality in schools, workplaces, and society.

The impact of menstrual health seems to be similarly profound on youth in East Asia, as in the rest of the world. A study in the Hualien region of eastern Taiwan revealed that the majority of schoolgirls there felt menstruation impacted their emotions, daily life, schoolwork, and social engagement.⁵² Emotional vulnerability was especially salient. Among youth with dysmenorrhea (painful menstruation) in Tainan county of southern Taiwan, menstrual distress was correlated with greater impact on daily activities, more frequent class absence, and increased use of analgesics.⁵³

This study examined the impact of menstrual health in Taiwan through the outcomes of absenteeism, productivity loss, and social disengagement. Previous studies in other non-Asian HICs have indicated relevance of those variables, although there have only been two limited Taiwanese studies on the impact of menstrual health.

Factors Associated with Menstrual Health

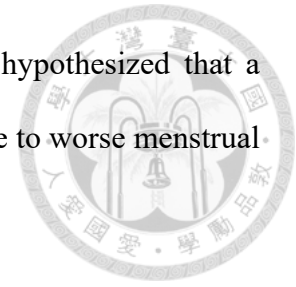


Through in-depth qualitative research in LMICs, it has become clear that poverty and resource limitations are major hindrances to menstrual health, but so is sociocultural context.^{54,55} Sociocultural context plays a role via the limiting the knowledge, limiting the social support, and shaping the behavioral expectations that menstruators encounter.³ In the validation study of the MPNS-36, the authors mentioned a need for future research on internalized stigma, as this could be a joint predictor of menstrual health experience across school and home environments.⁴⁸

In HICs, sociodemographic factors, environmental factors, physical factors, and perceived stigma all play a role. A recent study in the United States showed that people experiencing homelessness face greater challenges to menstrual health due to “inadequate access to toilets, bathing spaces, and laundering services, and pervasive menstrual stigma.”⁵⁶ Another study in the U.S. found that almost two thirds of a cohort of low-income women lacked the financial resources to afford adequate menstrual supplies.¹³ A nationwide study in the U.S. focused specifically on college students and found that 14.2% had experienced period poverty in the past year, but this varied significantly with race, immigrant status, and family education.⁴⁹ Period poverty did not have a significant relationship with sexual orientation, relationship status, student enrollment status, living on or off campus, and self-rated health status.⁴⁹ A cross-sectional survey of Australian college women found that perceived stigma was a significant predictor of lower confidence in managing menstruation.⁵⁷

Researchers in East Asia have also begun to study factors associated with menstrual health outcomes, as public awareness has increased in the past few years.³⁸ Grassroots movements have pointed to social stigma embedded in the culture as a key limitation to

menstrual health.⁵⁸ Specifically in China, researchers have also hypothesized that a combination of financial constraints and lack of education contribute to worse menstrual health among rural schoolgirls.⁵⁹



In 1992, Furth and Ch'en proposed three frameworks to describe how Taiwanese women conceptualized menstruation: *biomedicine* including “the Western cultural construction of menstrual distress that includes monthly pain and negative emotion,” *traditional Chinese medicine teachings* concerning vulnerability during menstruation, and *Buddhist beliefs* about managing menstrual pollution as a form of social decency.⁶⁰ Navigating within these frameworks, many Taiwanese women, during menstruation, have traditionally avoided tub baths, going into temples, exercise, and cold or raw food in addition to taking herbal “supports.”⁶⁰ A separate study in 2005 in Hong Kong demonstrated that traditional Chinese culture is related to girls internalizing negative feelings about menarche.⁶¹

A study in 2007 focusing specifically on southern Taiwanese adolescents found that 90 percent were familiar with menstrual taboos, including eating ice or drinking cold beverages, going to a temple, attending funerals, washing one's hair, having intercourse, showering with cold water, touching flowers, exercising, and others; the most frequently observed being the former three listed.⁶² While the majority of female students doubted their veracity, they still abided by these taboos.⁶² Mothers and schoolteachers were the Taiwanese adolescents' main source of menstrual education, but, compared to female students, male students had a relative lack of knowledge and more negative perception about menstruation.⁶²

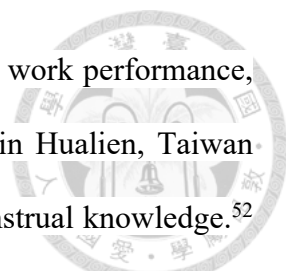
Taiwanese schoolgirls face substantial difficulties with menarche and menstruation, both physically and emotionally.⁶³ Qualitative research conducted in 2009 by Chang et al

revealed three themes in their experiences: “Changing bodies: the physical effects of menarche and menstruation, Emotional issues: the psychological impact of menarche and menstruation, and Social dimensions of the menarche and menstruation.”⁶³ In another study by the same authors in 2008, schoolgirls around the eastern, mountainous county of Hualien (the largest Taiwanese county by area but not heavily populated) had a correct response rate of only 45 percent on a menstrual knowledge questionnaire, with indigenous students scoring significantly lower than non-indigenous students.⁵² No studies prior to mine have compared any aspect of menstrual health by region of Taiwan.

At the outbreak of the COVID-19 pandemic, the Taiwanese NGO With Red conducted an informal study with 107 menstruating participants of various ages on the pandemic’s impact on the state of period poverty in Taiwan. They found that nearly 90 percent of respondents experienced increased stress from purchasing period supplies, and that one fourth of their respondents could not afford adequate supplies since the outbreak, with many attempting to find cheaper products and some even using fewer products to make ends meet.⁶⁴

A 2005 study revealed that dysmenorrhea was more severe in Taiwanese nurses who were younger and single.⁶⁵ A 2009 study among Taiwanese nursing students revealed that early or late menarche, obesity, and stress were significantly correlated with more menstrual cycle dysfunction (a composite variable of short and long cycles, variability in the length of cycles, duration of bleeding, premenstrual changes in physiological function and premenstrual changes in mental function).⁶⁶

A small scale prospective study of Taiwanese women showed that beliefs in menstrual predictability, menstruation as a debilitating event, and menstruation as a bothersome event were significantly correlated with “cognitive, behavioural and psychological



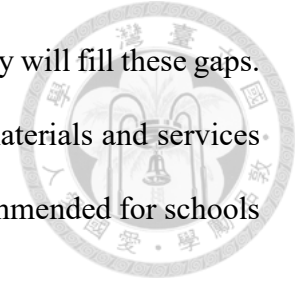
symptoms such as tension, distractibility, poor judgement, and poor work performance, etc.”⁶⁷ Positive menstrual health care behavior among schoolgirls in Hualien, Taiwan could be predicted by greater menarche preparation and greater menstrual knowledge.⁵² Menstrual distress among college-aged women in Tainan, Taiwan could be predicted by older age, an unemployed mother, severe menstrual pain, and negative menstrual attitude.⁵³ It has been hypothesized that indigenous populations face greater barriers to menstrual health.⁶⁸ While indigenous Taiwanese schoolgirls possessed less menstrual knowledge than non-indigenous Taiwanese schoolgirls, their menstrual health care behavior was similar.⁵²

The literature hints that menstrual health in HICs is impacted by sociodemographic factors, perceived stigma, physical factors, and environmental factors, therefore my study included these all as independent variables to yield a more comprehensive understanding. Small studies around Taiwan have painted a patchy picture that points particularly to the role of socioeconomic status, age, indigenous status, menstrual pain, beliefs or attitude about menstruation, and menstrual knowledge.

Significance

Menstrual health inequity and period poverty have been identified as problematic in high-income countries but are still gravely understudied. In Taiwan, any inquiry into menstrual health has been extremely limited in scope and population, i.e. a small cohort of nurses or students in one region of the country, without outcomes that can easily be compared internationally or leveraged to inform domestic policy. The literature currently yields no evaluation of period poverty in Taiwan, no standardized tool even to analyze menstrual health in East Asia, and extremely limited information about related factors, e.g. most at-risk ages, income levels, ethnicities, or regions. Type of period product used has never

been included in any analysis of menstrual health. This research study will fill these gaps. I anticipate the results guiding future policy, for example in what materials and services might be covered by NHI or what bathroom facilities might be recommended for schools and workplaces.



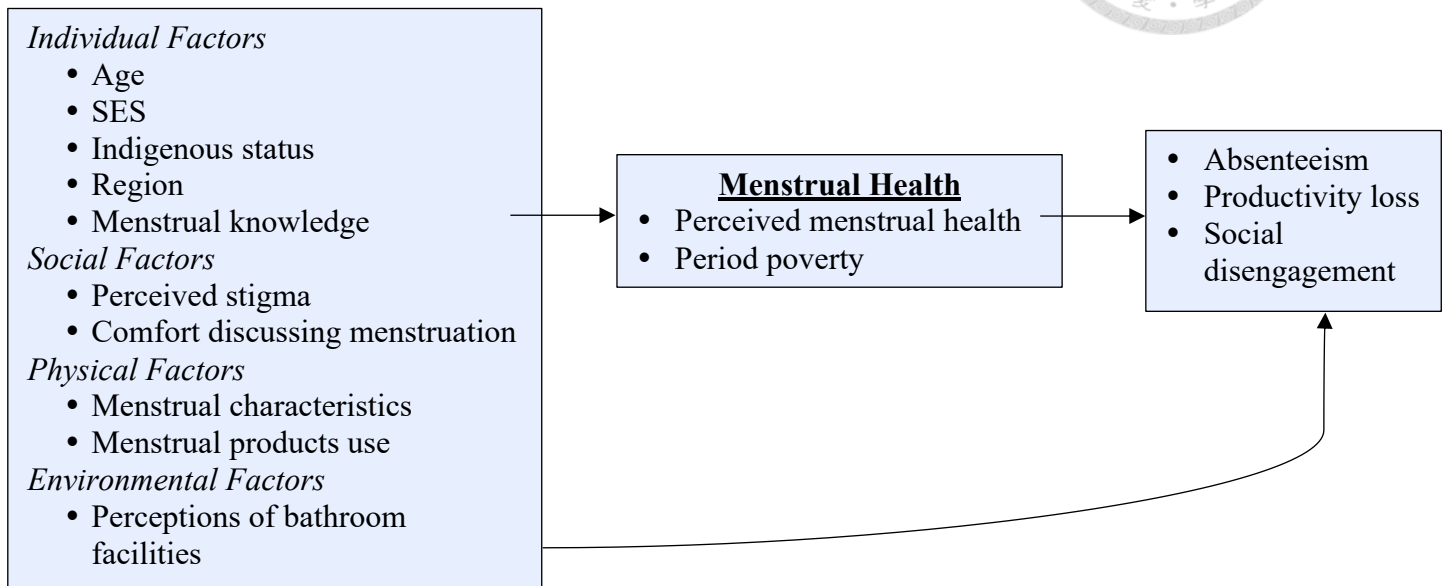
Specific Aims

- Develop a tool to document the status of menstrual health among youth in East Asian settings.
- Assess factors associated with menstrual health among youth in Taiwan.
- Examine the impact of menstrual health on educational, workplace, and social engagement for youth in Taiwan.

Methods



Study Framework



Study Sample and Data Collection

This quantitative study used a cross-sectional electronic survey, running from January 2023 to April 2023. It was approved by the National Taiwan University Research Ethics Committee. Inclusion criteria included postmenarchal (having had at least one menstrual period), aged 15 to 24, living in Taiwan, and Mandarin-speaking. While the original intent was to capture the entire age group of “young people” aged 10 to 24 years, the electronic survey format and questions were deemed inappropriate by the REC for the “younger adolescent” age range of 10 to 15 years, so the inclusion criteria was narrowed to the “youth” age range of 15 to 24 years.⁴⁴ These are WHO age group definitions.

A total of 133 people completed the survey. Four respondents’ results were excluded as they answered the quality control question incorrectly, and eight respondents’ results

were excluded as their ages fell outside of the inclusion criteria range. The final sample size was 121.



The survey was distributed through a QR code linking to Qualtrics. Social media apps popular among this age group were used to advertise, including paid Instagram ads, Facebook groups, Dcard groups, and PTT groups. To express gratitude for time spent completing the survey, participants with valid responses were entered in a lottery for ten 100 NTD gift cards.

The survey was conducted through Johns Hopkins University Qualtrics. Data was automatically captured by Qualtrics. Data was exported as an Excel file to Stata for analysis. Only the Primary Investigator had access to this data.

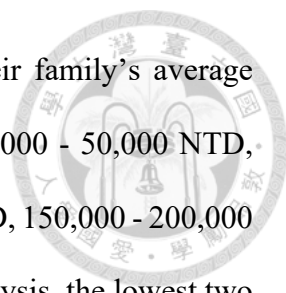
Study Instrument

The survey was developed in Mandarin Chinese and corrected by two research staff members who are native speakers. It was tailored to a youth population and to Taiwanese culture. The language level was aimed to be accessible to those with an elementary school reading level. Pilot cognitive testing of the survey was conducted among five volunteers meeting the study criteria.

The independent variables measured by the study instrument were individual factors (comprised of sociodemographic factors and menstrual knowledge), social factors, physical factors, and environmental factors.

