

# Risks and Consequences: An Analysis of Unintended Pregnancies and Unsafe Abortions among Female Factory Workers in Sri Lanka

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**Abstract** - In Sri Lanka, the occurrence of unsafe abortions remains a significant issue although the country only allows abortions when a woman's life is at risk. The Female Factory Workers (FFWs) are among the groups particularly susceptible to unsafe abortions. The objective of this research is to investigate the knowledge and practices of FFWs regarding unintended pregnancies and unsafe abortion. A structured questionnaire was administered by a team of trained interviewers among randomly selected 608 FFWs of reproductive age using multi-stage cluster sampling after receiving written informed consent. The knowledge among FFWs regarding managing unintended pregnancies and unsafe abortion is relatively limited. In particular, the knowledge of younger respondents is significantly lower compared to adults, placing them at higher vulnerability if they engage in sexual activity. The occurrence of unintended pregnancies and unsafe abortions is not uncommon within the group of FFWs who have experienced pregnancy, with rates of 22% and 7.4% respectively. Nearly half (47%) of the pregnancies reported among young FFWs were unintended. Among the 22 women who had undergone an abortion, 5 had never utilized any form of contraception, while 20 had never used Emergency Contraceptives. Focused interventions are needed to address the issue. Improving FFW's knowledge and access to resources can benefit both workers and management in long-run.

**Keywords:** Unwanted Pregnancy, Induced Abortion, Export Processing Zone, Contraception, Knowledge

## I. INTRODUCTION

The right to Sexual and Reproductive Health (SRH) is a fundamental human right recognized by the international community, and access to comprehensive SRH services is crucial for women's overall health and well-being. However, despite progress in some areas, many women around the world still face significant barriers to accessing these services, particularly women working in the informal economy, including FFWs (WHO, 2020). In Sri Lanka, the export processing zones (EPZs) have become an important source of employment for women, with over 100,000 women working in these zones as of 2019 (SLBFE, 2019). However, despite the economic benefits of EPZ employment, FFW often face a range of challenges related to their SRH, including limited access to comprehensive SRH services

(Peter, *et al.*, 2015; Peter, *et al.*, 2012; Rajapakse, *et al.*, 2018; Rajapakshe & De Silva, 2000).

It is well known that a significant portion of factories based in EPZs fail to offer satisfactory wages or assistance to their female workforce, leaving employees to endure substandard living conditions. These individuals are compelled to toil extended hours, all while grappling with the possibility of experiencing sexual and/or physical abuse (Engman, *et al.*, 2007; Peter, *et al.*, 2015). Moreover, the matter of sexual harassment has emerged as a notable concern among female employees in EPZs. Numerous women are compelled to reside in inexpensive housing away from their families, intensifying their sense of vulnerability (Peter, *et al.*, 2012).

According to a recent study, the healthcare-seeking tendencies of individuals employed in the Koggala Export Processing Zone (KgEPZ) are hindered by several factors, leading to a suboptimal level of engagement with healthcare services (Rajapakse, *et al.*, 2018). Hence, the community of EPZ workers, including those employed in the garment industry, is recognized as being highly susceptible to unintended pregnancies and induced abortions (Rajapakshe & De Silva, 2000).

An unintended pregnancy refers to a pregnancy that is either undesired, occurring when individuals do not wish to have any children or any more children, or mistimed, occurring earlier than the desired timing (CDC, 2021). Therefore, experiencing an unintended pregnancy poses various risks, including an increased likelihood of unsafe abortion and adverse effects on maternal mental health. These effects encompass perinatal depression, heightened stress levels, and diminished psychological well-being, ultimately leading to reduced life satisfaction (Bahk, *et al.*, 2015).

The reported prevalence of unplanned pregnancies in Sri Lanka varies from 17.2% to 46% (Malavige, 2010; Nawaratne, 2015; Edirisinghe, 2013; Ranatunga & Jayaratne, 2020). A community-based cross-sectional study conducted in 2010 in the Bentota MOH area revealed 46.7% of unplanned pregnancies (Malavige, 2010). According to

research conducted in 2015 within the Colombo Municipal Council approximately 44% of pregnancies were found to be unplanned (Nawaratne, 2015).

Additionally, a separate study conducted in the General Hospital Matara in 2013 revealed that 23.3% of pregnancies were unplanned (Edirisinghe, 2013). As per the findings of a recent hospital-based study conducted in 2020, which involved 494 pregnant women and utilized the London Measure of Unplanned Pregnancy (LMUP) tool, it was determined that approximately 17.2% of pregnancies among Sri Lankan women were unintended (Ranatunga & Jayaratne, 2020).

As stated by the World Health Organization (WHO), an unsafe abortion refers to the termination of an unintended pregnancy carried out by individuals without the required expertise or in an environment that lacks the essential medical standards, or both (WHO, 2007; WHO, 2022). In Sri Lanka, abortion is considered a criminal act except in cases where it is conducted to preserve the life of the mother (Penal Code, 1883). Despite the presence of a substantial national contraceptive prevalence rate of 65%, with 54% utilizing modern contraceptive methods (DCS, 2017), certain women still encounter unintended pregnancies.

