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## Qualitative study on the perception of combustible cigarettes, e-cigarettes and heated tobacco cigarettes among pregnant women

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### ABSTRACT

The research proposes to investigate the psychological reasons that may explain women's addiction to smoking during pregnancy and the perception of combustible cigarettes, electronic cigarettes and heated tobacco cigarettes. The sample included 30 participants who smoke or people who previously smoked who chose to quit or continue smoking during pregnancy. The data was gathered via a semi-structured interview and developed from three research questions: feelings, opinions and perceptions of pregnant women toward e-cigarettes, heated tobacco cigarettes, and combustible cigarettes. The study used thematic qualitative analysis for the methodological formulation of the results. The Standards for Reporting Qualitative Research Standards (QRRS) checklist was used. In this qualitative research, three psychological reasons for the onset of smoking were found and analyzed: feelings of stress, nervousness, and loneliness. According to the results: 40.91% of the women who smoked combustible cigarettes decided to keep on smoking and 59.09% decided to quit, 16.67% of participants who use heated tobacco cigarette decided to continue during pregnancy and the remaining 83.33% decide to stop; lastly, there is a condition of fairness for adults who use e-cigarette, 50% decided to continue smoking during pregnancy and the other 50% decided to stop smoking. The data indicate that those who continue to smoke during pregnancy are participants who smoke combustible cigarettes, stating that they reduce the amount of smoke inhaled. Meanwhile, participants who use heated tobacco cigarettes or e-cigarettes are certain that they pose less risk than combustible cigarettes; nevertheless, most of them decide to quit smoking during pregnancy. Another important aspect that has been noted is that of formal abandonment treatments, as quite unexpectedly, there has been a unanimous recognition of strong distrust toward the possible risks to the unborn child. There is a lot of distrust and little knowledge of official smoking cessation therapies, and because of this, participants stated that they can quit smoking whenever they want and only with their own willpower. Five categories and related themes emerged from the thematic analysis, such as reasons for starting with themes such as stress, irritation, loneliness, adolescence and integration; reasons for attachment to topics such as habit and carelessness about one's health; perceptions of traditional cigarettes compared to e-cigarettes and heated cigarettes with related topics such as sensory experiences and side effects; feelings and use of official smoking cessation therapies with issues as willpower and knowledge; information on the effects of smoke during pregnancy and breastfeeding, including risk information.

### KEYWORDS

Smoking; pregnancy; e-cigarette; heated tobacco cigarette; official cessation therapies; gestation; breastfeeding

### Introduction

The scientific literature is unanimous on the adverse effects of prenatal exposure to tobacco smoke on the fetus, with multiple short-term and

long-term implications.<sup>1</sup> However, around the world, tobacco smoking is one of the leading causes of premature death and disease and can be prevented.<sup>2</sup> The WHO estimates that over

eight million people worldwide die every year from smoking.<sup>3</sup> Smoking during pregnancy can lead to several problems which are now well-described and demonstrated in scientific literature. Therefore, quitting smoking has many advantages for the child-to-be, such as: reducing the risk of complications during pregnancy and childbirth; reducing the risk of stillbirth; the baby may be less likely to be born too early and face respiratory, feeding, and health problems that are often associated with premature birth; the child is less likely to be born with a low birth weight (children of participants who smoke are, on average, 200 g lighter than other children) and reduce the risk of sudden infant mortality (SIDS).<sup>4</sup> As for cigarettes on the market, it should be noted that new low-risk products are increasingly being used (such as electronic cigarettes and heated tobacco cigarettes) in addition to cigarettes that have long been in use, such as combustible cigarettes. The main features that distinguish them will be outlined below: combustible cigarettes have many harmful chemicals that are created by the burning of tobacco;<sup>5</sup> electronic cigarettes allow you to inhale nicotine through vapor instead of smoking, without producing tar or carbon monoxide (especially harmful to developing children) and contain some of the potentially hazardous chemicals that are present in cigarette smoke, but at much lower levels;<sup>4</sup> finally, heated tobacco products (HTP) are designed to heat the tobacco to a sufficiently high temperature to release steam, without burning it or producing smoke; this distinguishes them from electronic cigarettes by heating a tobacco leaf/sheet rather than a liquid.<sup>5</sup>

## Materials and methods

### Research questions

The research questions of this qualitative study address the following thematic areas:

1. What perceptions, thoughts, experiences, and feelings do the participants express concerning the traditional cigarette?
2. What perceptions, thoughts, experiences, and feelings do the participants express about the e-cigarette?