Individual Factors

Sociodemographic factors were captured by four variables: age, socioeconomic status (SES), indigenous status, and region. Only respondents aged 15 to 24 years old were

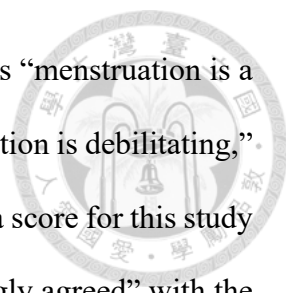


included in the study. To assess SES, they were asked about their family's average monthly income as a multiple choice of less than 30,000 NTD, 30,000 - 50,000 NTD, 50,000 - 70,000 NTD, 70,000 - 100,000 NTD, 100,000 - 150,000 NTD, 150,000 - 200,000 NTD, greater than 200,000 NTD, and I don't know. For ease of analysis, the lowest two categories were combined, as were the highest two categories. Region was assessed by categorizing the participant's reported city or county into northern Taiwan (Taipei, New Taipei City, Keelung, Yilan, Taoyuan, and Hsinchu) or non-northern Taiwan (in this study, Nantou, Chiayi, Pingtung, Changhua, Taichung, Tainan, Taitung, Hualien, Miaoli, and Kaohsiung).

Knowledge was assessed via a score from 0 to 4 based on correct answers to four questions on “cause of menstruation, source of menstrual bleeding, knowledge of menstruation prior to menarche and whether they believed they possessed enough knowledge to practically manage their menstruation.”⁵⁷ In a 2020 systemic review by Hennegan et al, the former three concepts are used widely across studies to measure knowledge of menstrual health and hygiene,⁶⁹ including in a Taiwanese adolescent setting.⁵² As a set of four, these questions were used by Munro et al in 2022 among Australian college students.⁵⁷ The knowledge score for this study was summed by adding a point for choosing “hormonal changes” as the cause of menstruation, choosing “uterus” as the source of menstrual bleeding, stating that they knew about menstruation before menarche, and stating that they felt they had enough knowledge to manage their menstruation.

Social Factors

Measurement of social, physical, and environmental factors were also based on the Munro et al survey.⁵⁷ Perceived stigma was assessed by asking participants if they strongly agree,

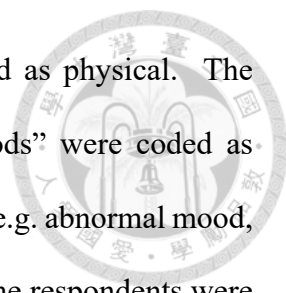


agree, strongly disagree, disagree, or feel neutral about the statements “menstruation is a normal and healthy part of life,” “menstruation is a curse,” “menstruation is debilitating,” and “society’s attitude of menstruation is that it is taboo.” The stigma score for this study was summed by adding two points if the participant said they “strongly agreed” with the stigma statement, adding one point if they “agreed,” subtracting one point if they “disagreed,” and subtracting two points if they “strongly disagreed.” The opposite was done for the single statement that countered stigma (“menstruation is a normal and healthy part of life”). The score was translated eight points to the right, so that all values would be positive.

As well, a Likert scale was used to ask participants if they felt comfortable discussing menstruation with mother/female caregiver, father/male caregiver, sister, brother, female friend, male friend, partner, female health professional, male health professional, female employer, male employer, female teacher, and male teacher. This scale is originally from Munro et al. but tailored to a Taiwanese context—pilot testing revealed a necessity to split the friend, health professional, employer, and teacher options by gender.⁵⁷ A comfort score was tallied by adding one point for each time the participant said they “disagreed” with feeling comfortable discussing menstruation with one of the listed people, adding two points for each time they “neither agreed nor disagreed,” adding three points for each time they “agreed,” adding four points for each time they “strongly agreed,” and dividing the score by the number of responses they completed (i.e. did not select “N/A”).

Physical Factors

The physical factors were measured by asking about complications or adverse effects they experience during menstruation, and by asking about the menstrual product used during their last period.⁵⁷ The response choices “dysmenorrhea,” “headaches or migraines,” and



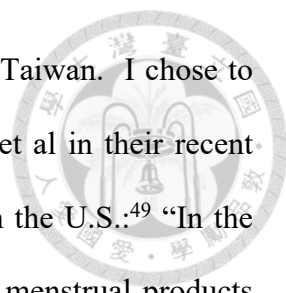
“other (e.g. backpain, gastrointestinal problems, acne)” were coded as physical. The response choices “heavy bleeding” and “irregular or missed periods” were coded as bleeding dysregulation. The response choice “emotional symptoms (e.g. abnormal mood, nervousness, depression)” was coded as emotional dysregulation. The respondents were then asked if they had consulted a medical professional about their menstruation, and if they received a diagnosis. Menstrual products used at last period was coded as others if the participant selected “tampons,” “cloth/rag,” “menstrual cup,” “period underwear,” or “other (clothing, regular underwear, toilet paper).” If the participant only selected “pads,” then it was coded as such. If the participant selected “pads” as well as another option, then it was coded as pads and others.

Environmental Factors

The environmental factors were measured by asking about participants’ perceptions of bathroom facilities at their school or workplace, namely privacy, functional toilets, cleanliness, functional locks, individual trash cans, toilet paper, and soap and water, as done by Munro et al.⁵⁷ An overall score was generated by adding a point each time the participant confirmed one of these qualities as occurring “rarely,” two points if occurring “sometimes,” three points if occurring “frequently,” and four points if occurring “always.”

Menstrual Health

The key variable of interest is menstrual health. The literature currently yields no standardized scale for its measurement.⁶⁹ I indirectly assessed it through perceived menstrual health and period poverty. Perceived menstrual health is a more holistic concept, while period poverty addresses the material, financial aspect of menstrual health. There is no standardized tool for the assessment of period poverty, but it is still important



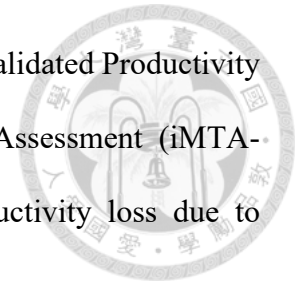
to explore its presence among various sociodemographic groups in Taiwan. I chose to use a combination of the same two questions utilized by Cardoso et al in their recent nationwide assessment of period poverty among college students in the U.S.:⁴⁹ “In the last year, how often have you experienced difficulty in purchasing menstrual products (such as pads or tampons)?” A score of zero was assigned if the participant responded “never,” a score of one if “occasionally,” a score of two if “sometimes,” a score of three if “frequently,” and a score of four if “always.” Perceived menstrual health was assessed by asking the participant how good they felt their menstrual health was, after being presented with the definition of menstrual health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, in relation to the menstrual cycle.”

Other Dependent Variables

This study measured three other dependent variables: absenteeism, productivity loss, and social disengagement. Absenteeism was assessed by asking participants how frequently they missed school or work due to menstruation over the past 6 months. A score of zero was assigned if the participant responded “never,” a score of one if “less than one day a month,” a score of two if “one day a month,” and a score of three if “more than one day a month.”

Productivity loss was assessed by asking participants to what extent they were unable to be at their most productive due to menstruation in an average day over the past month, whether at school or at work. 0 represented totally unproductive and 100 represented full productive. They were then asked how many days this occurred per month. Two participants were excluded from this analysis as their response to this question was greater than 30 days per month. These data were used to generate the number of days lost per

year for each participant due to menstruation. This is based on the validated Productivity Cost Questionnaire from the Institute for Medical Technology Assessment (iMTA-PCQ)⁷⁰ also used by Schoep et al in their 2018 study of productivity loss due to menstruation.⁴⁵



Social disengagement was assessed by asking participants how frequently they missed other activities, besides school or work, due to menstruation over the past 6 months. A score of zero was assigned if the participant responded “never,” a score of one if “less than one day a month,” a score of two if “one day a month,” and a score of three if “more than one day a month.”

To briefly summarize this discussion on the survey framework, the key variables chosen will be groundbreaking for determine a baseline evaluation of menstrual health in Taiwan. While the lack of a standardized scale for menstrual health generally will limit comparisons across studies, novel internal comparisons can still be made within the study to see what subgroups are most vulnerable and should be targeted in future research and policy. Assessing period poverty, specifically, will allow for original comparisons between Taiwan and other HICs. It will be meaningful to test if relationships between sociodemographic variables and menstrual health hold in an East Asian setting. The independent variables are worthy of study, because, in review of the literature, I hypothesize that they do impact menstrual health, and that there are relevant policy ramifications. For example, if usage of menstrual cups is correlated with better self-assessment of menstrual health and lower rates of period poverty, then this technology should be more heavily marketed as an economically and environmentally sustainable option for Taiwanese youth. Finally, the dependent variables of absenteeism, productivity loss, and social disengagement will help bring the significance of all this into

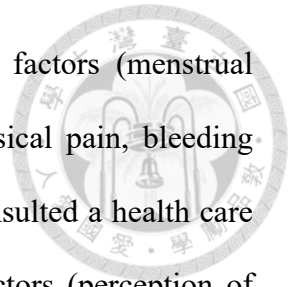
focus. Education is extremely valued in Taiwanese culture. If menstrual health inequities are hindering youth from reaching their full potential, then it is critical to understand the contributing factors. Studying social engagement can uncover if girls and women are suffering unfairly due to menstruation. Both of these independent variables have ramifications for Taiwan's economy and international standing.

Analytical Strategy

All data analyses were performed in Stata 15 (Stata Corp, College Station, TX). Continuous variables were reported as means with standard deviation and range, and categorical variables were reported as frequencies (%). The relationships between the below the categorical independent variables and absenteeism, productivity loss, social disengagement, period poverty, and menstrual health were assessed using bivariate analysis (ANOVA and t-test). Chi-squared analysis was conducted to create a correlation matrix of the relationships between all the continuous variables from the study framework. After testing for collinearity, regression analysis was used progressively to create five models to test associations. Regarding study aim 2, five regression models were conducted to examine factors associated with menstrual health, progressively including individual factors, social factors, physical factors, and environmental factors for each.

A series of models were also developed to examine the impact of period poverty and perceived menstrual health. Specifically, the first model specifically analyzes the period poverty and menstrual health's influence on absenteeism, productivity loss, and social disengagement without controlling covariates. The second model adds the individual factors (age, income, indigenous status, region, knowledge) to see whether the examined association still holds after controlling for the influences of individual factors. The third model adds the social factors (perceived menstrual stigma and comfort discussing

menstruation with others). The fourth model adds the physical factors (menstrual products used and menstrual characteristics, like presence of physical pain, bleeding dysregulation, or emotional dysregulation, and if the participant consulted a health care professional). Finally, the fifth model adds the environmental factors (perception of bathroom facilities).



Results



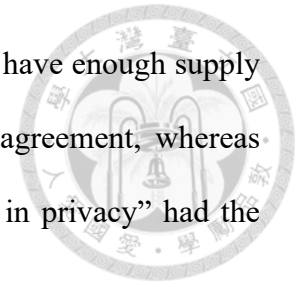
Characteristics of the Study Sample

Table 1 presents sample characteristics of 121 participants aged 15 to 24 who completed the questionnaire. All the participants were female identifying. Most participants were non-indigenous Taiwanese from Taipei and New Taipei City. The participants were evenly distributed between the income categories. The overall accuracy on the menstrual knowledge questions was 86.98%.

In regards to perceived stigma, 95.87% of participants agreed or strongly agreed menstruation is a normal and healthy part of life, whereas 5.79% agreed or strongly agreed that menstruation was a curse, 65.29% that menstruation is debilitating, and 21.49% that modern Taiwanese society sees menstruation as a taboo. The mean score for comfort discussing menstruation with others was higher when the other party was female (3.36, SD 0.67) than male (2.17, SD 0.88). The mean score for comfort discussing menstruation with a partner was 3.40 (SD 0.89).

In regards to physical factors, only a single participant (0.8%) denied complications or adverse characteristics associated with menstruation. The most frequently reported characteristics were dysmenorrhea (75.21%), other (backpack, gastrointestinal problems, acne) (74.38%), emotional dysregulation (67.77%), and irregular/missing periods (65.29%). The overwhelming majority of participants (97.52%) endorsed using pads at their last period, followed by 22 participants (18.18%) using tampons, 20 participants (16.53%) using period underwear. Only a single participant (0.8%) endorsed using a menstrual cup.

Of the various perceived aspects of bathroom facilities, “bathrooms have enough supply of toilet paper so I can clean/wipe my genitals” had the lowest agreement, whereas “bathrooms have functional locks on doors so I can use the toilet in privacy” had the highest agreement.



For the key variables of interest, 14 participants (11.57%) had experienced more than occasional period poverty over the past year. 33.06% characterized their menstrual health as bad or very bad, and 38.84% as good or very good.

For the impact of menstrual health, 38.68% missed some school on average every month because of menstruation, whereas 25.71% missed some work and 55.37% missed other activities. On average, participants lost 16 days of productivity at school due to menstruation and lost 13 days of productivity at work.

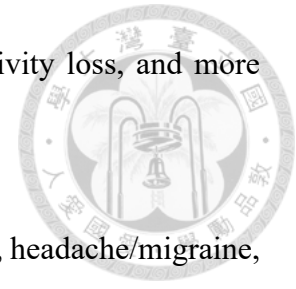
Bivariate Analyses

Tables 2a, 2b, and 3 present the results of bivariate analyses.

Of the individual factors, older participants reported worse perceived menstrual health, less period poverty, more absenteeism, more productivity loss, and more social disengagement. Residing in non-northern Taiwan was significantly correlated with more absenteeism and more period poverty. More menstrual knowledge was significantly correlated with more productivity loss.

Of the social factors, stronger perceived stigma was found to be significantly correlated with worse perceived menstrual health, more period poverty, more absenteeism, more productivity loss, and more social disengagement. More comfort discussing menstruation

was significantly correlated with more absenteeism, more productivity loss, and more social disengagement.