Regrettably, some of these individuals turn to illegal means, such as abortion, to address their situations (Senanayake, *et al.*, 2008). In a study conducted during the 1990s, an estimation was made indicating that there were approximately 125,000 to 175,000 abortions performed in a single year, predominantly being illegal procedures (De Silva, 1997). Subsequently, in a study carried out in 2000, a significantly higher rate of 658 induced abortions per day was estimated, resulting in an annual count of 240,170 abortions and an abortion ratio of 741 per 1000 live births (Rajapakshe, 2000). Applying Bongarts' model, a later study revealed a notable increase in the induced abortion rate from 0.035 abortions per woman in 1993 to 0.087 abortions per woman in 2007 (Abeykoon, 2012).

Following the introduction of medical abortion pills, there has been a notable transformation in the landscape of abortion practices in Sri Lanka. Women seeking to terminate their pregnancies now have convenient access to abortion pills, such as Misoprostol, which they can self-administer in the comfort of their homes (De Silva, 2019; Suranga & De Silva, 2020). However, there is limited scientific evidence and research available concerning the prevalence of medical abortion in Sri Lanka (Kaluarachchi, *et al.*, 2018). The objective of this study is to investigate the knowledge and behaviors of FFWs in the KgEPZ regarding unintended pregnancies and unsafe abortions.

## II. MATERIAL AND METHODS

The KgEPZ established in 1991, was purposively selected for this study as it is located in a popular tourist area and in the economic centre of the southern province of Sri Lanka.

Currently, 12,670, employees are working attached to 19 different factories of them 74% (n=9,412) are women (Koggala EPZ, 2021). A structured questionnaire was employed by a proficient team of female interviewers to collect data from a randomly selected sample of women in their reproductive age. The interviews were conducted using an online mobile application, and prior written informed consent was obtained from the participants. The research protocol underwent review by the Ethical Review Committee of the Sri Lanka Medical Association (SLMA) and was granted ethical approval on July 26, 2021 (ERC 21 - 013).

For the sampling process, a multi-stage cluster sampling technique was employed, treating each company as an independent cluster. The systematic Probability Proportional to Size (PPS) cluster selection method was utilized to select seven factories for inclusion in the study. (United Nations Secretariat, 2005). During the second stage, a total of 76 respondents were chosen from each factory.

However, one particular company was an exception, as it represented two clusters in the first stage due to its larger cluster size. In this case, the number of respondents selected from that factory was doubled, resulting in a total of 152 participants. The study focused on female employees between the ages of 18 and 49 who were currently working in KgEPZ and had completed at least one year (12 months) of employment at the time of the interview.

The minimum required sample size was determined using the standard sample size calculation formula for proportions with a finite population correction, as outlined by Cochran (1977). The calculation was based on a  $\pm 5\%$  margin of error and a 95% confidence interval, considering a population size of 9,412. To generate the largest sample size, the percentage of unintended pregnancies among FFW was assumed to be 50% (Cochran, 1977). A design effect of 1.5 was taken into account. To accommodate for potential non-responses, the study over-sampled by 10%. Consequently, the final minimum sample size was calculated to be 608 participants. Data entry was not required as the online Kobo tool was utilized for data collection. Data analysis was conducted using the Statistical Package for Social Sciences (SPSS-version 21). Descriptive statistics, statistical estimation techniques, and hypothesis testing (primarily nonparametric) were employed to derive conclusions.

## III. RESULTS OF THE STUDY

The study collected valid responses from 585 FFWs resulting in a 96% response rate. The results showed that the average age of the respondents was 31 years (SD = 8.67) with a range of 18 to 49 years. 31% of the respondents were young (below 25 years) and 67% were ever married. More than half (51%) of the respondents had been pregnant at least once in their lifetime, with 27% reporting more than 2 pregnancies. The majority of the respondents (52%) did not have any children, while 38% had one or two living children.

Education levels of the respondents were high, with 97% having completed their GCE Ordinary Level or higher. On average, the respondents had worked in the KgEPZ for 5 years (SD=4.50) with 47% having worked there for over 3 years. The sample was representative in terms of employment categories, with 3% being Managers/Executives, 15% being

Supervisors/Section leaders, and 82% being workers/associates. The majority of the respondents were Sinhala Buddhists (97.8%), with a small representation of Tamils (1%), Hindus (0.7%), Roman Catholics (1.0%), and Christians (Table I).

TABLE I PROFILE OF THE RESPONDENTS

Variable	Level	Number of Respondents (n=585)	Percentage	Cumulative Percentage
Age (Number of years)	Below 25	180	31%	31%
	25 and above	405	69%	100%
Level of Education	Up to Grade 8	16	3%	3%
	GCE O/L*	363	62%	65%
	GCE A/L**	140	24%	89%
	Above GCE A/L	66	11%	100%
Marital status	Currently Married	379	65%	65%
	Never Married	193	33%	98%
	Divorced	10	2%	99%
	Widow	1	0%	100%
	Other	2	0%	100%
Number of Pregnancies	None	288	49%	49%
	1 to 2	217	37%	86%
	3 or more	80	14%	100%
Number of Living Children	No Children	307	52%	52%
	1 to 2	221	38%	90%
	3 or more	57	10%	100%
Working Experience in the KgEPZ	1 to 3 Years	308	53%	53%
	4 to 6 Years	119	20%	73%
	7 to 9 Years	72	12%	85%
	10 Years and more	86	15%	100%
Designation	Managers, Assistant Managers / Executives	20	3%	3%
	Supervisors / Section leaders / Office assistants	86	15%	18%
	Workers / Associates	479	82%	100%

Note: - \*GCE O/L = General Certificate of Education Ordinary Level, \*\*GCE/AL = General Certificate of Education Advanced Level

*A. Knowledge on Unintended Pregnancies*

The findings indicated that the general understanding of FFWs regarding strategies to prevent unintended pregnancies was limited. Merely 25% of the respondents were aware that a girl could conceive after engaging in sexual activity, even before experiencing her first menstruation.