3. What perceptions, thoughts, experiences, and feelings do the participants express about heated tobacco cigarettes (eg IQOS, GLO)?

### Sampling and recruitment strategy

In this study, two non-probabilistic sampling techniques were used, purposeful sampling and quota sampling, which complement each other. Targeted sampling is a widely used method of qualitative research. In this type of sampling, participants are selected or sought based on pre-selected criteria based on the research question (i.e., the eligibility criteria). Quota sampling is a sampling technique, whereby quota of participants is pre-set prior to sampling (a number of 30 women). The sample size was predetermined: 30 women were recruited.

### Participants

Participants were selected according to pre-selected eligibility criteria, thereby defining non-probability sampling. Ethical issues were considered, especially the rights and protection of participants who decided to contribute voluntarily to qualitative research and data confidentiality was ensured according to the principles of the General Data Protection Regulation (GDPR). We used the following pseudonyms to ensure the anonymity of the interviews reported in our research: Jo A, Lor, Adr, Em, Bar, Deb, Tiz, Chr, Fra El, Ven, Cet Giu, Ros, Mar, Chia, Fran. Quota sampling permitted a predetermined number of participants which, in this study, corresponds to 30 women.

### Methodology

The study was approved by the Ethical Committee of the Department of Educational Sciences of the University of Catania (n. 2021.07.19/4). All procedures were conducted in accordance with the ethical standards set by the Italian National Association of Psychological. The Qualitative Method was used to conduct this study to determine the perceptions, thoughts, experiences, and feelings of the interest sample regarding

combustible, electronic, and heated tobacco cigarettes. Consequently, a qualitative thematic analysis was used; in addition, the Standards for Reporting Qualitative Research (SRQR) checklist was used for the methodology formulation of the same.<sup>6</sup> Thematic analysis is a method of identifying, analyzing, and reporting patterns (themes) in the data<sup>7</sup> which were gathered through the use of a semi-structured interview. This interview used an open text questionnaire composed of 21 questions and was characterized by review and checking phases.

### ***Eligibility criteria***

Participants were eligible to participate in this study if:

The study population was selected according to the following eligibility criteria: a) currently pregnant, or terminated pregnancy b) If she is a cigarette smoker currently > 5 cigarettes within the past 7 days, and c) > 18 years. If she does not smoke cigarettes, she has or has been a tobacco use disorder; d) no comorbidity with pathological conditions; e) is not involved in any clinical trial; f) is able to follow study procedures.

### ***Recruitment and sampling strategy***

The non-probabilistic sampling technique, often favored in qualitative research, was used. This type of strategy allows participants to be selected according to research goals and eligibility criteria. Quota sampling was used to determine in advance the number of participants, which is 30.

### ***Data collection and processing***

The research is characterized by a collaboration with the members of the chair of pediatrics and obstetrics. This collaboration made it possible to integrate the psychological approach with the bio-medical approach, in a study that concentrates on both aspects. All of this was guided by two researchers experienced in addictions who were able to guide the researchers in the design and development of the interview model, in the subsequent analysis, until the conclusions were

drawn. The average time of the interviews was of half an hour and they were all taped (with consent). Participants and investigator were not known to each other prior the interview, this allowed us to achieve a great deal of transparency on what was reported by the participants. Interviews were completed on an individual base in October 2021. The paper and pencil method was used to conduct the interviews. The preference and subsequent application of the interview stems from the desire to give participants the freedom to speak their thoughts, and their feelings brought on by the use of cigarettes and, at the same time, wanting to define limits to address the topics desired by the researchers

### ***Data management and analysis***

The interview transcripts were later formatted in Microsoft Word. The informed consent form was shared with participants. It explains the purpose of the research, the possibility of withdrawal, and the confidentiality of personal data. To identify common patterns and characteristics for the topic of smoking, after the encoding of the answers, variables were labeled that defined the formation of a predefined list of codes. The preference and subsequent application of the interview stems from the desire to give participants the freedom to express themselves on their thoughts, and their feelings brought on by the use of cigarettes and, at the same time, wanting to define limits to address the topics desired by the researchers. The three research questions were observed during interviews and compared to the eligibility criteria, highlighting the obvious aspects common to the participants. This study used a thematic analysis involving multiple angles and interactions of the participants' opinions was used. Braun & Clarke<sup>7</sup> describe thematic analysis as "a method to identify, analyze and report patterns (themes) within data". The transcripts were studied one at a time by highlighting and memorizing the various sections, creating a one or two page summary for each interview. After the reading period, independent notes were taken and both investigators developed a coding system that included deductive codes derived from the topic guide and inductive codes emerged from the

interview data. The text was encoded in the transcription in accordance with the descriptions of the code and the surrounding context. In this process, the researchers used codes as filters for large volumes of textual data and sections of text around a common description. The codes were reorganized into themes after the codes were applied to all transcripts. Five major themes have been identified and related to the original research questions:

1. Grounds for commencement;
2. Reasons for attachment;
3. Perceptions of traditional cigarettes compared to electronic cigarettes and heated tobacco cigarettes;
4. Perceptions and use of official therapies for quitting;
5. Information on the effects of smoking during pregnancy and lactation.

The final phase may be described as a summary process.<sup>7</sup> Starting from the definition, description, and transcription of the themes and using extracts from literal quotes from the participants, it is possible to get to the essence of the themes.

## Results

This section sets out the characteristics of the participants first, giving a general overview of the issues raised, followed by a more detailed description.

### Characteristics of participants

Quota sampling permitted a predetermined number of participants which, in this study, corresponds to 30 women, all of Italian nationality, aged 24 to 61 years (average age 34,5), and with qualifications that vary between primary school and university degree. As shown in [Table 1](#), a sample of 30 women (with the average age of 37 years) was considered: 22 participants who smoke combustible cigarettes (73.33%), 2 users of electronic cigarette only (6.67%), and 6 adults who use heated tobacco cigarettes (20.00%). Regarding the use of formal

**Table 1.** Characteristics of participants.

	TOTAL	SMOKING DURING PREGNANCY	STOPPED DURING PREGNANCY
Participants n (%)	30 (100%)	10 (33%)	20 (67%)
Age: average (DS)	37 (9,10 DS)	41 (11 DS)	35 (11 DS)
Participants who use e-cigarette n(%)	2 (6.67%)	1 (3.33%)	1 (3.33%)
Participants who use heated tobacco products (%)	6 (20.00%)	1 (3.33%)	5 (16.67%)
Participants who smoke n(%)	22 (73.33%)	9 (30.00%)	13 (43.33%)
Smokers who have tried therapies approved to quit n (%)	1 (3.33%)	1 (3.33%)	0 (0.00%)

**Table 2.** Categories and themes.

Categories	Themes
Grounds for commencement	<ul style="list-style-type: none"> <li>• Stress, nervousness and sense of loneliness</li> </ul>
Grounds for attachment	<ul style="list-style-type: none"> <li>• Adolescence and integration</li> <li>• Habit</li> <li>• Disrespect for their own health</li> </ul>
Perceptions of traditional cigarettes as opposed to e-cigarettes and heated tobacco	<ul style="list-style-type: none"> <li>• Sensory experiences</li> <li>• Side effects</li> </ul>
Perceptions and use of official therapies for quitting smoking	<ul style="list-style-type: none"> <li>• Willpower</li> <li>• Consciousness</li> </ul>
Information on the effects of smoking during pregnancy and lactation	<ul style="list-style-type: none"> <li>• Information about the risks</li> </ul>

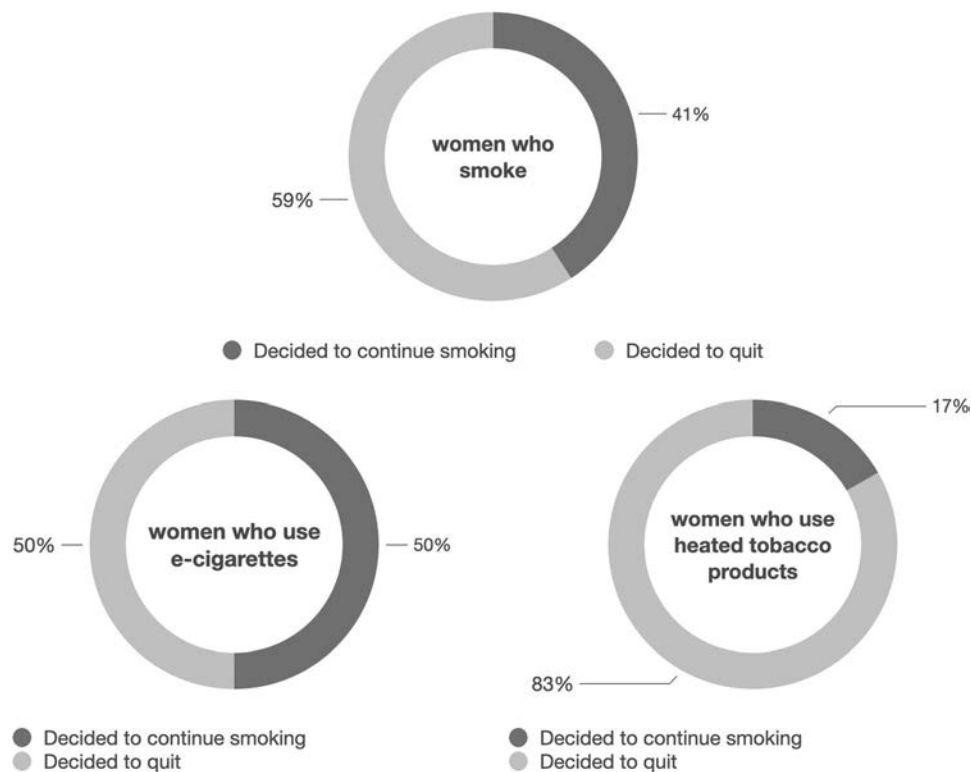
cessation therapies, only one person confirmed having tried them.