Of the physical factors, the presence of physical pain (dysmenorrhea, headache/migraine, other) was significantly correlated with more social disengagement. The presence of bleeding dysregulation (irregular/missing periods, heavy bleeding) was significantly correlated with worse perceived menstrual health. Emotional dysregulation was significantly correlated with worse perceived menstrual health, more absenteeism, more productivity loss, and more social disengagement. Having previously consulted a doctor for menstrual characteristics was significantly correlated with worse menstrual health, more absenteeism, and more social disengagement.

For the environmental factor, positive perception of bathroom facilities was found to be significantly correlated with better perceived menstrual health, less period poverty, less absenteeism, less productivity loss, and less social disengagement.

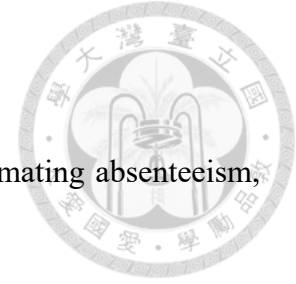
Multiple Regression Analyses

Factors Associated with Menstrual Health

Tables 4a-b present the results of multiple regression analyses estimating period poverty and perceived menstrual health, run as per the methods. No significant associations emerged between the covariates and period poverty in any of the models. The results for Model 1 and 2 estimating perceived menstrual health imply that the individual and social factors are not associated with perceived menstrual health. Further inclusion of physical and environmental factors (Models 3 and 4) did not change these results but did reveal that a previous consultation with a doctor had a negative impact on menstrual health ($B = -0.77, p < 0.05$). This relationship held in Model 4 ($B = -0.75, p < 0.05$).

Impact of Menstrual Health

Tables 5a-c present the results of multiple regression analyses estimating absenteeism, productivity loss, and social disengagement, run as per the methods.



In Models 1 through 3, worse perceived menstrual health is significantly associated with all the outcomes, that is more absenteeism, more productivity loss, and more social disengagement—this is especially strong between perceived menstrual health and productivity loss ($B=-4.63$, $p<0.01$). However, these associations are progressively weakened with inclusion of other controls to the model, especially physical factors.

When looking at the full Model 5, compared to women living in northern Taiwan, those residing in non-norther Taiwan ($B=0.62$, $p<0.01$) had more absenteeism. A negative perception of bathroom facilities ($B=-0.06$, $p<0.05$) was also associated with more absenteeism. Only the presence of emotional dysregulation was associated with more productivity loss ($B=7.12$, $p<0.05$), and none of the factors in the complete Model 5 were significantly associated with social disengagement.

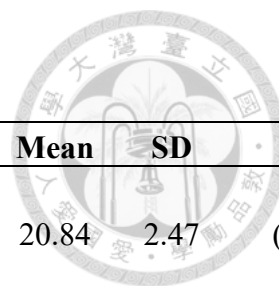


Table 1. Sample characteristics (n=121)

	n	%	Mean	SD	Range
Individual factors					
Age			20.84	2.47	(15, 24)
Average family income					
<50,000 NTD	23	19.01			
50,000-70,000 NTD	17	14.05			
70,000-100,000 NTD	16	13.22			
100,000-150,000 NTD	23	19.01			
>150,000 NTD	17	14.05			
Unknown	25	20.66			
Ethnicity					
Indigenous Taiwanese	5	4.13			
Region					
Northern Taiwan	87	71.90			
Non-northern Taiwan	34	28.10			
Menstrual knowledge			3.48	0.75	(1, 4)
Social factors					
Perceived stigma			5.21	2.22	(0, 13)
Comfort discussing menstruation			2.83	0.70	(0.44, 4)
Physical factors					
Menstrual characteristics					
Physical pain	112	92.56			
Bleeding dysregulation	81	66.94			
Emotional dysregulation	82	67.77			
Previously consulted a doctor about menstruation	56	46.28			
Menstrual products used at last period					
Pads	76	62.81			
Pads and others	42	34.71			
Others (tampons, cup, underwear)	3	2.48			
Environmental factors					
Perception of bathroom facilities			22.02	3.68	(9, 28)
Menstrual health					
Perceived menstrual health			2.03	0.97	(0, 4)
Period poverty			0.41	0.81	(0, 4)
Outcomes					
Absenteeism			0.61	0.82	(0, 3)
Productivity loss (in days lost per year)			9.71	13.50	(0, 92.16)
Social disengagement			0.79	0.87	(0, 3)

Note. SD=standard deviation.

Table 2a. Bivariate analysis with categorical variables and other outcomes

	Absenteeism			Productivity Loss			Social Disengagement					
	n(%)	Mean	SD	F/t-score	n(%)	Mean	SD	F/t-score	n(%)	Mean	SD	F/t-score
Family income				0.72				0.10				0.21
<50,000 NTD	23(23.96)	0.61	0.89		23(24.21)	8.40	9.82		23(23.96)	0.70	0.97	
50,000-70,000 NTD	17(17.71)	0.53	0.87		17(17.89)	8.26	9.12		17(17.71)	0.76	0.83	
70,000-100,000 NTD	16(16.67)	0.38	0.62		16(16.84)	10.28	19.33		16(16.67)	0.75	0.86	
100,000-150,000 NTD	23(23.96)	0.78	0.90		23(24.21)	8.95	9.37		23(23.96)	0.83	0.72	
>150,000 NTD	17(17.71)	0.82	1.19		16(16.84)	10.03	11.52		17(17.71)	0.94	1.09	
Ethnicity				-1.54				-0.06				-1.09
Non-indigenous	116(95.87)	0.59	0.88		114(95.80)	9.69	13.51		116(95.87)	0.77	0.85	
Indigenous Taiwanese	5(4.13)	1.20	0.84		5(4.20)	10.08	15.03		5(4.13)	1.20	1.30	
Region				-2.39**				-1.26				-1.00
Northern Taiwan	87(71.90)	0.49	0.78		85(71.43)	8.72	11.38		87(71.90)	0.74	0.83	
Non-northern Taiwan	34(28.10)	0.91	1.06		34(28.57)	12.17	17.71		34(28.10)	0.91	0.97	
Menstrual characteristics				-1.39				-1.09				-2.05*
Physical pain												
No	9(7.44)	0.22	0.44		9(7.56)	5.00	8.03		9(7.44)	0.22	0.44	
Yes	112(92.56)	0.64	0.90		110(92.44)	10.09	13.81		112(92.56)	0.83	0.88	
Bleeding dysregulation				-1.43				-0.81				-1.43
No	40(33.06)	0.45	0.78		40(33.61)	8.30	14.27		40(33.06)	0.63	0.67	
Yes	81(66.94)	0.69	0.92		79(66.39)	10.42	13.14		81(66.94)	0.86	0.95	
Emotional dysregulation				-2.93**				-3.77**				-2.92**
No	39(32.23)	0.28	0.60		39(32.77)	3.37	4.89		39(32.23)	0.46	0.64	
Yes	82(67.77)	0.77	0.95		80(67.23)	12.80	15.21		82(67.77)	0.94	0.92	
Previously consulted a doctor about menstruation				-3.17**				-1.59				-3.05**
No	65(53.72)	0.38	0.72		65(54.62)	7.92	12.51		65(53.72)	0.57	0.64	
Yes	56(46.28)	0.88	0.97		54(45.38)	11.86	14.44		56(46.28)	1.04	1.03	
Menstrual products used at last period				0.18				0.30				0.14
Pads	76(62.81)	0.61	0.82		75(63.03)	9.02	11.80		76(62.81)	0.82	0.87	
Pads and others	42(34.71)	0.64	1.01		41(34.45)	11.03	16.59		42(34.71)	0.74	0.89	
Others (tampons, cup, underwear)	3(2.48)	0.33	0.58		3(2.52)	8.80	7.03		3(2.48)	0.67	0.58	

Note. SD=standard deviation; * $p<0.05$; ** $p<0.01$.



Table 2b. Bivariate analysis with categorical variables and key variables

	n(%)	Period Poverty			Menstrual Health		
		Mean	SD	F/t-score	Mean	SD	F/t-score
Family income				1.92			0.98
<50,000 NTD	23(23.96)	0.52	1.12		1.74	1.14	
50,000-70,000 NTD	17(17.71)	0.59	0.80		2.18	0.81	
70,000-100,000 NTD	16(16.67)	0.50	0.73		2.31	1.01	
100,000-150,000 NTD	23(23.96)	0.04	0.21		2.13	1.01	
>150,000 NTD	17(17.71)	0.24	0.56		1.94	0.97	
Ethnicity				0.04			0.08
Non-indigenous	116(95.87)	0.41	0.81		2.03	0.98	
Indigenous Taiwanese	5(4.13)	0.40	0.89		2.00	1.00	
Region				-2.80**			1.92
Northern Taiwan	87(71.90)	0.29	0.59		2.14	0.94	
Non-northern Taiwan	34(28.10)	0.74	1.16		1.76	1.02	
Menstrual characteristics							
Physical pain				-1.59			0.60
No	9(7.44)	0.00	0.00		2.22	0.67	
Yes	112(92.56)	0.45	0.84		2.02	1.00	
Bleeding dysregulation				-0.13			2.36*
No	40(33.06)	0.40	0.71		2.33	0.92	
Yes	81(66.94)	0.42	0.86		1.89	0.97	
Emotional dysregulation				0.45			3.72**
No	39(32.23)	0.46	0.82		2.49	0.85	
Yes	82(67.77)	0.39	0.81		1.82	0.96	
Previously consulted a doctor about menstruation				0.48			2.66**
No	65(53.72)	0.45	0.75		2.25	0.81	
Yes	56(46.28)	0.38	0.89		1.79	1.09	
Menstrual products used at last period				2.10			1.83
Pads	76(62.81)	0.30	0.61		2.12	0.91	
Pads and others	42(34.71)	0.62	1.08		1.83	1.08	
Others (tampons, cup, underwear)	3(2.48)	0.33	0.58		2.67	0.58	

Note. SD=standard deviation; * $p < 0.05$; ** $p < 0.01$.



Table 3. Bivariate analysis with continuous variables

Variables	1	2	3	4	5	6	7	8	9
1 Age	-	-	-	-	-	-	-	-	-
2 Menstrual knowledge	0.1435*	-	-	-	-	-	-	-	-
3 Perceived stigma	0.1093*	0.0524	-	-	-	-	-	-	-
4 Comfort discussing menstruation	0.1902**	-0.0229	-0.1696**	-	-	-	-	-	-
5 Perception of bathroom facilities	0.0536	0.0498	-0.2679**	0.1165*	-	-	-	-	-
6 Perceived menstrual health	-0.1362*	-0.0218	-0.3575**	0.0115	0.1393*	-	-	-	-
7 Period poverty	-0.1581**	-0.0403	0.1119*	-0.0094	-0.3044**	-0.1752**	-	-	-
8 Absenteeism	0.1059*	-0.0185	0.1796**	0.1164*	-0.1516**	-0.3060**	-0.0301	-	-
9 Productivity loss	0.1097*	0.0741*	0.1871**	0.0823*	-0.1599**	-0.3598**	0.1909**	0.4431**	-
10 Social disengagement	0.1200*	-0.045	0.2186**	0.0782*	-0.1288*	-0.3069**	0.0324	0.6651**	0.4811**

* $p < 0.05$. ** $p < 0.01$.

Table 4a. Regression models estimating period poverty

	Model 1		Model 2		Model 3		Model 4	
	<i>B</i>	95% <i>CI</i>	<i>B</i>	95% <i>CI</i>	<i>B</i>	95% <i>CI</i>	<i>B</i>	95% <i>CI</i>
Individual factors								
Age	-0.03	-0.09, 0.04	-0.03	-0.10, 0.04	-0.04	-0.11, 0.03	-0.04	-0.11, 0.03
Average family income								
(<i>ref.</i> : <50,000 NTD)								
50,000-70,000 NTD	0.03	-0.47, 0.52	0.03	-0.47, 0.53	0.11	-0.41, 0.64	0.11	-0.42, 0.63
70,000-100,000 NTD	-0.10	-0.62, 0.43	-0.08	-0.61, 0.45	0.00	-0.54, 0.55	0.05	-0.50, 0.59
100,000-150,000 NTD	-0.48	-0.93, -0.03	-0.47	-0.94, 0.00	-0.43	-0.91, 0.05	-0.40	-0.88, 0.09
>150,000 NTD	-0.33	-0.83, 0.18	-0.33	-0.84, 0.18	-0.36	-0.88, 0.16	-0.28	-0.81, 0.25
Ethnicity								
(<i>ref.</i> : Non-indigenous)								
Indigenous Taiwanese	0.01	-0.72, 0.74	0.02	-0.72, 0.76	0.03	-0.72, 0.78	0.08	-0.67, 0.82
Region								
(<i>ref.</i> : Northern Taiwan)								
Non-northern Taiwan	0.18	-0.18, 0.55	0.20	-0.18, 0.58	0.19	-0.20, 0.57	0.18	-0.21, 0.56
Menstrual knowledge	0.00	-0.21, 0.22	0.01	-0.20, 0.22	-0.02	-0.23, 0.20	-0.02	-0.23, 0.20
Social factors								
Perceived stigma			0.09	-0.25, 0.42	0.05	-0.29, 0.40	0.02	-0.33, 0.37
Comfort discussing menstruation			0.07	-0.18, 0.32	0.03	-0.22, 0.29	0.04	-0.21, 0.29
Physical factors								
Menstrual characteristics								
Physical pain			0.49	-0.15, 1.13	0.55	-0.09, 1.19	0.55	-0.09, 1.19
Bleeding dysregulation			-0.06	-0.47, 0.35	-0.06	-0.47, 0.35	-0.06	-0.47, 0.35
Emotional dysregulation			-0.16	-0.54, 0.22	-0.20	-0.58, 0.18	-0.20	-0.58, 0.18
Previously consulted a doctor about menstruation			0.16	-0.25, 0.58	0.13	-0.29, 0.54	0.13	-0.29, 0.54
Menstrual products used at last period								
(<i>ref.</i> : Pads)								
Pads and others			0.32	-0.03, 0.67	0.32	-0.03, 0.67	0.32	-0.03, 0.67
Others (tampons, cup, underwear)			-0.29	-1.48, 0.90	-0.23	-1.42, 0.96	-0.23	-1.42, 0.96
Environmental factors								
Perception of bathroom facilities								
			-0.03	-0.08, 0.02	-0.03	-0.08, 0.02	-0.03	-0.08, 0.02

Note. *ref.* =reference; *B* =unstandardized regression coefficient; *CI* =confidence interval.

p*<0.05; *p*<0.01.