Furthermore, only 40% possessed knowledge regarding the possibility of pregnancy resulting from intercrural sexual intercourse. Notably, only 31% of the younger participants demonstrated awareness of this fact. Additionally, 67% of

FFW were unaware of the fertile period, and only 51% of youth respondents knew about it. Only 63% of respondents were aware of the possibility of contraceptive failure.

ECs were less well known, with only 26% of respondents being aware of the effective time period to take an ECP, and only 33% being aware that a prescription is not required to purchase ECPs. The knowledge of youth FFW regarding unintended pregnancies was considerably lower than that of adults, with fewer youth respondents answering all questions correctly (Table II).

TABLE II NUMBER AND PERCENTAGE OF RESPONDENTS WHO CORRECTLY ANSWERED THE KNOWLEDGE QUESTIONS ON PREGNANCY AND OVERCOMING UNINTENDED PREGNANCIES DISAGGREGATED BY AGE CATEGORY

	Age				Total (n=585)		Ch <sup>2</sup> test for association X <sup>2</sup> (P)
	Below 25 (n=180)		25 and Above (n=405)		#	%	
	#	%	#	%			
01) A girl can become pregnant after a sexual act even before the first menstruation	39	22%	106	26%	145	25%	1.357 (0.244)
02) A girl or women can become pregnant following an intercrural sexual act	56	31%	178	44%	234	40%	8.560 (0.003)**
03) There are specific days in the menstrual cycle where the chance of becoming pregnant is relatively high	92	51%	301	74%	393	67%	30.446 (0.000)**
04) Any modern contraceptive method is not 100% secure in preventing a pregnancy	83	46%	288	71%	371	63%	33.572 (0.000)**
05) There are some drugs which can be taken even after an unsafe sexual encounter to avoid a pregnancy	111	62%	298	74%	409	70%	8.409 (0.004)**
06) Emergency contraceptives must be taken within 7 days after an unsafe sexual encounter in order to avoid an unintended pregnancy	25	14%	129	32%	154	26%	20.732 (0.000)**
07) A valid prescription from a medical doctor is necessary to purchase Emergency Contraceptive Pills from the pharmacies in Sri Lanka	42	23%	151	37%	193	33%	10.971 (0.001)**
08) Frequent use of emergency contraceptives do not have adverse effects.	122	68%	310	77%	432	74%	4.957 (0.026)*

Note: # = Number of Respondents, % = Percentage of Respondents, \* = Statistically significant association at 95% confidence level, \*\* = Statistically significant association at 99% confidence level

The knowledge of the respondents on unintended pregnancies was found to be associated with several factors including age, marital status, number of pregnancies, number of living children, history of using contraceptives or ECs, history of unintended pregnancy or unsafe abortion, and years of working experience in the KgEPZ. The results showed that the number of years of working experience in the KgEPZ was positively associated with the knowledge of overcoming unintended pregnancies, potentially due to the confounding effect of age. However, there was no statistically significant difference in knowledge between higher and lower designated staff. Marital status also played a role in the respondents' knowledge, with married respondents having more pregnancies and more living children tending to possess a better understanding of unintended pregnancies. Respondents who have ever used contraceptives or ECs were found to have better knowledge compared to those without such experiences. Interestingly, those respondents with a history of unintended pregnancies and unsafe abortion tended to have better knowledge of unintended pregnancies, even though the causality is uncertain. This may be due to the opportunity they had to learn about these aspects while they were dealing with unintended pregnancy or unsafe abortion. This highlights that FFWs tend to acquire information on unintended pregnancies through real-life events rather than formal education (Supplementary material I).

#### B. Knowledge on Unsafe Abortion and Abortion Law

Understanding the knowledge of Female Factory Workers (FFWs) regarding unsafe abortion and the legal regulations

surrounding induced abortion in Sri Lanka is crucial in preventing such incidents in their lives. However, the results of the study indicate that the knowledge of FFWs in this area is inadequate. Merely 11% of the respondents (n=64) were familiar with the circumstances in which abortion is legally permitted in Sri Lanka. Surprisingly, a considerable portion (34%, n=199) believed that abortion is illegal in all situations, even when it is necessary to safeguard the mother's life. Furthermore, a significant proportion (9.3%, n=54) assumed that abortion is only legal when it is essential for the mother's physical and mental well-being. Approximately 15% of the respondents (n=90) incorrectly believed that abortion is within the bounds of the law if the pregnancy involves fetal abnormalities.

Additionally, a small percentage of FFWs (6.2%, n=32) mistakenly believed that abortion is permissible in cases of rape or incest. Remarkably, only 11% of the respondents were knowledgeable about the conditions under which abortion is allowed in Sri Lanka. Approximately two-thirds of the respondents (65%, n=379) held the mistaken belief that providing medical assistance to a woman who has undergone an illegal abortion is considered an offense under the current abortion law. Furthermore, only 55% (n=320) were aware that pregnant women can receive free and safe abortion services from government hospitals if their medical condition during pregnancy is deemed life-threatening. Notably, the knowledge level of young female respondents (below 25 years of age) was significantly lower compared to that of adult respondents. For instance, only 7% of young participants were aware of the legal conditions for induced abortion in Sri Lanka (Table III).