### Themes

Based on the thematic analysis, the codes were grouped into categories of five and their respective themes, listed in [Table 2](#).

The sample was divided as follows: of the 22 women who smoked combustible cigarettes, 9 decided to keep on smoking (40.91%) and 13 decided to stop smoking (59.09%). Among the 2 adults who smoke e-cigarette, only one decided to continue smoking while pregnant (50%) and the other decided to stop smoking (50%). Of the six smokers of heated tobacco cigarettes, only 1 woman decided to continue smoking during pregnancy (16.67%), and the other 5 stopped (83.33%) ([Figure 1](#)). Of the 30 women in general, 10 continued smoking throughout pregnancy (33.33%), and 20 stopped smoking (66.67%). Regarding the use of smoking cessation therapies, only one participant attempted to quit smoking using formal smoking cessation therapies (3.33%).





**Figure 1.** Smoking behaviors.

### *Category 1: grounds for commencement*

Thanks to an important question in the interview given to the participants, that is “tell me about your relationship with smoking, for example, how did it begin?” 60% (Figure 1) of the sample were found to have started smoking in adolescence or prior to adolescence. When asked to remember the reasons why they started smoking, 18 women reported starting with friends during school breaks when they saw their parents smoking. In short, curiosity, the desire to feel good, to be accepted by the group, and to feel attractive, were powerful reasons that encouraged them to try. Furthermore, the period was often related to times when they felt profoundly sad, alone, stressed, or nervous.

**Theme 1: stress, nervousness, and sense of loneliness.** Research participants were asked about their relationship to smoking, with 13.33% reporting that smoking can reduce stress. This immediately justifies the dependency. Unlike stress, nervousness is a condition of irritability and nervous tension, it is often associated with stress and may cause you to commit actions dictated by impulsivity.

Participants were asked about their relationship to smoking, and 10% of them said that smoking makes them less nervous. It has been found that nervousness can lead to a relapse of addiction, thus becoming the cause. Smoking is therefore associated with an “irreplaceable form of calming” capable of calming the nervousness of the participants. Finally, the feeling of loneliness that pervades some participants is no less relevant: 6.6% of them recognize smoking as a companion that never leaves them alone. Smoking is a companion who always remains there, in the saddest and darkest times of the participants.

“I smoke out of nervousness because for me it is a way of calming myself. Which is not true,

because it’s a psychological thing. “

(Jo A, 36 years)

“When I gave birth to my first child I didn’t smoke to breastfeed, then the milk ran out and one day, I was so nervous that I lit a cigarette and started smoking again.”

(Lor, 34 years)

**Theme 2: adolescence and integration.** From the analysis of the reasons for the onset, critical times

have been found in which you want to smoke, namely pre-teen and adolescence. In this period of life, friendships are of incomparable and essential importance, often you decide to do something, thinking that you will be accepted and feel part of a group. Participants were asked to discuss their relationship with smoking, and 43.33% of them mentioned preteens and adolescence as critical moments when they wanted to start smoking.

“I tried smoking to be seen by my classmates when I was only thirteen.