Table 4a. Regression models estimating period poverty

	Model 1		Model 2		Model 3		Model 4	
	<i>B</i>	95% <i>CI</i>	<i>B</i>	95% <i>CI</i>	<i>B</i>	95% <i>CI</i>	<i>B</i>	95% <i>CI</i>
Individual factors								
Age	-0.03	-0.09, 0.04	-0.03	-0.10, 0.04	-0.04	-0.11, 0.03	-0.04	-0.11, 0.03
Average family income (<i>ref.</i> : <50,000 NTD)								
50,000-70,000 NTD	0.03	-0.47, 0.52	0.03	-0.47, 0.53	0.11	-0.41, 0.64	0.11	-0.42, 0.63
70,000-100,000 NTD	-0.10	-0.62, 0.43	-0.08	-0.61, 0.45	0.00	-0.54, 0.55	0.05	-0.50, 0.59
100,000-150,000 NTD	-0.48	-0.93, -0.03	-0.47	-0.94, 0.00	-0.43	-0.91, 0.05	-0.40	-0.88, 0.09
>150,000 NTD	-0.33	-0.83, 0.18	-0.33	-0.84, 0.18	-0.36	-0.88, 0.16	-0.28	-0.81, 0.25
Ethnicity								
(<i>ref.</i> : Non-indigenous)								
Indigenous Taiwanese	0.01	-0.72, 0.74	0.02	-0.72, 0.76	0.03	-0.72, 0.78	0.08	-0.67, 0.82
Region								
(<i>ref.</i> : Northern Taiwan)								
Non-northern Taiwan	0.18	-0.18, 0.55	0.20	-0.18, 0.58	0.19	-0.20, 0.57	0.18	-0.21, 0.56
Menstrual knowledge	0.00	-0.21, 0.22	0.01	-0.20, 0.22	-0.02	-0.23, 0.20	-0.02	-0.23, 0.20
Social factors								
Perceived stigma			0.09	-0.25, 0.42	0.05	-0.29, 0.40	0.02	-0.33, 0.37
Comfort discussing menstruation			0.07	-0.18, 0.32	0.03	-0.22, 0.29	0.04	-0.21, 0.29
Physical factors								
Menstrual characteristics								
Physical pain			0.49	-0.15, 1.13	0.55	-0.09, 1.19		
Bleeding dysregulation			-0.06	-0.47, 0.35	-0.06	-0.47, 0.35		
Emotional dysregulation			-0.16	-0.54, 0.22	-0.20	-0.58, 0.18		
Previously consulted a doctor about menstruation			0.16	-0.25, 0.58	0.13	-0.29, 0.54		
Menstrual products used at last period (<i>ref.</i> : Pads)								
Pads and others			0.32	-0.03, 0.67	0.32	-0.03, 0.67		
Others (tampons, cup, underwear)			-0.29	-1.48, 0.90	-0.23	-1.42, 0.96		
Environmental factors								
Perception of bathroom facilities								
			-0.03	-0.08, 0.02				

Note. *ref.* =reference; *B*=unstandardized regression coefficient; *CI*=confidence interval.

p*<0.05; *p*<0.01.

Table 5a. Regression models estimating absenteeism

	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	95% CI	B	95% CI	B	95% CI	B	95% CI	B	95% CI
Period poverty	-0.09	-0.28, 0.10	-0.15	-0.39, 0.09	-0.15	-0.39, 0.09	-0.14	-0.39, 0.11	-0.18	-0.43, 0.07
Perceived menstrual health	-0.29**	-0.45, -0.13	-0.24**	-0.43, -0.06	-0.21*	-0.41, -0.02	-0.12	-0.33, 0.09	-0.12	-0.32, 0.09
Individual factors										
Age			0.04	-0.03, 0.12	0.03	-0.04, 0.11	0.02	-0.05, 0.10	0.03	-0.05, 0.11
Average family income										
(<i>ref.</i> : <50,000 NTD)										
50,000-70,000 NTD			0.08	-0.48, 0.63	0.03	-0.53, 0.60	0.06	-0.53, 0.66	0.07	-0.51, 0.64
70,000-100,000 NTD			-0.05	-0.64, 0.53	-0.04	-0.63, 0.55	0.00	-0.60, 0.60	0.08	-0.51, 0.67
100,000-150,000 NTD			0.28	-0.23, 0.80	0.25	-0.28, 0.78	0.32	-0.20, 0.85	0.39	-0.13, 0.91
>150,000 NTD			0.35	-0.21, 0.92	0.35	-0.22, 0.92	0.32	-0.25, 0.89	0.46	-0.12, 1.03
Ethnicity										
(<i>ref.</i> : Non-indigenous)										
Indigenous Taiwanese			0.47	-0.34, 1.28	0.52	-0.30, 1.35	0.43	-0.39, 1.25	0.51	-0.29, 1.32
Region										
(<i>ref.</i> : Northern Taiwan)										
Non-northern Taiwan			0.57**	0.16, 0.98	0.53*	0.11, 0.95	0.61**	0.18, 1.03	0.62**	0.20, 1.03
Menstrual knowledge			-0.08	-0.31, 0.15	-0.09	-0.32, 0.15	-0.07	-0.31, 0.17	-0.07	-0.31, 0.16
Social factors										
Perceived stigma					0.04	-0.05, 0.13	0.02	-0.08, 0.11	0.01	-0.08, 0.10
Comfort discussing menstruation					0.09	-0.17, 0.35	0.06	-0.20, 0.33	0.08	-0.17, 0.34
Physical factors										
Menstrual characteristics										
Physical pain			0.40	-0.30, 1.11			0.40	-0.30, 1.11	0.53	-0.17, 1.23
Bleeding dysregulation			0.22	-0.23, 0.67			0.22	-0.23, 0.67	0.21	-0.23, 0.65
Emotional dysregulation			0.33	-0.12, 0.78			0.33	-0.12, 0.78	0.26	-0.18, 0.71
Previously consulted a doctor about menstruation			0.20	-0.26, 0.65			0.20	-0.26, 0.65	0.15	-0.30, 0.60
Menstrual products used at last period										
(<i>ref.</i> : Pads)										
Pads and others			0.01	-0.38, 0.41			0.01	-0.38, 0.41	0.01	-0.37, 0.40
Others (tampons, cup, underwear)			-0.36	-1.68, 0.96			-0.36	-1.68, 0.96	-0.25	-1.55, 1.04
Environmental factors										
Perception of bathroom facilities									-0.06*	-0.11, 0.00

Note. *ref.* =reference; B=unstandardized regression coefficient; CI=confidence interval.

*p<0.05; **p<0.01.

Table 5b. Regression models estimating productivity loss

	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	95% CI	B	95% CI	B	95% CI	B	95% CI	B	95% CI
Period poverty	2.17	-0.67, 5.02	-0.58	-3.85, 2.70	-0.59	-3.91, 2.73	0.03	-3.45, 3.51	-0.04	-3.58, 3.50
Perceived menstrual health	-4.63**	-7.00, -2.25	-4.07**	-6.55, -1.59	-3.86**	-6.52, -1.20	-2.88*	-5.77, 0.00	-2.88	-5.78, 0.03
Individual factors										
Age			0.51	-0.51, 1.54	0.42	-0.67, 1.50	0.25	-0.87, 1.38	0.26	-0.88, 1.39
Average family income										
(<i>ref.</i> : <50,000 NTD)										
50,000-70,000 NTD			2.79	-4.73, 10.31	2.43	-5.27, 10.12	1.88	-6.28, 10.04	1.89	-6.33, 10.10
70,000-100,000 NTD			6.28	-1.72, 14.28	6.40	-1.68, 14.49	5.59	-2.71, 13.88	5.71	-2.70, 14.12
100,000-150,000 NTD			1.90	-5.09, 8.90	1.58	-5.60, 8.76	2.20	-5.07, 9.47	2.30	-5.06, 9.66
>150,000 NTD			3.41	-4.32, 11.14	3.45	-4.37, 11.26	3.94	-4.01, 11.89	4.18	-4.04, 12.40
Ethnicity										
(<i>ref.</i> : Non-indigenous)										
Indigenous Taiwanese			3.63	-7.37, 14.62	4.08	-7.12, 15.28	3.05	-8.27, 14.36	3.18	-8.26, 14.61
Region										
(<i>ref.</i> : Northern Taiwan)										
Non-northern Taiwan			-0.62	-6.26, 5.02	-0.93	-6.70, 4.84	-0.64	-6.57, 5.28	-0.63	-6.59, 5.33
Menstrual knowledge			1.68	-1.50, 4.86	1.63	-1.59, 4.86	2.09	-1.22, 5.40	2.09	-1.24, 5.42
Social factors										
Perceived stigma					0.34	-0.89, 1.57	0.02	-1.28, 1.32	0.01	-1.30, 1.32
Comfort discussing menstruation					0.86	-2.76, 4.48	0.44	-3.22, 4.10	0.49	-3.21, 4.18
Physical factors										
Menstrual characteristics										
Physical pain							-1.16	-10.91, 8.60	-0.94	-10.91, 9.02
Bleeding dysregulation							-1.98	-8.21, 4.24	-1.99	-8.26, 4.27
Emotional dysregulation							7.23*	1.03, 13.43	7.12*	0.83, 13.42
Previously consulted a doctor about menstruation							1.12	-5.23, 7.46	1.05	-5.35, 7.46
Menstrual products used at last period										
(<i>ref.</i> : Pads)										
Pads and others							-0.11	-5.65, 5.44	-0.09	-5.67, 5.49
Others (tampons, cup, underwear)							2.99	-15.23, 21.21	3.17	-15.22, 21.57
Environmental factors										
Perception of bathroom facilities									-0.09	-0.85, 0.66

Note. *ref.* =reference; B=unstandardized regression coefficient; CI=confidence interval.

*p<0.05; **p<0.01.

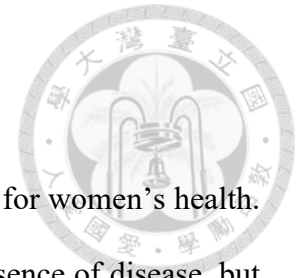
Table 5c. Regression models estimating social disengagement

	Model 1		Model 2		Model 3		Model 4		Model 5	
	B	95% CI	B	95% CI	B	95% CI	B	95% CI	B	95% CI
Period poverty	-0.02	-0.21, 0.16	-0.04	-0.29, 0.20	-0.04	-0.29, 0.21	-0.05	-0.31, 0.20	-0.08	-0.33, 0.18
Perceived menstrual health	-0.28**	-0.43, -0.12	-0.23*	-0.42, -0.05	-0.21*	-0.41, -0.01	-0.15	-0.37, 0.06	-0.15	-0.37, 0.06
Individual factors										
Age			0.06	-0.02, 0.13	0.05	-0.03, 0.13	0.04	-0.04, 0.12	0.05	-0.03, 0.13
Average family income										
(<i>ref.</i> : <50,000 NTD)										
50,000-70,000 NTD			0.24	-0.32, 0.81	0.21	-0.37, 0.79	0.32	-0.28, 0.93	0.32	-0.28, 0.93
70,000-100,000 NTD			0.29	-0.31, 0.89	0.30	-0.30, 0.91	0.41	-0.20, 1.03	0.46	-0.16, 1.08
100,000-150,000 NTD			0.27	-0.25, 0.80	0.25	-0.28, 0.79	0.34	-0.20, 0.88	0.38	-0.16, 0.92
>150,000 NTD			0.43	-0.15, 1.00	0.43	-0.15, 1.01	0.41	-0.17, 1.00	0.49	-0.11, 1.09
Ethnicity										
(<i>ref.</i> : Non-indigenous)										
Indigenous Taiwanese			0.42	-0.40, 1.25	0.46	-0.38, 1.30	0.40	-0.44, 1.24	0.44	-0.40, 1.28
Region										
(<i>ref.</i> : Northern Taiwan)										
Non-northern Taiwan			0.32	-0.10, 0.74	0.29	-0.14, 0.72	0.34	-0.10, 0.78	0.35	-0.09, 0.78
Menstrual knowledge			-0.06	-0.30, 0.17	-0.07	-0.31, 0.17	-0.09	-0.33, 0.16	-0.09	-0.33, 0.16
Social factors										
Perceived stigma					0.03	-0.06, 0.12	0.01	-0.08, 0.11	0.01	-0.09, 0.10
Comfort discussing menstruation					0.05	-0.22, 0.31	0.03	-0.24, 0.30	0.04	-0.22, 0.31
Physical factors										
Menstrual characteristics										
Physical pain							0.53	-0.20, 1.25	0.60	-0.13, 1.33
Bleeding dysregulation							0.09	-0.37, 0.55	0.08	-0.38, 0.54
Emotional dysregulation							0.11	-0.34, 0.57	0.08	-0.39, 0.54
Previously consulted a doctor about menstruation							0.40	-0.07, 0.86	0.37	-0.10, 0.84
Menstrual products used at last period										
(<i>ref.</i> : Pads)										
Pads and others							-0.01	-0.41, 0.39	-0.01	-0.41, 0.39
Others (tampons, cup, underwear)							0.10	-1.25, 1.45	0.16	-1.19, 1.51
Environmental factors										
Perception of bathroom facilities									-0.03	-0.09, 0.02

Note. *ref.* =reference; B=unstandardized regression coefficient; CI=confidence interval.