SUPPLEMENTARY MATERIAL I THE MEDIAN NUMBER OF CORRECT ANSWERS PROVIDED TO THE KNOWLEDGE QUESTIONS ON OVERCOMING UNINTENDED PREGNANCIES DISAGGREGATED BY ASSOCIATED FACTORS

Variable	Level	Number of Respondents (n=585)	Median SCORE	Test for association		r (p)
				Mean Rank	Significant	
Age (Years)	Below 25	180	3	221	@ 0.000**	0.274 (0.000)**
	25 and Above	404	4	325		
Years of formal education	Up to GCE O/L	378	4	295	@ 0.641	-0.04 (0.924)
	Above O/L	206	4	289		
Working Experience in the KgEPZ	Less than 5 years	355	4	278	@ 0.006**	0.075 (0.068)
	5 Years and more	229	4	316		
Marital Status	Never Married	193	3	214	@ 0.000**	
	Ever Married	389	4	332		
Number of Pregnancies	Zero	288	3	234	# 0.000**	0.307 (0.000)**
	1 to 2	216	5	353		
	3 to 6	80	5	342		
Number of Living Children	Zero	307	3	241	# 0.000**	0.293 (0.000)**
	1 to 2	220	5	350		
	3 to 6	57	5	351		
Designation	Workers / Associates	478	4	288	@ 0.119	
	Higher grade staff	106	4	316		
Ever used any kind of contraceptive method?	Yes	246	5	359	@ 0.000**	
	No	336	3	243		
Ever used emergency contraceptive pills	Yes	66	5	407	@ 0.000**	
	No	518	4	278		
Has a history of unintended pregnancy	Yes	65	5	374	@ 0.000**	
	No	517	4	283		
Has a history of induced abortion	Yes	22	5	367	@ 0.035*	
	No	560	4	290		

Note: Median SCORE = Median number of correct answers provided by the respondents, @ = Probability value of Mann-Whitney U test, # = Probability value of Kruskal-Wallis test, r = Spearman Rank Correlation Coefficient, P = Probability, \* = statistically significant at 95% confidence level, \*\* = statistically significant at 99% confidence level

TABLE III NUMBER AND PERCENTAGE OF RESPONDENTS WHO CORRECTLY ANSWERED THE KNOWLEDGE QUESTIONS ON UNSAFE ABORTION IN SRI LANKA, DISAGGREGATED BY AGE CATEGORY

Statement	Age				Total (n=585)		Ch <sup>2</sup> test for association X <sup>2</sup> (P)
	Below 25 (n=180)		25 and Above (n=405)		#	%	
	#	%	#	%			
01) The most common reason mentioned by the illegal abortion seekers in Sri Lanka is to terminate the first pregnancy after the marriage.	82	46%	246	61%	328	56%	11.666 (0.001)**
02) Majority of Sri Lankan women who undergo illegal abortion are unmarried youth who were having premarital sex.	26	14%	84	21%	110	19%	3.236 (0.072)
03) Induced abortion is legal in Sri Lanka under some circumstances.	52	29%	147	36%	199	34%	3.043 (0.081)
04) If yes, in which situations is induced abortion legal in Sri Lanka?	12	7%	52	13%	64	11%	4.873 (0.027)*
05) Provision of treatment for a women who has gone through an illegal abortion is an offence as per the present abortion law.	59	33%	147	36%	206	35%	0.676 (0.411)
06) A pregnant women can get free safe abortion service from a government hospital, if the medical condition she has with the pregnancy is considered as a threat to her life.	75	42%	245	60%	320	55%	17.826 (0.000)**

Note: # = Number of Respondents, % = Percentage of Respondents, \* = Statistically significant association at 95% confidence level, \*\* = Statistically significant association at 99% confidence level

The results further showed that various demographic factors such as age, marital status, and number of pregnancies, number of living children, history of using contraceptives, and history of undergoing induced abortion were found to have a significant association with the respondents' knowledge on unsafe abortion and the abortion law. The knowledge on unsafe abortion improved with age and

experience, as ever-married respondents and those with a higher number of pregnancies and living children had a better understanding of unsafe abortion. Respondents who had used contraceptives and undergone induced abortions in the past also tended to have a better understanding of induced abortions (Supplementary material II).

SUPPLEMENTARY MATERIAL II MEDIAN NUMBER OF CORRECT ANSWERS PROVIDED TO THE KNOWLEDGE QUESTIONS OF UNSAFE ABORTION DISAGGREGATED BY ASSOCIATED FACTORS AND TEST RESULTS FOR STATISTICAL ASSOCIATION

Variable	Level	Number of Respondents (n=585)	Median SCORE	Test for association		r(p)
				Mean Rank	Significant	
Age (Years)	Below 25	180	2	245	@ 0.000**	0.196 (0.000)**
	25 and Above	404	2	314		
Years of formal education	Up to GCE O/L	378	2	293	@ 0.949	-0.016 (0.699)
	Above O/L	206	2	294		
Working Experience in the KgEPZ	Less than 5 years	355	2	283	@ 0.077	0.065 (0.114)
	5 Years and more	229	2	308		
Marital Status	Never Married	193	2	272	@ 0.031*	
	Ever Married	389	2	303		
Number of Pregnancies	Zero	288	2	274	# 0.015*	0.129 (0.002)**
	1 to 2	216	2	305		
	3 to 6	80	2	327		
Number of Living Children	Zero	307	2	275	# 0.017*	0.117 (0.005)**
	1 to 2	220	2	315		
	3 to 6	57	2	305		
Designation	Workers / Associates	478	2	283	@ 0.077	
	Higher grade staff	106	2	308		
Ever used any kind of contraceptive method	Yes	246	2	315	@ 0.005*	
	No	336	2	275		
Ever used emergency contraceptive pills	Yes	66	2	323	@ 0.115	
	No	518	2	289		
Has a history of unintended pregnancy	Yes	65	2	291	@ 0.945	
	No	517	2	293		
Has a history of induced abortion	Yes	22	2.5	378	@ 0.014*	
	No	560	2	290		