I started smoking daily, becoming addicted to fifteen cigarettes a day for forty years “

(Adr, 50 years)

“I started at 17 for fun”

(Em, 42 years)

### **Category 2: grounds for attachment**

Regarding reasons for not quitting smoking, only one participant said she found peace of mind, even if she just lit a cigarette. Three participants attributed negative terms because they know the risks to which they are exposed, but do not want to stop. This latter aspect is enhanced by the belief that they are related to the habit of smoking rather than the nicotine itself. Only one woman reported being addicted to the latter. Although the reasons for attachment found by the participants are many, 63.33% (Figure 1) of them do not justify the continuation of the habit even during pregnancy; indeed, they recognize it as an excellent reason to quit smoking, even if temporarily.

“I can’t stop because something is missing, for example, after eating,

I always drink coffee and smoke, even if I’m pregnant “

(Bar, 28 years)

“It relaxes me a lot, gives me relaxation, releases”

(Deb, 30 years)

“The empty moments push me to smoke, I smoke to kill time”

(Tiz, 32 years)

**Theme 1: habit.** Participants were asked what was driving them to continue smoking, and 96.67% of them mentioned that it was a habit. This is the most surprising aspect of all because it encompasses the concept of almost the entire sample. Only one participant talks about a different reason, namely that of the actual nicotine dependence.

“I continue to smoke out of habit! For example, sometimes

I forget that I have just lit a cigarette and I light another one at the same time. “

(Chr, 61 years)

“Maybe I continue to smoke out of habit alone,

but I feel like I’m pausing what I do

and then resuming later. “

(Fra El, 24 years)

**Theme 2: disrespect for his health.** Participants were asked what was driving them to continue smoking and it was found that 13.33% of the sample underestimated the risks they could face, leading to a justification for vice, even at delicate moments such as those of pregnancy. There’s some way you can control your addiction. In fact, people who previously smoked said they stopped smoking as soon as they discovered that they were pregnant because they knew the potential risks.

“I went to SERT because I was 8 months pregnant and even though I limited myself to smoking less, when someone smoked near me I would go closer to smell their cigarette smoke.

In addition, during pregnancy, even though my husband told me not to smoke more than five cigarettes a day, I bought cigarettes and smoked them secretly from him, in the garage and in the cold so as not to be seen. “

(Ven, 40 anni)

“With smoking, you don’t decide. With food you can say that you are on a diet,

you can’t do it with a cigarette. It is an ugly and stupid mechanism.

I smoke because if I don’t smoke I feel like eating and then I suddenly gain weight.

I don’t even eat gum because I know that then my gastric juices increase.

Believe me, I make all the arguments, but not with smoking.”

(Ven, 40 years)

### **Category 3: perceptions of traditional cigarettes as opposed to e-cigarettes and heated tobacco**

E-cigarettes and heated tobacco cigarettes are new devices designed to reduce the harm caused by tobacco use. Participants were asked what they thought of e-cigarettes and heated tobacco cigarettes. Many women believe that they are harmless or only mildly harmful, particularly compared to combustible cigarettes. However, there is considerable distrust of e-cigarettes, even without having direct experience of them, with 63.33% saying that they have never tried them or are unaware of them. (Figure 1)

**Theme 1: sensory experiences.** Participants were asked about their perceptions of heated tobacco, electronic cigarettes, and combustible cigarettes. Specifically, the concept of a heated cigarette was very positive indeed, 16.67% of the sample reported only positive aspects of this, such as lack of smell, the smoky taste on the palate that does not last, and the definition of a valid substitute to fuel cigarette because of lower risks that may be involved. Compared to e-cigarettes, it was found that although smoking was increasing, only 3.33% of participants were intrigued by a probable direct experience. The rest of the sample showed distrust of e-cigarette because of certain experiences related by relatives, especially with respect to health risks. For example, they talked about chest discomfort that was not present before, hoarseness and increased fatigue. 73.3% of the women surveyed, continue to prefer, to choose and use the combustible cigarette because it brings them more pleasure, in spite of the awareness of the damages that can be caused. For some participants, the most important moment of smoking is to inhale and light, which can only be identified in the fuel of the cigarette. Because of that, it looks irreplaceable.

**Theme 2: side effects.** Among the majority of users and all respondents, the common idea is that e-cigarettes and new devices that “warm up” tobacco are less harmful to health. But the scientific

information, at the present time, does not allow us to do a similar review. When participants were asked what they thought of burning, heated, and electronic tobacco cigarettes, only the side effects were mentioned in the latter. Many participants indicated that they had quit smoking due to these effects, and two other participants mentioned their relatives’ negative experiences. 16.67% of the sample decided to stop smoking the combustible cigarette to permanently switch to the heated tobacco cigarette because they were aware of the potential health risks. Lack of chest pain and breathing problems have been mentioned. If you decide to try the electronic cigarette to stop using the conventional cigarette, you often end up no longer using the electronic cigarette or even using it at the same time. The sample reported some incompleteness and dissatisfaction with the use of the e-cigarette.