*p<0.05; **p<0.01.

Discussion



It is incredible how little is known about a field that is foundational for women's health. Menstrual health is multidimensional, marked not merely by the absence of disease, but also by holistic wellbeing. This study was the first to look at period poverty and other factors of menstrual health never before studied in Taiwan, including sociodemographic factors and period product choice, and how they relate to outcomes never before studied in this region.

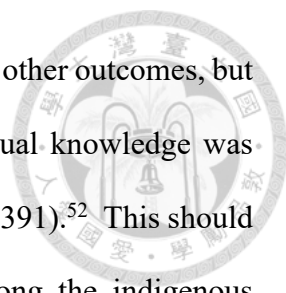
This exploratory study was a fairly representative sample of Taiwanese youth, in terms of income, indigenous status, region of residence, and even menstrual product usage. Despite limited power to determine prevalence, the findings allow for important investigation of the relationships between various factors and menstrual health in a novel context. Also, the results reveal a significant bivariate association of menstrual health with absenteeism, productivity loss, and social disengagement—issues which should be addressed as a matter of Taiwanese public health and gender equity.

In this discussion section, I will first elaborate on the associations between independent variables, proceeding through the framework of individual factors, social factors, physical factors, and environmental factors, and contextualize them within the established literature. I will also discuss the dependent variables and present international comparisons. Next, I will address limitations. Finally, I will conclude with broader implications and suggestions derived from this research.

Individual Factors

Of the sociodemographic factors measured, age had the most significant relationships with other variables (see Table 3, Appendix Table 2). With older age seemed to come with more menstrual knowledge and comfort discussing the topic, it was simultaneously associated with worse menstrual health and more stigma, absenteeism, productivity loss, and social disengagement. It could be hypothesized that stigma is learned, as a Taiwanese adolescent progresses through society, and that menstrual characteristics become more obtrusive to their lives. When the relationship between age and period poverty was examined, older age appeared to be protective. While a cross-sectional study cannot prove causation, these findings accentuate the vulnerability of younger adolescents to period poverty, consistent with qualitative findings in the US.⁷¹ For this reason, schools in Taiwan could hold potential as a point of contact for interventions.

Interestingly, income did not have a significant impact on period poverty, nor any other outcome. Rather, region of Taiwan was much more predictive of period poverty. Residing in non-northern Taiwan was strongly related to more severe period poverty. One possible explanation is the concentration of economic resources in the northern region centering around Taipei, even though individual income is not significant. Urban and northern are not fully synonymous in Taiwan, but there still could be regional cultural differences, for example, in politics, education, and healthcare. The present findings suggest regional barriers to period product access that merit a southward reorientation (the main NGO force, With Red, is currently headquartered in Taipei).⁴⁴ While this is the first study to look at regional differences in menstrual health in Taiwan, other studies have similarly shown rural populations face a much higher risk of period poverty.⁵⁹



Being indigenous did not significantly affect menstrual health nor the other outcomes, but this study did confirm previous findings from Hualien that menstrual knowledge was significantly weaker among indigenous participants ($t=2.0865$, $p=0.0391$).⁵² This should not be interpreted as menstrual education being any inferior among the indigenous community, just because it does not adhere to the framework of measurement used by this study and the rest of the field.

Of all the participants in that study, 22.1% thought menstrual blood came from the urethra, whereas only 1.7% of all the participants in the present study thought so, with 86.8% instead choosing the correct answer of the uterus. This could be due to regional differences (their study was only in eastern Taiwan) or, more likely, inclusion characteristics (their study was ages 10 to 12 years, including premenarchal girls).

Social Factors

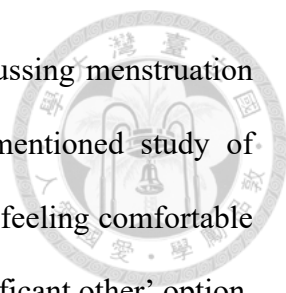
Stigma was interwoven with so many other variables (see Table 3). More stigma was significantly correlated with less comfort discussing menstruation, worse perception of bathroom facilities, worse perceived menstrual health, more period poverty, and more absenteeism, productivity loss, and social disengagement. While the direction of these relationships will be for future research to uncover, the present study shows that stigma is crucial to understanding a framework of holistic menstrual health in East Asia.

When compared with Munro et al's 2022 study of Australian female college students, fewer Taiwanese participants agreed that menstruation is a curse (5.8% Taiwanese versus 9.1% Australian) and that society's attitude of menstruation is that it is taboo (21.5% Taiwanese versus 52.8% Australian). In both studies, nearly all participants felt menstruation was a normal and healthy part of life (95.9% Taiwanese versus 96.0%

Australian). However, 65.3% of Taiwanese participants believed that menstruation is debilitating, compared to only 25.1% of the Australian sample. These stark disparities imply deeply culturally-bound conceptions of menstruation. A simplistic view of Asian society as suffering from greater menstrual stigma than Western society would be inaccurate; rather, perspectives are nuanced in ways unique to the local context.

The prominence of the view of menstruation as debilitating could be related to the traditional Chinese medicine belief that menstruation is a period of physiologic vulnerability for women.⁶⁰ A study of junior high schoolers in southern Taiwan found that 48.3% of boys and 29.6% of girls believed that one should not exercise while menstruating,⁶² and a study of adolescent schoolgirls in central Taiwan found that 20.8% believed one should rest more while menstruating.⁷² These studies pair with the current one to demonstrate how a stigma of weakness might threaten girls' social engagement, especially when it comes to physical activity—which, in reality, has been tied to positive menstrual health.^{73–75}

This study lends support for the promotion of menstrual education among Taiwanese at the grade school level, especially since stigma became more ingrained as age increased in this study. It has been established that premenarchal girls can be powerfully influenced by cultural stigma surrounding menstruation, internalizing negative stereotypes more than positive.⁷⁶ Specifically within the East Asian cultural context, menstrual stigma has been shown to be related to negative beliefs among adolescents.⁶¹ In both Western and Asian societies, adequate menstrual education is paramount for youth to feel confident in their menstrual health and to maintain their normal activity level while menstruating.^{52,77} This study affirms that cultural beliefs surrounding menstruation do differ in significant, specific ways, so menstrual education and policy must be culturally appropriate.

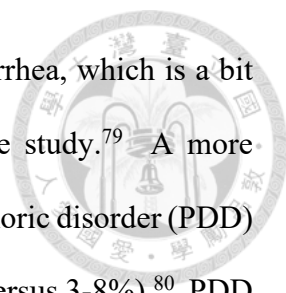


Closely related to stigma is the other social factor of comfort discussing menstruation with others ($r=-0.1696$, $p<0.01$). When compared to the aforementioned study of Australian young women, the present sample had more respondents feeling comfortable or very comfortable discussing menstruation with every single ‘significant other’ option, except for friends (see Appendix Table 1). Most notable were the differences in comfort discussing with an employer (Taiwanese 46.1% when averaging the two gender options versus Australian 9.2%) and with a teacher (Taiwanese 58.1% when averaging the two gender options versus Australian 6.9%). These findings further undermine the stereotype that discussing menstruation is taboo is all of East Asian society. Avenues for future study could be the role of menstruation euphemisms or the role the influence of menstrual leave on these differences—a policy found in Taiwan but not Australia nor many other Western countries (Spain was the first European country in February 2023).^{27,78}

Physical Factors

The same percentage of participants in this study had consulted a doctor about menstruation, as in the aforementioned Australian study (46.3% versus 46.0%).⁵⁷ As well, both studies found extremely low percentages of participants free from menstrual complications (0.8% versus 0.6%), with roughly equivalent rates of painful periods, irregular/missing periods, and migraines/headaches (see Appendix Table 1). However, many more Taiwanese subjects endorsed other characteristics (back pain, gastrointestinal problems, acne) compared to the Australian study (74.4% versus 28.6%), and many fewer endorsed heavy bleeding (7.4% versus 59.3%). Slightly fewer Taiwanese participants endorsed emotional dysregulation (67.8% versus 89.9%).

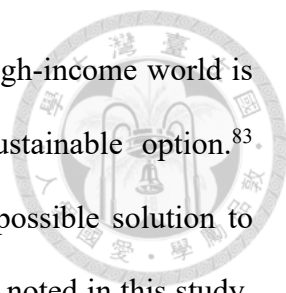
It is difficult to ascertain the true epidemiology of menstrual characteristics from the literature for comparison. A 1982 study from the U.S. using National Health Examination



Survey data found that 59.7% of adolescent girls reported dysmenorrhea, which is a bit lower than the recent Australian study and this present Taiwanese study.⁷⁹ A more modern meta review comparing the prevalence of premenstrual dysphoric disorder (PDD) similarly found lower rates in East Asia than in the West (1.3-2.8% versus 3-8%).⁸⁰ PDD is a more restrictive diagnosis than generally asking about emotional dysregulation during menstruation, and the authors commented that language used to define the phenomenon differs between cultures.

In terms of the consequences of menstrual characteristics, the present study revealed a very prominent effect of emotional dysregulation on Taiwanese youth, confirming previous qualitative research among Taiwanese girls.⁶³ Emotional dysregulation was strongly correlated with worse perceived menstrual health and more absenteeism, productivity loss, and social disengagement. Emotional dysregulation was also significant in the models estimating perceived menstrual health and productivity loss. This could be an aspect of menstrual wellbeing that is falling through the cracks of healthcare for this age group.

This was the first research in East Asia to look at how menstrual product usage relates to menstrual health. However, few definitive conclusions can be made about the influence of period product used because the study comprised so few non-pad users (2.48%), which does roughly match other estimates of the current situation in Taiwan.³⁴ For comparison, the Australian study saw 23.9% of participants mainly using tampons,⁵⁷ and an American study of low-income women in Missouri saw 37.2% mainly using tampons.¹³ It is estimated that up to 70 percent of American menstruators use tampons at least occasionally.^{13,33,36,37} Decision-making about tampon and menstrual cup usage among Taiwanese menstruators has begun to be explored by other researchers.^{81,82} Reusable products present the potential to provide a sustainable future to menstrual hygiene

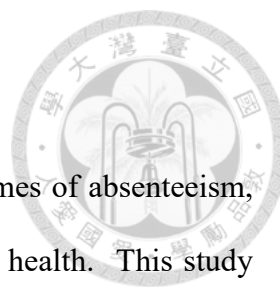


management.⁸³ Especially as the impact of period poverty in the high-income world is realized, reusable products are poised as a more financially sustainable option.⁸³ Tampons and the menstrual cup, as opposed to pads, could be a possible solution to absenteeism and social disengagement during menstruation that was noted in this study, ultimately making progress towards fighting the weakness stigma that was so salient in this sample of Taiwanese women.

Environmental Factors

More negative perception of bathroom facilities correlated with worse perceived menstrual health and more period poverty, absenteeism, productivity loss, and social disengagement, matching previous qualitative research on barriers to menstrual health.^{3,71} Even when controlling for all the other covariates, perception of bathroom facilities was still significant in the most complete model predicting absenteeism. The previously cited study of Australian students showed that a more negative perception of bathroom facilities correlated with less confidence in managing menstruation.⁵⁷ For their study, the most pertinent aspects within the environmental factors were clean and sanitary facilities and access to sufficient privacy.⁵⁷ In the current Taiwanese study, the aspects most lacking, by far, were clean and sanitary facilities and access to sufficient toilet paper.

These results are important because they are an actionable item where infrastructure investment is a matter of gender equity. Although other high-income countries have begun providing free period products in bathrooms,^{18,19,21,84} perhaps the most suitable first step for Taiwan's unique landscape is to begin providing free toilet paper. A future cost-effectiveness analysis study could be powerful in investigating reduced absenteeism if schools and workplaces addressed bathroom facility standards.



Outcomes/Impact

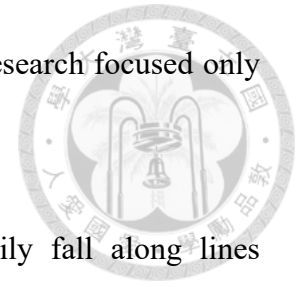
No other study in Taiwan has looked at the socially relevant outcomes of absenteeism, productivity loss, or social engagement, as they relate to menstrual health. This study found much lower percentages of school absenteeism than in a comparable study from the U.S. (38.7% of Taiwanese subjects missing any amount of class for period-related reasons versus 70.7% of American subjects).⁸⁵ The percentage of school absenteeism among the Taiwanese subjects was slightly higher than work absenteeism (25.72%) but lower than social absenteeism (55.37%), which could reflect the respective pressures in those environments. Cultural factors could be driving Taiwanese to attend school and work, even if the result is distraction.

Based on the mean of this sample, a woman's period causes her to lose nearly ten days a year in productivity, which aligns with a large nationwide cross-sectional survey of Dutch women (mean = 10.5 days, SD = 11.8).⁴⁵ The standard deviation among Taiwanese subjects was also quite high, meaning that this is not a universal experience for all menstruators. Girls trying to succeed in school or women trying to succeed in the workplace are entered in a roulette where some must overcome a constant disadvantage compared to their male counterparts.