Note: Median SCORE = Median number of correct answers provided by the respondents, @ = Probability value of Mann-Whitney U test, # = Probability value of Kruskal-Wallis test, r = Spearman Rank Correlation Coefficient, P = Probability, \* = Statistically significant at 95% confidence level, \*\* = Statistically significant at 99% confidence level

### C. Use of Contraception and Emergency Contraception

Nearly half of the respondents (42.4%, n=247) had ever used any modern contraceptive method, with the interval estimates from 38.2% to 46.5% (P<0.05). Only two unmarried respondents have ever used a modern contraceptive method. Of the 377 married respondents, 63.1% (n=238) had used any kind of modern contraceptive method. Around one-tenth of the FFW (11.3%, n=66) had used ECs during their lifetime. Only one never married girl indicated that she had used ECs. Out of the 379 married women, 15.6% (95% Confidence Interval = 12.1% to 19.6%) had ever used ECs. Compared to

the married FFW, unmarried counterparts reported a much lower lifetime prevalence of emergency contraception. Only one never married girl indicated that she had used ECs in her lifetime. There were 11 FFW (all of them are married) in the sample (2.9%) who had used ECs during the past 12 months. Five respondents indicated that they used ECs twice during the past 12 months.

### D. Incidences of Unintended Pregnancies

The findings reveal that unintended pregnancies are not uncommon among FFWs in the KgEPZ. Approximately 40%

of the respondents (n=229) reported being aware of someone working in the KgEPZ who had experienced an unintended pregnancy, with 66% (n=152) attributing it to contraceptive failures. Furthermore, around 11.1% of the respondents (Point Estimate = 11.1%, n=65, 95% Confidence Interval = 8.7% to 14%) reported having personally faced an unintended pregnancy at some point in their lives. Among these cases, more than half (57%, n=37) were attributed to contraceptive failures. The average age of FFWs with a history of unintended pregnancies was 35 years (SD = 8.3 years), ranging from 20 to 49 years. On average, they had six years of work experience in the KgEPZ and received 11 years of formal education. Out of the 65 respondents who experienced unintended pregnancies, only 17 (26.2%)

reported ever using Emergency Contraceptives (ECs), while 22 (34%) resorted to induced abortion.

Close to half of the respondents (49%) had never experienced a pregnancy throughout their lives, suggesting that a significant portion of them may not be sexually active. Notably, there was only one unmarried girl in the sample who had encountered an unintended pregnancy. Consequently, we conducted further analysis focusing on a subset of 297 respondents who had experienced pregnancy at some point during the study period. Among these 297 individuals, approximately one-fifth (22%, n=65, Confidence Interval = 17.4% to 27.1%) had encountered an unintended pregnancy in their lifetime (Table IV).

TABLE IV NUMBER AND PERCENTAGE OF EVER-PREGNANT RESPONDENTS WHO HAVE EXPERIENCED AN UNINTENDED PREGNANCY DURING THEIR LIFETIME; ASSOCIATION WITH SOCIO-DEMOGRAPHIC FACTORS

Variable	Levels	Number of respondents who have ever pregnant (n=296)	Numbers faced with an unintended pregnancy (n=65)	Percentage of ever pregnant	Ch <sup>2</sup> test for association X <sup>2</sup> (P)
Age (Years)	Below 25	19	9	47%	#P=0.018*
	25 and Above	277	56	20%	
Level of Education	Up to GCE O/L	230	50	22%	0.029 (0.864)
	Above O/L	66	15	23%	
Working Experience in the KgEPZ	Less than 5 years	146	30	21%	0.335 (0.563)
	5 Years and more	150	35	23%	
Number of Pregnancies	Zero	0	0	N/A	5.522 (0.019)*
	1 to 2	216	40	19%	
	3 to 6	80	25	31%	
Number of Living Children	Zero	19	7	37%	§
	1 to 2	220	41	19%	
	3 to 6	57	17	30%	
Designation	Workers / Associates	265	59	22%	0.137 (0.711)
	Higher grade staff	31	6	19%	

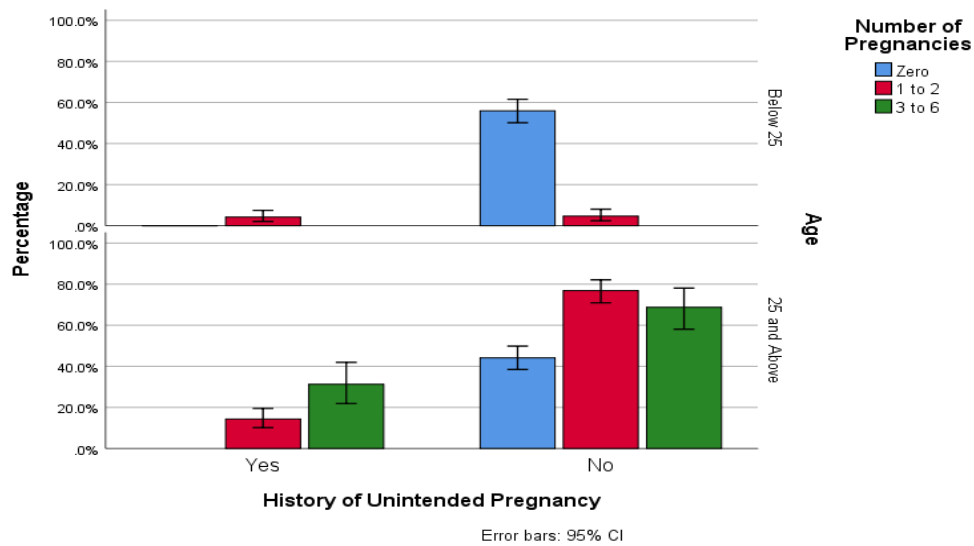
Note: \* = statistically significant association at a 95% confidence level. # = the probability value of the fishers-exact test is presented. § = Chi2 test was not performed as 16.7% of the cells have an expected value of less than 05