“Now I smoke both conventional cigarettes and heated tobacco.

I smoked the electronic cigarette for a short time, then

I didn’t feel well because I always had a cough.”(

Cet Giu, 40 years)

### **Category 4: perceptions and use of official therapies for quitting smoking**

Participants were asked to describe their perceptions of formal quit therapies (such as varenicline and bupropion) and other remedies such as nicotine gum or a nicotine patch. Among 30 participants, only one tried to stop using nicotine gum but failed. In addition, only four out of thirty women report that a friend, mother or father stopped using NRT gum or the NRT patch (two people for both). It was surprisingly observed that not all participants were familiar with varenicline and bupropion. There is a lack of confidence in nicotine replacement therapies. Indeed, 66.67% (Figure 1) relate the cessation of smoking to willpower.

“I’ve heard of it, but

I’m not interested in stopping, so I don’t know whether they work or not, I’m not informed”

(Adr, 50 years old)



**Theme 1: willpower.** In response to the question “What do you think about smoking cessation approvals?” 46.67% of participants responded that to stop they needed willpower or commitment, but nothing else. Sudden cessation is possible if you use your strength and the \_belief that you are stronger than your addiction. Thus, they are wary of such therapies, assuming that they may not be safe remedies during pregnancy and that, on the contrary, there may be many risks.

**Theme 2: consciousness.** A final point to keep in mind is that the answers given seem to lack information in relation to official therapies. 40% of respondents have never heard of it, don't know it and don't care. Nevertheless, 16.6% of the sample recognizes the validity of formal smoking cessation therapies and supports their use: specifically, a participant is likely to try drugs.

#### **Category 5: information on the effects of smoking during pregnancy and lactation**

Participants were asked about their knowledge of the effects of smoking during the gestation months on both the fetus and the mother at the time of conception and lactation. All the women interviewed are aware of the serious harm that smoking can cause to their children, but they have no specific knowledge about it. They assign the responsibility to external causes: they claim that they have not received the right information either from the gynecologist or pre-part courses. Referring to preparatory courses, we refer to 20% (Figure 1) of the sample who had the opportunity to participate. Participants expressed both a lack of disclosure of information by health professionals and a desire for more information about why smoking poses a real risk to the baby. Participants report that the topic is not covered during the childbirth classes since none of them report smoking out of embarrassment. In other instances where the topic is discussed, the sample stated that it is done superficially.

“I knew the baby couldn't oxygenate well if I smoked too much. I knew it hurt regardless, but beyond what it should have hurt even more “

(Ros, 41 years old)

“I know it hurts because the blood vessels are blocked for both, I don't know more because I've never wanted to see videos showing the effects of smoking on the fetus”

(Ven, 40 years old)

“I've read enough to understand that it's already bad for me,

so even more for the baby in my womb.”

(Mar, 46 years old)

“I know about miscarriages, premature births and ectopic pregnancies

and that there may also be developmental delays”

(Chia, 38 years old)

#### **Theme 1: information about the risks**

The problem is that there is a lack of information on the risks of the fetus if the mother keeps smoking. Unfortunately, for this reason, 10% of respondents said they continued to smoke, although to a lesser extent. Participants were asked what they knew about the effects of smoking while pregnant and nursing, many of them mentioned the possibility of an abortion, ectopic pregnancy, or a reduced fetal birth weight. Only one participant spoke about maternal milk reduction (Figure 2).