Limitations

Some limitations of this study include sample size and limited generalizability. With more overall participants, the survey would have a better chance of accurately describing the role of covariates that were rarer in the sample, i.e. being indigenous, non-cisgender, or a tampon or menstrual cup user. Although those subjects were few, their prevalence

did roughly match the representation in Taiwanese society. This research focused only youth so the results could not be generalized to other age groups.



Ethnicity as it may be described in Taiwan does not necessarily fall along lines comparable to other cultures' construction of ethnicity. The survey questions asking about ethnicity underwent many reiterations, with none of them being entirely clear to all the pilot testers. In the end, it was decided to use only indigenous versus non-indigenous status in the analysis. More detailed disaggregation of data would be useful for future analysis to capture the experiences of new residents, for example.

Distributing a survey about an arguably taboo topic as a foreign researcher presented some difficulties. Recruitment of younger participants and those residing outside of Taipei and New Taipei City was the most difficult and required focused effort. It was possible that the distribution format, in which word-of-mouth ultimately played some part, introduced bias in the sample, perhaps towards more highly educated, more Westernized, or more urbanized participants.

This project probably could have benefitted from a simplification of variables measured. The study was exploratory in nature, but comparing covariates and presenting models did become a little unwieldy. This author could only hope that the richness of the discussion made up for the numerosity of the sections.

Conclusions and Implications

Based on this analysis of associated menstrual health factors, future health policy should center on the following three areas of identified importance: improving bathroom facilities, providing positive menstrual education, and supporting emotional side-effects

of menstruation. It is vital that future research and health policy also segregate by region, since this was an essential correlate in Taiwan's menstrual health landscape.



The results showed low prevalence of period poverty; 11.57% of participants said they more than occasionally experienced period poverty—a novel finding with no other estimates existing in Taiwan for comparison, but roughly equivalent to the estimates of American youth.⁸⁵ However, this does not mean that it is not an issue of health inequity deeply affecting the lives of certain Taiwanese people. The field could benefit from hearing from more local minority groups, such as those experiencing homelessness or housing insecurity, as research from the U.S. has shown their challenges to be quite different from the greater population's.^{14,56}

However, this study does start a conversation that maybe widely subsidized period products would not be the highest-yield intervention for greater Taiwanese society, if it were to follow the trend of certain other high-income countries outside of Asia. Instead, consciously investing in specific aspects of bathroom facilities, particularly in more rural Taiwan, could be a reasonable first step. Indeed, if there does not exist infrastructure for maintaining adequate stock in free toilet paper, then the universal provision of period products would be ambitious. The focus should firstly be on clean and sanitary facilities with toilet paper provided.

Secondly, this study suggests women's engagement in their school, work, and other activities might benefit by a more supportive social climate, free of menstrual stigma. Menstruation as debilitating is the most prevalent misconception that needs to be addressed gradually, whether through incorporating menstrual education into the sexual and reproductive health education guidelines already present in Taiwan or through some other cultural shift campaign.⁸⁶ Any strategy to promote positive perception of

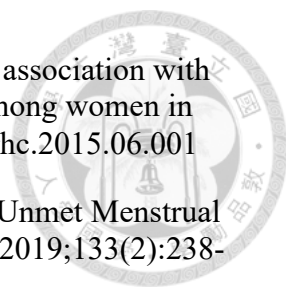
menstruation should also include males, as previous Taiwanese research has shown that boys' desire to acquire more menstrual knowledge exists but is restricted.^{62,63,87}

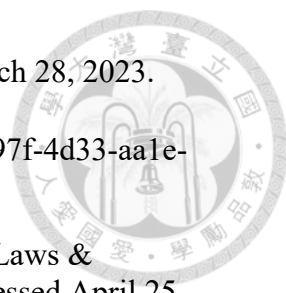
Finally, this study provides evidence for an intervention concentrating on the emotional side-effects of menstruation, as this seems to be linked with productivity loss for Taiwanese youth. Perhaps providing targeted mental health resources, whether through health care professionals, schools, or families could be a solution worth exploring. Previous research has suggested Taiwanese school nurses could help address this need.⁶³ This study calls for urgency as the current situation shows menstrual health overall, and its emotional manifestations, are becoming worse and worse as adolescents transition to young adulthood.

References

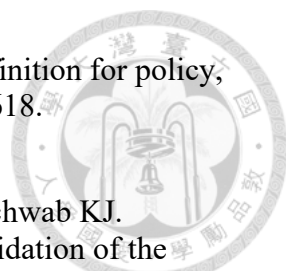


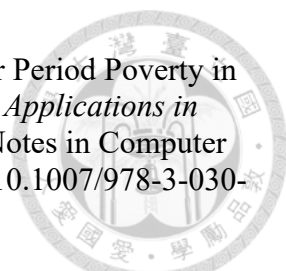
1. Menstrual hygiene. Accessed September 22, 2021. <https://www.unicef.org/wash/menstrual-hygiene>
2. Menstrual Hygiene Management Enables Women and Girls to Reach Their Full Potential. Accessed September 23, 2021. <https://www.worldbank.org/en/news/feature/2018/05/25/menstrual-hygiene-management>
3. Hennegan J, Shannon AK, Rubli J, Schwab KJ, Melendez-Torres GJ. Women’s and girls’ experiences of menstruation in low- and middle-income countries: A systematic review and qualitative metasynthesis. *PLOS Medicine*. 2019;16(5):e1002803. doi:10.1371/journal.pmed.1002803
4. Sustainable Development Goals | United Nations Development Programme. UNDP. Accessed April 21, 2023. <https://www.undp.org/sustainable-development-goals>
5. Sommer M, Sahin M. Overcoming the Taboo: Advancing the Global Agenda for Menstrual Hygiene Management for Schoolgirls. *Am J Public Health*. 2013;103(9):1556-1559. doi:10.2105/AJPH.2013.301374
6. Scorgie F, Foster J, Stadler J, et al. “Bitten By Shyness”: Menstrual Hygiene Management, Sanitation, and the Quest for Privacy in South Africa. *Med Anthropol*. 2016;35(2):161-176. doi:10.1080/01459740.2015.1094067
7. Chinyama J, Chipungu J, Rudd C, et al. Menstrual hygiene management in rural schools of Zambia: a descriptive study of knowledge, experiences and challenges faced by schoolgirls. *BMC Public Health*. 2019;19(1):16. doi:10.1186/s12889-018-6360-2
8. Sivakami M, Maria van Eijk A, Thakur H, et al. Effect of menstruation on girls and their schooling, and facilitators of menstrual hygiene management in schools: surveys in government schools in three states in India, 2015. *J Glob Health*. 9(1):010408. doi:10.7189/jogh.09.010408
9. Ndlovu E, Bhala E. Menstrual hygiene – A salient hazard in rural schools: A case of Masvingo district of Zimbabwe. *Jamba*. 2016;8(2):204. doi:10.4102/jamba.v8i2.204
10. Girod C, Ellis A, Andes KL, Freeman MC, Caruso BA. Physical, Social, and Political Inequities Constraining Girls’ Menstrual Management at Schools in Informal Settlements of Nairobi, Kenya. *J Urban Health*. 2017;94(6):835-846. doi:10.1007/s11524-017-0189-3
11. Das P, Baker KK, Dutta A, et al. Menstrual Hygiene Practices, WASH Access and the Risk of Urogenital Infection in Women from Odisha, India. *PLoS One*. 2015;10(6):e0130777. doi:10.1371/journal.pone.0130777

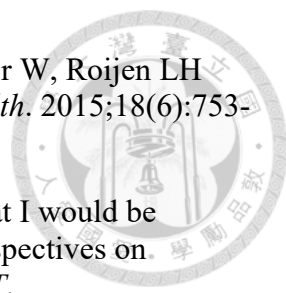
- 
12. Anand E, Singh J, Unisa S. Menstrual hygiene practices and its association with reproductive tract infections and abnormal vaginal discharge among women in India. *Sex Reprod Healthc*. 2015;6(4):249-254. doi:10.1016/j.srhc.2015.06.001
 13. Sebert Kuhlmann A, Peters Bergquist E, Danjoint D, Wall LL. Unmet Menstrual Hygiene Needs Among Low-Income Women. *Obstet Gynecol*. 2019;133(2):238-244. doi:10.1097/AOG.0000000000003060
 14. Gruer C, Hopper K, Smith RC, Kelly E, Maroko A, Sommer M. Seeking menstrual products: a qualitative exploration of the unmet menstrual needs of individuals experiencing homelessness in New York City. *Reproductive Health*. 2021;18(1):77. doi:10.1186/s12978-021-01133-8
 15. Casola AR, Luber K, Riley AH, Medley L. Menstrual Health: Taking Action Against Period Poverty. *Am J Public Health*. 2022;112(3):374-377. doi:10.2105/AJPH.2021.306622
 16. New World Bank country classifications by income level: 2022-2023. Published July 1, 2022. Accessed June 6, 2023. <https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2022-2023>
 17. News · CBC. Ontario students to get free menstrual products as part of deal with Shoppers Drug Mart | CBC News. CBC. Published October 8, 2021. Accessed April 25, 2023. <https://www.cbc.ca/news/canada/toronto/ontario-free-menstrual-products-shoppers-period-poverty-1.6204580>
 18. Ontario Launches Free Menstrual Products in Schools. [news.ontario.ca](https://news.ontario.ca/en/release/1000941/ontario-launches-free-menstrual-products-in-schools). Accessed April 25, 2023. <https://news.ontario.ca/en/release/1000941/ontario-launches-free-menstrual-products-in-schools>
 19. Legislation - HB0205. Accessed February 18, 2022. <https://mgaleg.maryland.gov/mgawebsite/Legislation/Details/HB0205?ys=2021RS#:~:text=Requiring%20each%20county%20board%20of,least%20two%20women%27s%20restrooms%20by>
 20. Diapers and tampons shake ‘nonessential item’ tax status in more states as prices rise. Accessed April 25, 2023. <https://www.nbcnews.com/business/consumer/states-cut-taxes-diapers-tampons-high-inflation-rcna42537>
 21. Period Products Free Provision Scotland Bill. Accessed April 25, 2023. <https://www.parliament.scot/bills-and-laws/bills/period-products-free-provision-scotland-bill>
 22. Taiwan. In: *The World Factbook*. Central Intelligence Agency; 2023. Accessed April 21, 2023. <https://www.cia.gov/the-world-factbook/countries/taiwan/>
 23. Wu TY, Majeed A, Kuo KN. An overview of the healthcare system in Taiwan. *London J Prim Care (Abingdon)*. 2010;3(2):115-119.
 24. 衛生福利部. National Health Expenditure. 衛生福利部. Published January 9, 2017. Accessed April 21, 2023. <https://www.mohw.gov.tw/lp-130-2.html>

- 
25. 2.16.886.101.20003. 族群. 行政院全球資訊網. Published March 28, 2023. Accessed June 4, 2023. <https://www.ey.gov.tw/state/99B2E89521FC31E1/2820610c-e97f-4d33-aa1e-e7b15222e45a>
26. Act of Gender Equality in Employment - Legislative History - Laws & Regulations Database of The Republic of China (Taiwan). Accessed April 25, 2023. <https://law.moj.gov.tw/ENG/LawClass/LawHistory.aspx?pcode=N0030014>
27. Spain gives menstrual leave to female workers. Other countries do, too. - The Washington Post. Accessed May 11, 2023. <https://www.washingtonpost.com/world/2023/02/17/spain-paid-menstrual-leave-countries/>
28. Spain passes Europe's first paid "menstrual leave" law. euronews. Published February 16, 2023. Accessed June 4, 2023. <https://www.euronews.com/next/2023/02/16/spain-set-to-become-the-first-european-country-to-introduce-a-3-day-menstrual-leave-for-wo>
29. Paid menstrual leave: a rare right - Taipei Times. Published December 19, 2022. Accessed April 25, 2023. <https://www.taipeitimes.com/News/feat/archives/2022/12/19/2003790976>
30. King S. Menstrual Leave: Good Intention, Poor Solution. In: Hassard J, Torres LD, eds. *Aligning Perspectives in Gender Mainstreaming: Gender, Health, Safety, and Wellbeing*. Aligning Perspectives on Health, Safety and Well-Being. Springer International Publishing; 2021:151-176. doi:10.1007/978-3-030-53269-7_9
31. Chang C, Chen FL, Chang CH, Hsu CH. A preliminary study on menstrual health and menstrual leave in the workplace in Taiwan. 台灣公共衛生雜誌. 2011;30(5). Accessed April 25, 2023. <https://www.proquest.com/openview/4337b67db26f2ad03f29586da4b00e2b/1?cbl=806341&pq-origsite=gscholar&parentSessionId=yp8O84LugXRHz8%2FvrHmJNec%2BcE2iljxiItzWqbaTUUG%3D>
32. The Unspeakable Pain of Period Poverty and Shame in China. RADII | Stories from the center of China's youth culture. Published September 14, 2020. Accessed April 28, 2022. <https://radiichina.com/menstrual-period-poverty-shame-china/>
33. Wang Y. China made 85 billion sanitary pads last year, and not one tampon. Here's why. Los Angeles Time. Published March 18, 2016. Accessed April 28, 2022. <https://www.latimes.com/world/asia/la-fg-china-tampons-20160318-story.html>
34. The woman who brought menstrual cups to Taiwan - Taipei Times. Published November 28, 2017. Accessed April 26, 2023. <https://www.taipeitimes.com/News/taiwan/archives/2017/11/28/2003683064>