As expected, there was a positive association between experiencing an unintended pregnancy and the number of pregnancies (Mann-Whitney U statistic =6146, P=0.018). There was almost twice the risk of facing an unintended pregnancy among the FFWs who had three or more pregnancies (Odd Ratio= 0.593) compared to those who had one or two pregnancies (Odd Ratio= 1.185). A similar trend and association were observed between the number of living children and unintended pregnancies. Almost one-third of the pregnancies were considered unintended when the woman already had 3 or more children (supplementary material III).

Considering that a significant portion of the youth respondents may not be sexually active, the prevalence of unintended pregnancies among this group (5%, n=9) is notably lower compared to the adults (14%, n=56) in the overall sample. However, when we focus on the sub-sample

of women who have experienced pregnancy, the rate of unintended pregnancies among youth is more than twice as high (47%, n=9) compared to adults (20%, n=56). It is worth highlighting that almost half (47%) of the pregnancies reported among youth FFWs are considered unintended.

Education level demonstrates a significant association with unintended pregnancies among FFWs (X<sup>2</sup>=4.667, P=0.029), with a higher prevalence observed among those with lower educational attainment (13%, n=50) compared to respondents with formal education, GCE A/L or higher (7%, n=15). Unintended pregnancies are significantly more prevalent among lower designated staff (workers/associates) (12%, n=59) compared to higher-grade staff (6%, n=6). However, the number of years worked at the KgEPZ is not significantly associated with unintended pregnancies.



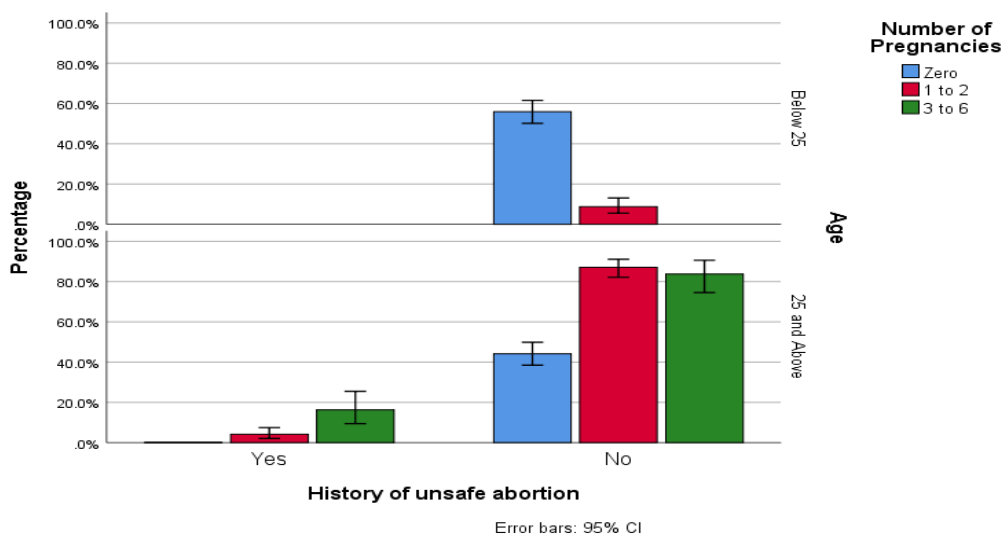
Supplementary material III - History of unintended pregnancy by age and number of pregnancies

*E. Incidences of Unsafe Abortions*

Approximately one-fifth of the participants (19.5%, n=114) reported knowledge of a female worker in the KgEPZ who had undergone an illegal abortion during their lifetime. Among them, nearly half (49%, n=56) believed that these women had experienced complications following the procedure. A small percentage of respondents (3.2%, n=19) were aware of individuals or health service providers near the KgEPZ who were willing to offer induced abortion services. Six respondents indicated that such service providers were located within a distance of fewer than 5 kilometers, while the remaining respondents (n=8) stated that these providers were situated within a 20-kilometer radius.