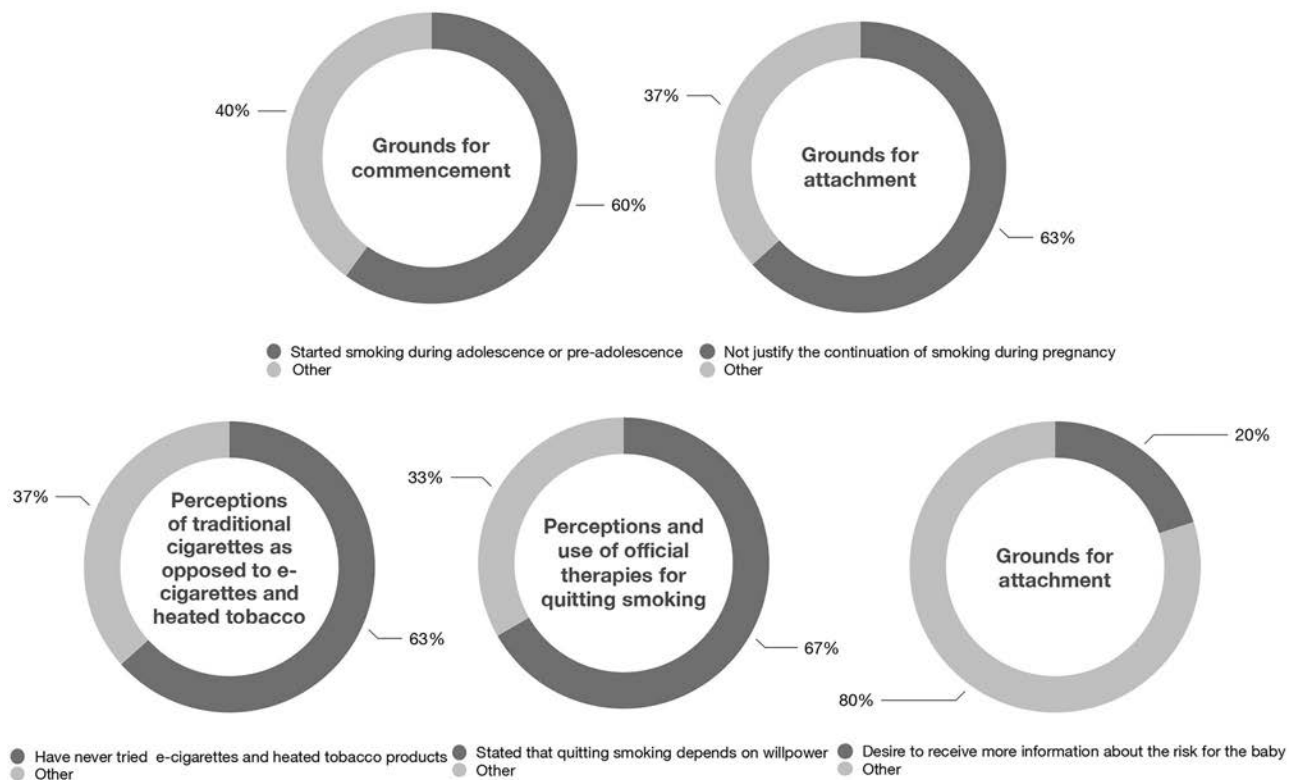
“I don't have medical knowledge, but I know that it was claimed that a few cigarettes don't hurt, but it's absolutely false!! In reality, even just one cigarette hurts and it is because the smoke reaches the fetus through the blood and the latter rightly suffers from it. For example, I documented myself independently because due to Covid.19 I was unable to participate in any preparatory courses and I saw ultrasound videos of people smoking and you could see that the baby was writhing with every puff that the mother took. This video made me realize that it doesn't matter if it's two cigarettes a day or if it's ten, the child is affected by these substances! This helped me not change my mind and remain firm on what I thought and that is that I shouldn't smoke during pregnancy.”

(Fra, 24 years old)

## **Discussion**

There is not much work in the scientific landscape to address this issue. The small sample of

## Results for each categories



**Figure 2.** Results for each category.

this study may be recognized as a limitation. The motivation on our part to address a delicate issue such as smoking during pregnancy is to provide a higher level of awareness of the real risks associated with smoking during pregnancy and increasing public awareness.

The sample was divided as follows: of the 22 women who smoked combustible cigarettes, 9 decided to keep on smoking (40.91%) and 13 decided to stop smoking (59.09%). Among the two participant who smoke e-cigarette, only one decided to continue smoking while pregnant (50%) and the other decided to stop smoking (50%). Of the 6 People who use heated tobacco products, only 1 woman decided to continue during pregnancy (16.67%), while the remaining 5 stopped (83.33%). (Figure 1) Of the 30 women in general, 10 continued smoking throughout pregnancy (33.33%), and 20 stopped smoking (66.67%). Regarding the use of smoking cessation therapies, only 1 participant attempted to quit smoking using formal smoking cessation