- 
35. First menstrual cup to be legally available in Taiwan. *BBC News*. <https://www.bbc.com/news/world-asia-37906227>. Published November 10, 2016. Accessed April 25, 2023.
36. Atkin E. Why Do Americans Refuse to Give Up Tampons? *The New Republic*. Published online May 21, 2018. Accessed April 26, 2023. <https://newrepublic.com/article/148432/americans-refuse-give-tampons>
37. Kounang N. What's in your pad or tampon? CNN. Published November 13, 2015. Accessed April 26, 2023. <https://www.cnn.com/2015/11/13/health/whats-in-your-pad-or-tampon/index.html>
38. May T, Chien AC. 'Stand by Her': In China, a Movement Hands Out Free Sanitary Pads in Schools. *The New York Times*. <https://www.nytimes.com/2020/11/09/world/asia/china-period-shame-universities.html>. Published November 9, 2020. Accessed April 25, 2022.
39. Taipei pilot project to give students free menstrual pads - Taipei Times. Accessed April 25, 2023. <https://www.taipeitimes.com/News/taiwan/archives/2021/04/05/2003755117>
40. 一場以月經為名的運動 | 小紅帽 With Red. Accessed April 25, 2023. <https://www.littleredhood.org/>
41. Lin V. With Red & Period Museum: A global menstrual movement initiated from Taiwan. Presented at: June 1, 2023; National Taiwan University College of Public Health.
42. Taipei to offer high school girls period products, a first in Asia | Taiwan News | 2021-08-27 16:30:00. Accessed April 28, 2022. <https://www.taiwannews.com.tw/en/news/4277786>
43. Tainan City Government. Dedicated to Building A Gender-Friendly City, Tainan City Government Signs MOU With KNH Enterprise To Continue Luna Period Project. Tainan News. Published December 20, 2018. Accessed April 25, 2023. https://www.tainan.gov.tw/en/News_Content.aspx?n=13205&s=7871004&Create=1
44. World Health Organization. Adolescent health in the South-East Asia Region. Adolescent health. Accessed June 4, 2023. <https://www.who.int/southeastasia/health-topics/adolescent-health>
45. Schoep ME, Adang EMM, Maas JWM, Bie BD, Aarts JWM, Nieboer TE. Productivity loss due to menstruation-related symptoms: a nationwide cross-sectional survey among 32 748 women. *BMJ Open*. 2019;9(6):e026186. doi:10.1136/bmjopen-2018-026186
46. Delanerolle G, Yang X, Cavalini H, et al. An Exploratory Systematic Review and Meta-analysis on Period Poverty. Published online January 18, 2023:2023.01.18.23284706. doi:10.1101/2023.01.18.23284706

- 
47. Hennegan J, Winkler IT, Bobel C, et al. Menstrual health: a definition for policy, practice, and research. *Sex Reprod Health Matters*. 29(1):1911618. doi:10.1080/26410397.2021.1911618
48. Hennegan J, Nansubuga A, Smith C, Redshaw M, Akullo A, Schwab KJ. Measuring menstrual hygiene experience: development and validation of the Menstrual Practice Needs Scale (MPNS-36) in Soroti, Uganda. *Open access*.:16.
49. Cardoso LF, Scolese AM, Hamidaddin A, Gupta J. Period poverty and mental health implications among college-aged women in the United States. *BMC Women's Health*. 2021;21(1):14. doi:10.1186/s12905-020-01149-5
50. Sumpter C, Torondel B. A Systematic Review of the Health and Social Effects of Menstrual Hygiene Management. *PLOS ONE*. 2013;8(4):e62004. doi:10.1371/journal.pone.0062004
51. Sveinsdóttir H. Menstruation, objectification and health-related quality of life: A questionnaire study. *J Clin Nurs*. 2018;27(3-4):e503-e513. doi:10.1111/jocn.14049
52. Chang YT, Chen YC. Menstrual Health Care Behavior and Associated Factors Among Female Elementary Students in the Hualien Region. *Journal of Nursing Research*. 2008;16(1):8. doi:10.1097/01.JNR.0000387285.23065.2d
53. Chen HM, Chen CH. Related Factors and Consequences of Menstrual Distress in Adolescent Girls with Dysmenorrhea. *The Kaohsiung Journal of Medical Sciences*. 2005;21(3):121-127. doi:10.1016/S1607-551X(09)70288-8
54. Factors impacting on menstrual hygiene and their implications for health promotion - Anne Mutunda Lahme, Ruth Stern, Diane Cooper, 2018. Accessed October 4, 2021. https://journals.sagepub.com/doi/full/10.1177/1757975916648301?casa_token=pjPORFqoij0AAAAA%3A5IrB1xPH28wOUHnVtE2kJuaa5ODAssOuSIV14X5O0wNKwGZaRDKOle4aIAwU_ydiExnSWeMbOIXZ&
55. Kaur R, Kaur K, Kaur R. Menstrual Hygiene, Management, and Waste Disposal: Practices and Challenges Faced by Girls/Women of Developing Countries. *Journal of Environmental and Public Health*. 2018;2018:e1730964. doi:10.1155/2018/1730964
56. Sommer M, Gruer C, Smith RC, Maroko A, Kim Hopper null. Menstruation and homelessness: Challenges faced living in shelters and on the street in New York City. *Health Place*. 2020;66:102431. doi:10.1016/j.healthplace.2020.102431
57. Munro AK, Keep M, Hunter EC, Hossain SZ. Confidence to manage menstruation among university students in Australia: Evidence from a cross-sectional survey. *Womens Health (Lond Engl)*. 2022;18:17455065211070666. doi:10.1177/17455065211070666
58. Why Asian women still suffer period stigma, and how a culture of openness could end taboos | South China Morning Post. Accessed April 25, 2022. <https://www.scmp.com/lifestyle/health-wellness/article/3073866/why-asian-women-still-suffer-period-stigma-and-how>

- 
59. Zeng J, Liu B, Sun X, Wu J. ‘Blooming’: A Design Concept for Period Poverty in Rural Areas of China. In: Rau PLP, ed. *Cross-Cultural Design. Applications in Arts, Learning, Well-Being, and Social Development*. Lecture Notes in Computer Science. Springer International Publishing; 2021:408-422. doi:10.1007/978-3-030-77077-8_31
60. Furth C, Ch’en S yueh. Chinese Medicine and the Anthropology of Menstruation in Contemporary Taiwan. *Medical Anthropology Quarterly*. 1992;6(1):27-48. doi:10.1525/maq.1992.6.1.02a00030
61. Yeung DY, Tang CS kum, Lee A. Psychosocial and Cultural Factors Influencing Expectations of Menarche: A Study on Chinese Premenarcheal Teenage Girls. *Journal of Adolescent Research*. 2005;20(1):118-135. doi:10.1177/0743558404271134
62. Cheng CY, Yang K, Liou SR. Taiwanese adolescents’ gender differences in knowledge and attitudes towards menstruation. *Nursing & Health Sciences*. 2007;9(2):127-134. doi:10.1111/j.1442-2018.2007.00312.x
63. Chang YT, Chen YC, Hayter M, Lin ML. Menstrual and menarche experience among pubescent female students in Taiwan: implications for health education and promotion practice. *Journal of Clinical Nursing*. 2009;18(14):2040-2048. doi:10.1111/j.1365-2702.2008.02545.x
64. Red 小紅帽 With. 調查報告 | COVID-19 爆發後的臺灣月經貧窮現況. 小紅帽 With Red. Published December 18, 2021. Accessed April 23, 2022. <https://medium.com/withred/covid-19-periodpoverty-c1c724c0ac8b>
65. Chung FF, Yao CCC, Wan GH. The Associations between Menstrual Function and Life Style/Working Conditions among Nurses in Taiwan. *Journal of Occupational Health*. 2005;47(2):149-156. doi:10.1539/joh.47.149
66. Chang PJ, Chen PC, Hsieh CJ, Chiu LT. Risk factors on the menstrual cycle of healthy Taiwanese college nursing students. *Australian and New Zealand Journal of Obstetrics and Gynaecology*. 2009;49(6):689-694. doi:10.1111/j.1479-828X.2009.01097.x
67. Lu Z yann J. The relationship between menstrual attitudes and menstrual symptoms among Taiwanese women. *Journal of Advanced Nursing*. 2001;33(5):621-628. doi:10.1046/j.1365-2648.2001.01705.x
68. Krusz E, Hall N, Barrington DJ, et al. Menstrual health and hygiene among Indigenous Australian girls and women: barriers and opportunities. *BMC Women’s Health*. 2019;19(1):146. doi:10.1186/s12905-019-0846-7
69. Hennegan J, Brooks DJ, Schwab KJ, Melendez-Torres GJ. Measurement in the study of menstrual health and hygiene: A systematic review and audit. *PLoS One*. 2020;15(6):e0232935. doi:10.1371/journal.pone.0232935

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70. Bouwmans C, Krol M, Severens H, Koopmanschap M, Brouwer W, Roijen LH van. The iMTA Productivity Cost Questionnaire. *Value in Health*. 2015;18(6):753-758. doi:10.1016/j.jval.2015.05.009
71. Lombardo AR, Sao SS, Abboud S, et al. "It was just a given that I would be uncomfortable on my period:" Adolescent and young adult perspectives on menstrual health management. *UNPUBLISHED MANUSCRIPT*.
72. Liu HL, Chen KH, Peng NH. Cultural Practices Relating to Menarche and Menstruation among Adolescent Girls in Taiwan—Qualitative Investigation. *Journal of Pediatric and Adolescent Gynecology*. 2012;25(1):43-47. doi:10.1016/j.jpag.2011.08.006
73. Daley AJ. Exercise and Primary Dysmenorrhoea. *Sports Med*. 2008;38(8):659-670. doi:10.2165/00007256-200838080-00004
74. Kim MJ, Cho J, Ahn Y, Yim G, Park HY. Association between physical activity and menopausal symptoms in perimenopausal women. *BMC Womens Health*. 2014;14:122. doi:10.1186/1472-6874-14-122
75. Li S, Holm K, Gulanick M, Lanuza D, Penckofer S. The relationship between physical activity and perimenopause. *Health Care Women Int*. 1999;20(2):163-178. doi:10.1080/073993399245863
76. Marván ML, Espinosa-Hernández G, Vacio A. Premenarcheal Mexican girls' expectations concerning perimenstrual changes and menstrual attitudes. *J Psychosom Obstet Gynaecol*. 2002;23(2):89-96. doi:10.3109/01674820209042790
77. Adolescent Girls' Perspectives of Family Interactions Related to Menarche and Sexual Health - Anne M. Teitelman, 2004. Accessed April 25, 2023. <https://journals.sagepub.com/doi/10.1177/1049732304268794>
78. About bloody time: Is Australia ready for paid menstrual leave? Money magazine. Published March 7, 2023. Accessed May 11, 2023. <https://www.moneymag.com.au/about-bloody-time-is-australia-ready-to-provide-paid-menstrual-leave>
79. Klein JR, Litt IF. Epidemiology of Adolescent Dysmenorrhea. *Pediatrics*. 1981;68(5):661-664. doi:10.1542/peds.68.5.661
80. Schatz DB, Hsiao MC, Liu CY. Premenstrual Dysphoric Disorder in East Asia: A Review of the Literature. *Int J Psychiatry Med*. 2012;43(4):365-380. doi:10.2190/PM.43.4.f
81. Huang PT, Huang JH. Menstrual Cup Use Intention and the Moderating Effects of Sexual Orientation and Gender Characteristic Among Female University Students in Taiwan: A Theory-Driven Exploration. *Arch Sex Behav*. 2020;49(4):1355-1366. doi:10.1007/s10508-019-1412-y
82. An exploration of tampon use intentions among female college students based on the Theory of Planned Behavior: examining sexual orientation and gender characteristic as effect modifiers - ProQuest. Accessed April 25, 2023.