The estimated prevalence of induced abortion among reproductive-aged FFW in the KgEPZ is 3.8%, with a range of 2.4% to 5.6% at a 95% confidence level. Out of the sample, 22 participants reported having undergone at least one induced abortion in their lifetime. Although the number is

relatively small (n=22), we conducted a descriptive analysis to examine the characteristics of these respondents. All of them were above 25 years of age, with an average age of 36 years. Only one respondent who had undergone an induced abortion was never married, while the others were currently married (n=20) or divorced (n=1). Among these respondents, three terminated their first pregnancy, while the remaining reported terminating 2<sup>nd</sup> (n=6), 3<sup>rd</sup> (n=6), 4<sup>th</sup> (n=5), or 5<sup>th</sup> (n=3) pregnancy (Supplementary material IV). Five women who had a history of induced abortion had no children, while others had 1 (n=7), 2 (n=8), or 3 (n=2) living children at the time of the interview. On average, they had 6 years of work experience in the KgEPZ and had received 12 years of formal education. Induced abortions were more commonly reported among machine operators (n=12), followed by quality checkers (n=4), helpers (n=3), and higher-grade staff (n=3). However, there was no statistically significant difference in the prevalence of induced abortion between lower-grade staff (workers/associates) and higher-grade staff.



Supplementary material IV History of unsafe abortion by age and number of pregnancies



Out of the 22 respondents who had a history of induced abortion, 18 women (81%) had used surgical procedures, whereas only 4 respondents had undergone induced abortion using medical procedures / pills. Only two women with abortion history have ever used EC pills; missed opportunities to prevent unsafe abortion. The prevalence of induced abortion was 4% among the FFWs who reported one or two pregnancies, whereas it is 14% among the FFW with

three or more pregnancies. This association was statistically significant when we excluded the 288 respondents who had never been pregnant in their lifetime ( $X^2=12.483$ ,  $P=0.000$ ). We performed further analysis on the abortion history of the subsample of 296 respondents who had been pregnant at least once by the time of the interview (Table V). Abortion prevalence among ever pregnant respondents was 7.4% (95% CI = 4.7%-11%).

TABLE V NUMBER AND PERCENTAGE OF EVER-PREGNANT RESPONDENTS WHO HAVE EXPERIENCED AN INDUCED ABORTION DURING THEIR LIFETIME; ASSOCIATION WITH SOCIO-DEMOGRAPHIC FACTORS

Variable	Levels	Ever pregnant (n=296)	Ever aborted (n=22)	%	Ch <sup>2</sup> test for association X <sup>2</sup> (P)
Age (Years)	Below 25	19	0	0%	#0.378
	25 and Above	276	22	8%	
Level of Education	Up to GCE O/L	230	14	6%	#0.109
	Above O/L	65	8	12%	
Working Experience in the KgEPZ	Less than 5 years	146	9	6%	0.700 (0.403)
	5 Years and more	149	13	9%	
Number of Pregnancies	Zero	0	0	N/A	12.563 (0.000)**
	1 to 2	215	9	4%	
	3 to 6	79	13	16%	
Number of Living Children	Zero	19	5	26%	\$
	1 to 2	219	15	7%	
	3 to 6	57	2	4%	
Designation	Workers / Associates	264	19	7%	#0.714
	Higher Grade staff	31	3	10%	

Note: Ever pregnant = Number of respondents who have ever been pregnant, Ever aborted = Number who have ever undergone an induced abortion, % = Percentage of respondents who have undergone an induced abortion out of ever pregnant respondents, \*\* = statistically significant association at a 99% confidence level. # = the probability value of the fishers-exact test is presented. \$ = Chi<sup>2</sup> test was not performed as more than 12.5% of the cells have an expected value of less than 05

#### IV. DISCUSSION

The results of the current study highlight the need for greater attention to be paid to improving knowledge about overcoming unintended pregnancies, unsafe abortions, and abortion law among FFWs in Sri Lanka. When compared to a community-based household survey conducted in 2016 among adult female residents in Colombo, Sri Lanka, the FFW in this study showed significantly lower levels of knowledge in most aspects. For instance, while 60% of the female residents in Colombo were aware that a girl can become pregnant after a sexual act, even before her first menstruation, only 25% of the FFW in this study were aware of this fact. However, it is encouraging to note that a higher proportion of FFW (70%) were aware of the EC Pill, compared to female residents in Colombo (48%) (Suranga, *et al.*, 2016).

The results of both the current study and a previous study conducted among Sri Lankan adults (Suranga M, *et al.*, 2017) highlight the lack of association between formal education and knowledge related to abortion. However, access to other sources of information has been found to have a significant

impact on the development of abortion-related knowledge. Information from community-level service providers such as Public Health Midwives, Public Health Nursing Sisters or Medical Officers of Health has been found to have the highest effect size (10%) on overall knowledge of abortion. Mass media, including TV programmes, movies, films or dramas related to abortion and TV/radio news on induced abortion, had moderate effects (6% and 5% respectively) on knowledge of abortion. Printed media, including newspapers, leaflets, and handouts, showed a relatively low effect size (4%) on overall knowledge of abortion (Suranga M, *et al.*, 2017). These findings suggest that a woman’s knowledge of induced abortion develops as she is exposed to SRH-related incidents and matures, rather than through formal education. FFWs are likely to have fewer opportunities than other women to access these sources of information, particularly community-based service providers that have proven to be most effective in building abortion-related knowledge. Therefore, it is important to provide adequate opportunities for FFWs to access this information in the workplace.

Compared to their married counterparts, unmarried FFW reported a much lower use of emergency contraception. Only

one never-married girl indicated having used ECs in her lifetime. However, this is at odds with national statistics. According to the national youth health Survey 2012/2013, nearly 9% of sexually active youth or their partners reported using ECs in the previous month (Suranga, 2019). A separate study conducted among 395 undergraduate students in Sri Lanka found that 6.5% of respondents had used ECs in their lifetime (Boteju, *et al.*, 2017). Furthermore, data from the Happy Life Contact Centre of FPA Sri Lanka suggests that a significant number of young people sought information on ECs through their telephone hotline in 2015 (Tissera, *et al.*, 2014). These findings suggest that the prevalence of emergency contraception reported in the current study may be a lower estimate, potentially due to unmarried FFW providing socially desirable answers in the factory setting.