<https://www.proquest.com/openview/c9764be7d681d0146941b1839a82b98d/1?cbl=806341&pq-origsite=gscholar&parentSessionId=3behKmqle4wqn46%2Blaf%2FQd4V1S1mFzIukDxmOkANyik%3D>

- 
83. Hossain F. *Menstrual Cup Use Intention Among Female University Students: Examples from Bangladesh and Japan*. Master's. National Taiwan University; 2021.
84. Schmitt ML, Booth K, Sommer M. A Policy for Addressing Menstrual Equity in Schools: A Case Study From New York City, U.S.A. *Frontiers in Reproductive Health*. 2022;3. Accessed April 5, 2023. <https://www.frontiersin.org/articles/10.3389/frph.2021.725805>
85. Sebert Kuhlmann A, Key R, Billingsley C, Shato T, Scroggins S, Teni MT. Students' Menstrual Hygiene Needs and School Attendance in an Urban St. Louis, Missouri, District. *Journal of Adolescent Health*. 2020;67(3):444-446. doi:10.1016/j.jadohealth.2020.05.040
86. Liang CH. *Teachers' and Pupils' Perceptions of Sex Education in Taiwan and England: A Comparative Study*. phd. University of Warwick; 2010. Accessed May 15, 2023. <http://webcat.warwick.ac.uk/record=b2339681~S15>
87. Chang YT, Hayter M, Lin ML. Pubescent male students' attitudes towards menstruation in Taiwan: implications for reproductive health education and school nursing practice. *Journal of Clinical Nursing*. 2012;21(3-4):513-521. doi:10.1111/j.1365-2702.2011.03700.x



Appendix Table 1. Additional sample characteristics (n=121)

	n	%	Mean	SD	Range
Knowledge					
Knew what a period was prior to menarche	100	82.64			
Identified hormones as the cause of menstruation	110	90.91			
Identified the uterus as the source of bleeding	105	86.78			
Felt had sufficient knowledge to manage own period	106	87.60			
Perceived stigma*					
Menstruation is normal and healthy part of life	116	95.87			
Menstruation is a curse	7	5.79			
Menstruation is debilitating	79	65.29			
Society sees menstruation as a taboo	26	21.49			
Comfort discussing menstruation					
Overall average			2.83	0.70	(0.44, 4)
With females			3.36	0.67	(0.50, 4)
With males			2.17	0.88	(0, 4)
With partner			3.40	0.89	(0, 4)
Comfortable discussing menstruation with*					
Mother/female caregiver	121	85.95			
Father/male caregiver	118	33.90			
Sister	100	89.00			
Brother	88	42.04			
Female friend	121	94.22			
Male friend	113	49.55			
Partner	92	84.78			
Female health professional	118	96.61			
Male health professional	111	73.88			
Female employer	92	69.56			
Male employer	84	22.62			
Female teacher	116	82.76			
Male teacher	114	33.33			
Menstrual characteristics					
Painful periods	91	75.21			
Irregular/missing periods	79	65.29			
Heavy bleeding	9	7.44			
Migraines/headaches	52	42.98			
Emotional dysregulation	82	67.77			
Other (back pain, gastrointestinal problems, acne)	90	74.38			
Perception of bathroom facilities					
Privacy			3.55	0.67	(1, 4)
Functional toilets			3.20	0.90	(0, 4)
Clean and sanitary			2.52	0.89	(0, 4)
Functional locks on doors			3.75	0.47	(2, 4)
Available bin to dispose materials			3.68	0.58	(1, 4)
Toilet paper			2.32	1.13	(0, 4)
Clean running water and soap			3.01	0.99	(0, 4)
Perceived menstrual health					
Very bad	6	4.96			
Bad	34	28.10			
Neither good nor bad	34	28.10			
Good	44	36.36			
Very good	3	2.48			
Period poverty over the past year					
Never	90	74.38		88.43	
Occasionally	17	14.05			
Sometimes	10	8.26		11.57	
Frequently	3	2.48			
Always	1	0.83			
School absenteeism (n=106)					
Never	65	61.32			
Less than one day a month	25	23.58			
One day a month	11	10.38			
More than one day a month	5	4.72			
Work absenteeism (n=70)					
Never	52	74.29			
Less than one day a month	10	14.29			
One day a month	7	10.00			
More than one day a month	1	1.43			
Social disengagement (n=121)					
Never	54	44.63			
Less than one day a month	46	38.02			
One day a month	14	11.57			
More than one day a month	7	5.79			

Note. SD=standard deviation; *percent agreed or strongly agreed

Appendix Table 2. Bivariate analysis of age and menstrual characteristics

	n(%)	Age		t-score
		Mean	SD	
Menstrual characteristics				
Physical pain				-0.78
No	9(7.44)	20.22	2.28	
Yes	112(92.56)	20.89	2.49	
Bleeding dysregulation				-0.06
No	40(33.06)	20.83	2.75	
Yes	81(66.94)	20.85	2.34	
Emotional dysregulation				-2.06*
No	39(32.23)	20.18	2.57	
Yes	82(67.77)	21.16	2.38	
Previously consulted a doctor about menstruation				-2.15*
No	65(53.72)	20.40	2.61	
Yes	56(46.28)	21.36	2.21	

Note. SD=standard deviation; * $p < 0.05$; ** $p < 0.01$.

Survey Instrument



臺灣青少年及青年之經期健康與其影響因素網路調查研究

您好:

這是一份由國立臺灣大學公共衛生學院執行的【匿名學術問卷調查】，若您是【15-24 歲初經後的女性，且現居於臺灣】，誠摯邀請您參加本研究。此研究目的是了解臺灣女性青年經期健康狀況，問卷填答時間約 10 分鐘。您的參與對於本研究十分重要，問卷沒有標準答案，也沒有對錯，請依據您的真實經驗與想法作答。

本研究使用 Qualtrics 做為網路問卷平台，此線上問卷軟體已被廣泛使用於學術研究及各類的線上調查中，具有商業規格之使用者資安保護機制，僅架設此網路問卷之研究人員有權限可開啟及取得研究資料。您所提供的資料將以整體統計方式呈現，不會顯示您個別填答之資料，您的填答將絕對保密且只限於論文研究中使用，並不會做為其他用途，請不用擔心資料會外流，敬請放心作答。

研究計畫主持人將依法把任何可辨識您身分之紀錄與您個人隱私之資料視同機密處理，絕對不會公開。所蒐集的資料將以完全去連結之方式妥善保存至 2024 年 02 月研究結束，並於年限後將資料及其加密的檔案全數刪除，完全銷毀。此外，您保有退出研究之權利，若於填答過程中有任何退出之想法，隨時可以停止作答；關閉頁面，即可退出並終止參與研究，而您所填答之資料亦不會留存。

本研究經費來源為自籌。若您在研究過程中有任何疑問，歡迎您與本計畫負責之研究生聯絡，電子信箱：r10853007@ntu.edu.tw，或可與臺灣大學研究倫理中心聯絡諮詢，電話：(02) 3366-9956；電子信箱：ordre@ntu.edu.tw。

若您願意參與本研究，請按《下一頁》並開始填寫。若您的年齡為 20 歲以下，請進入下面的閱讀「家長知情同意宣告」，並告知家長有關此研究之相關資訊。為感謝對本研究之協助，凡完成填答並提交問卷者，將提供每一位參與者相關衛教資訊以茲參考，並以人人有獎的方式抽獎以表感謝。

國立臺灣大學 公共衛生學院 指導教授 張齡尹
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家長知情同意宣告

親愛的家長，您好：

這是一份由國立臺灣大學公共衛生學院執行的【匿名學術問卷調查】，目的為了解臺灣女性青年經期健康狀況，調查對象為 15-24 初經後的年輕女性。本問卷無標準答案，主要想了解您孩子的真實經驗與想法。

本研究使用 Qualtrics 做為網路問卷平台，此線上問卷軟體已被廣泛使用於學術研究及各類的線上調查中，具有商業規格之使用者資安保護機制，僅架設此網路問卷之研究人員有權限可開啟及取得研究資料。您的孩子所提供的資料將以整體統計方式呈現，不會顯示其個別填答之資料，將絕對保密且只限於論文研究中使用，並不會做為其他用途，故不用擔心資料會外流，敬請您的孩子放心作答。研究計畫主持人將依法把任何可辨識您身分之紀錄與您個人隱私之資料視同機密處理，絕對不會公開。所蒐集的資料將以完全去連結之方式妥善保存至 2024 年 02 月研究結束，並於年限後將資料及其加密的檔案全數刪除，完全銷毀。

您孩子的參與對本研究十分重要，然而，若您不同意您的子女參加本研究，請於 2023 年 4 月前聯絡本計畫主持人，即可要求撤回您孩子所提供的資料。

本研究經費來源為自籌。若您在研究過程中有任何疑問，歡迎您與本計畫負責之研究生聯絡，電子信箱：r10853007@ntu.edu.tw，或可與臺灣大學研究倫理中心聯絡諮詢，電話：(02) 3366-9956；電子信箱：ordre@ntu.edu.tw。

若您同意您的孩子參與本研究，請您自行列印或儲存本業內容，並請按《下一頁》讓您的孩子開始填寫。

國立臺灣大學 公共衛生學院

指導教授 張齡尹

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A. 首先, 想先請教您一些初步的問題：

A1. 請問您幾歲？

A2. 請問您的生理性別為何？

男性

女性

其他

B. 接下來, 想詢問您對生理期的想法。請問您對下列的陳述是【非常不同意】、【不同意】、【不同意也不反對】、【同意】，或是【非常同意】。

B1. 生理期是生活中正常且健康的一部分

非常不同意

不同意

不同意也不反對

同意

非常同意

B2. 生理期是一種詛咒

非常不同意

不同意

不同意也不反對

同意

非常同意

B3. 生理期使人衰弱

非常不同意

不同意

不同意也不反對

同意

非常同意



B4. 臺灣現代社會視生理期是一種禁忌

非常不同意

不同意

不同意也不反對

同意

非常同意

B5. 請問您是否能自在地和下列哪些人談論生理期?



	非常 不同意	不同意	不同意 也不反對	同意	非常同意	不適用
母親/女性 照顧者						
父親/男性 照顧者						
姐妹						
兄弟						
女性朋友						
男性朋友						
伴侶						
女性健康 職業人員						
男性健康 職業人員						
女性雇主						
男性雇主						
女性老師						
男性老師						



C1. 請問您在生理期期間是否有以下症狀？

- 痛經
- 週期不規則或沒來
- 嚴重出血
- 偏頭痛或頭痛
- 情緒症狀（例如：喜怒無常，緊張、憂鬱）
- 其他（例如：背痛、胃腸道問題、長痘痘）
- 我沒有任何副作用

C2. 請問您是否曾因生理期的症狀而諮詢醫生？

是

否 [跳答 C3]



C3. 請問您在諮詢醫生之後，被診斷出何種結果？

- 生理期失調
- 痛經（又稱經痛，指的是生理期或在月經前後出現小腹疼痛的症狀）
- 閉經（指的是生育年齡女性無月經或月經停止）
- 子宮異常出血（在生理期之期間出血）
- 子宮內膜異位
- 多囊性卵巢症候群
- 其他（例如：經前焦慮障礙、子宮腺肌病、月經過多）

C4. 請問您最近一次生理期，主要使用何種生理用品？

- 衛生棉
- 衛生棉條
- 月亮杯
- 布巾
- 生理內褲
- 其他（例如：衣服、普通內褲、衛生紙）



D1. 請問您在學校或在工作的時候以下情況發生的頻率為何？

	總是	經常	有時	很少	從不
廁所有足够的隱私讓我可以更換生理用品					
廁所有功能性廁所（不會堵塞、能够沖水、馬桶座沒有損壞等）					
廁所乾淨且衛生					
廁所的門可上鎖，讓我可以 在上廁所時保有隱私					
每間廁所都有垃圾桶讓我可以 丟棄用過的生理用品					
廁所裡有足够的衛生紙讓我可以 清潔/擦拭私密處					
廁所有乾淨的自來水和手部清潔用品					

E1. 請問您在第一次生理期來之前，是否已經知道生理期是什麼嗎？

是

否

不確定/不記得

E2. 請問您認為影響女性生理期的最主要原因是什麼？

激素程度的變化
飲食的變化
體力活動程度的變化
我不知道



E3. 請問您認為生理期的經血是從哪裡來的？

胃臟
子宮
陰道
卵巢
我不知道

E4. 請問您覺得自己是否有足夠的知識來處理您的生理期？

是
否

F1. 請問您在最近一年內，有多常發生難以負擔購買生理用品（例如：衛生棉或衛生棉條）的經驗？

總是
常常
偶爾
有時
從未



G. 「經期健康」被定義為「不僅僅是沒有與生理期相關的疾病與虛弱，更是一個身體、精神和社會適應上的完好狀態。」

G1. 根據以上定義，您覺得您的「經期健康」狀態如何？

非常好

好

不好也不差

差

非常差

H1. 在過去六個月中，您平均多常因生理期而沒去上課？

沒有

每月少於一天

每月一天

每月一天以上

目前沒有上課

H2. 在過去六個月中，您平均多常因生理期而沒去工作？

沒有

每月少於一天

每月一天

每月一天以上

目前沒有上班

H3. 在這個問題中，請選擇「每月少於一天」，以確保您有專心。

沒有

每月少於一天

每月一天

每月一天以上



H4. 在過去六個月中，您平均多常因生理期而缺席其他的活動（上課、上班以外）？

沒有

每月少於一天

每月一天

每月一天以上

H5. 在過去六個月中，您是否曾因生理期而導致在上課時的學習效率較低？

沒有

有[請續答 H5a 與 H5b]

H5a. 平均一個月中，您有幾天會因生理期而導致在學習的學習效率較低？

H5b. 在這些天中，您的平均學習效率為何？（0=完全無效率 ~ 100=跟平常一樣有效率）

H6. 在過去六個月中，您是否曾因生理期而導致上班時的工作效率較低？

沒有

有[請續答 H6a 與 H6b]

H6a. 平均一個月中，您有幾天會因生理期而導致上班時的工作效率較低？

H6b. 在這些天中，您的平均工作效率為何？（0=完全無效率 ~ 100=跟平常一樣有效率）

I. 最後，我們還有一些個人基本問題想請教您。

II. 請問您是哪裡人?

- 台灣閩南人
- 台灣客家人
- 台灣原住民
- 大陸各省市(含港澳金馬)
- 其他，請說明： _____



I2. 請問您目前居住在哪一個縣/市？

臺北市

新北市

基隆市

桃園市

臺中市

臺南市

高雄市

新竹縣

苗栗縣

彰化縣

南投縣

雲林縣

嘉義縣

屏東縣

宜蘭縣

花蓮縣

臺東縣

澎湖縣

金門縣

連江縣



I3. 最近一年，您家中每月的平均總收入大約為多少元？



未滿 3 萬元

3 萬元以上 ~ 未滿 5 萬元

5 萬元以上 ~ 未滿 7 萬元

7 萬元以上 ~ 未滿 10 萬元

10 萬元以上 ~ 未滿 15 萬元

15 萬元以上 ~ 未滿 20 萬元

20 萬元以上

不知道

J1. 請您留下 Email，此資訊將只作為發放禮品之聯絡方式。

感謝您花時間參與此調查。

我們已記錄您的回應。