The results of the current study highlight the diverse experiences of FFW when it comes to induced abortion. Out of the 25 participants who reported a history of induced abortion, 3 reported having terminated their first pregnancy, while the others had gone through 2 to 5 pregnancies before having an abortion. This aligns with previous research which suggest that most unmarried abortion seekers visit the abortion clinic for termination of their first pregnancy whereas among the married, only a small proportion terminate their first pregnancy (Rajapakshe & De Silva, 2000; De Silva, 1997; Talagala, 2010). In terms of the method of induced abortion, the majority of participants (81%) in the current study reported having undergone a surgical procedure, whereas only 4 reported using medical procedures or pills. This contradicts the notion that there has been a shift towards medical abortions among Sri Lankan women in recent years (De Silva, 2019; Kaluarachchi, *et al.*, 2018). It is worth noting, however, that it is possible that some of the FFWs who underwent medical abortions may not have disclosed accurate information.

The current study found that there were no reported cases of abortion among the youth in the sample. While a national survey revealed that 0.94% of female adolescents have resorted to abortion (Talagala, *et al.*, 2004), the most recent national survey showed a lower figure of 0.1% (FHB, 2015). However, previous studies have indicated that approximately 10% of abortion seekers in Sri Lanka are unmarried (Suranga, 2019; Suranga & De Silva, 2020). The under-reporting of abortions among unmarried youth in the current study may be due to a lack of specific data collection on the age at the time of abortion in the current study, as well as a tendency among youth respondents to provide socially desirable answers during the interview context.

## V. IMPLICATIONS AND RECOMMENDATIONS

The findings of this research highlight the pressing need for increased knowledge and resources for FFWs in Sri Lanka regarding unintended pregnancies and unsafe abortion. With a lack of knowledge and limited access to formal and informal sources of information, FFW are at a heightened risk for unintended pregnancies and unsafe abortion. To address

this issue, factory management can play a crucial role in providing opportunities for FFW to access information and resources related to SRH. One approach could be to conduct regular, short informational sessions within the factory setting. Additionally, the increased use of technology and mobile phones among youth presents an opportunity for factory management to utilize digital channels for conveying information and messages about SRH. By partnering with existing digital health service providers, such as Doc991, Happy Life, Know4Sure, and Yowun Piyasa, factory management can improve access to essential SRH services for FFW while they are on the job. The implementation of digital health interventions would not only be effective, but also efficient in terms of time and resources, particularly in the context of EPZ.

The findings of this research also highlight a concerning gap in knowledge among respondents regarding abortion and its law. A large majority (65%) held incorrect beliefs about the provision of treatment for women who undergo illegal abortions. This lack of knowledge puts the lives of these women at risk if they face complications from unsafe abortions. The situation for younger women is even direr, and it's crucial for action to be taken. To address this, the factory management can play a significant role in educating its workers. They can distribute informational materials, such as leaflets or brochures that clearly outline the causes and consequences of unintended pregnancies, unsafe abortions, and the abortion laws in the country.

Moreover, the research also revealed a lack of knowledge among the respondents regarding contraceptives and ECs. A significant proportion of women with a history of induced abortions did not use any form of contraception, and many had incorrect beliefs about ECs, including the need for a prescription and the effective time to take them. Improving access to accurate information and essential commodities, such as contraceptives and ECs, can significantly reduce the incidence of unintended pregnancies and induced abortions. The factory management can explore innovative approaches, including digital health interventions, to ensure its workers have access to the information and resources they need to protect their SRH.

Despite being the most common source of information on abortion (Suranga M, *et al.*, 2017), information received from peers or friends may not always be accurate or trustworthy (Talagala, 2010). To address this issue, the factory management can consider developing a network of trained peer educators who can provide accurate information and health commodities to workers. By investing in peer education interventions through behavioral change communication, the management can not only increase the knowledge of workers about SRH but also provide them with access to essential commodities like contraceptives and pregnancy test strips. This will help reduce the incidence of unintended pregnancies and unsafe abortions, thus improving the overall SRH of FFWs.

*Ethical Consideration and Approval:* Data were collected as per the ethical guidelines of the Ethical Review Committee of the Sri Lanka Medical Association. All the data was collected after receiving written informed consent. Ethical approval to conduct this research was granted by the Ethical Review Committee of Sri Lanka Medical Association (Reference Number: - SLMA/ERC 21 – 013)

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## VI. CONCLUSION

The findings of this research reveal a concerning lack of knowledge among FFWs regarding unintended pregnancy, unsafe abortion, and abortion law. This leaves them vulnerable to both health and social risks, with young workers (below 25 years of age) being even more susceptible. The prevalence of unintended pregnancies among FFW is considerable as two-tenth of ever-pregnant FFWs having experienced unintended pregnancy in their lifetime. 7.4% of unsafe abortion among ever-pregnant FFWs is negligible. Awareness sessions, peer education programs, and service delivery interventions are highly recommended to overcome this challenge. The factory management can play a critical role in addressing this issue by conducting digital health interventions that are convenient, accessible, and non-disruptive to the workers' daily routines. With reliable information and resources, FFWs can make informed decisions and lead healthy lives. By improving the workers' knowledge and access to resources, both the workers and the management can benefit in the long run.

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