therapies (3.33%). In this qualitative research, three psychological reasons for the onset of smoking were found and analyzed: feelings of stress, nervousness, and loneliness. In order to highlight this point, the research by Barros et al.<sup>8</sup> reported that: adults who smoke have significantly lower levels of life satisfaction, positive affect, and higher levels of negative affect than people who have never smoked. Moreover, it has been found that the period in which this dependency begins appears to be the same: that is, the period of preadolescence or adolescence. Almost all of the participants say that their motivation to continue smoking is closely related to habit. Only one participant reported having a tobacco use disorder. Every action which includes smoking is a positive reinforcement factor for the subject: bringing the cigarette to the mouth, inhaling puffs of smoke, blowing the smoke and the subsequent feeling of being able to throw away problems as well. Although some of them experienced (directly and indirectly) life episodes that gave

them strong reasons to quit smoking, they feel a constant contradiction between the desire to quit and the impossibility to do so. First, we argued that women would choose to use electronic or heated tobacco cigarettes rather than combustible cigarettes during pregnancy because they are less harmful.

The results confirm in part the assumption. Meanwhile, participants who smoke heated tobacco cigarettes or electronic cigarettes are certain that there are less risks than combustible cigarettes. However, almost all chose to stop smoking during pregnancy. The data indicate that those who continue to smoke while pregnant are participants who smoke combustible cigarettes, but claim to reduce the amount of nicotine inhaled. Another important aspect that has been noted is that of official abandonment treatments, as completely unexpected, there has been a unanimous recognition of a high level of mistrust of the potential risks to the unborn child. Despite this concern, nicotine replacement therapy (NRT) is strongly recommended in clinical guidelines like the ones in Australia for pregnant women who are unable to stop smoking unless they receive appropriate support.<sup>9</sup> Because there is no absolute certainty about the risks this may cause to the fetus, physicians recommend low levels of NPS prescription during pregnancy.<sup>9</sup> The authors discovered that women had limited information about the risks that their baby may face during pregnancy and breastfeeding. In particular, only one participant stated that milk production could be lower if she chooses to smoke during the pregnancy.

## Conclusion

Health resistance has an important direct effect on smoking attitude<sup>10</sup> and it is important to offer an antismoking solution for pregnant women not motivated to quit. Qualitative research was carried out on a sample of 30 women, all of Italian nationality, aged between 24 and 61 years (average age 34.5) with a qualification that varies between primary school and university degrees. Participants were chosen if they met two valid eligibility criteria for this study: if they were or had been a tobacco use disorder and were pregnant. Three

original reasons were found that lead women to smoke, which are feelings of stress, nervousness, and loneliness. A common feature also seems to be age, in fact, most of the sample stated that they started smoking around 12 to 16 years. The reasons for wanting to try are different: to feel good, to feel appealing, to know that you are accepted and included in a group, and to want to resemble your parents. The reasons for attachment noted here are two: first, the woman smokes out of habit. This is because the woman when she smokes decides to put everything on break and, once the cigarette is over, she resumes her activities with a lot more energy. The other reason is contempt for one's own health, in fact, most of the sample communicates not voluntarily learning about the health risks that may arise. With respect to the perception of the three cigarette models, the most optimistic perception is certainly strongly related to the heated tobacco cigarette which is perceived as less harmful and more satisfactory. While e-cigarettes are perceived to be less harmful and satisfying than combustible cigarettes; they are perceived to be more harmful but more satisfying. There is a great deal of distrust and knowledge about official smoking cessation therapies, and because of that, participants say that they can quit smoking when they want and with their own willpower. Finally, information on the risks to the baby during pregnancy and breastfeeding is seriously lacking and participants attribute this to health professionals. The participants ask for more information, especially during the birth courses.

While the majority of women decide independently to break away from the habit of traditional and electronic smoking during pregnancy, the study carried out by Mescolo et al.<sup>11</sup> could be used as an illustration, in which it is stated that the risks of smoking EC during pregnancy are still largely unknown. However, the evidence indicates that even nicotine-free EC aerosols can cause damage to the fetus. HTR8/SVneo cells derived from transfected human chorionic villi were used to study the function of placenta cells exposed to nicotine-free insipid EC without nicotine, showing a significant decrease in trophoblast deficiency and angiogenic functions, which are vital to placental circulation. These results suggest that

placental cells may be vulnerable to exposure to EC aerosols, even in the absence of nicotine, but these results need further investigation.

### Authors' contributions

All authors contributed equally

### Disclosure statement

PC has been affiliated with the CoEHAR since December 2019 in a pro bono role. He is coauthor of a protocol paper supported by an Investigator-Initiated Study award program established by Philip Morris International in 2017. The other authors have no conflicts of interest to declare. RP is full tenured professor of Internal Medicine at the University of Catania (Italy) and Medical Director of the Institute for Internal Medicine and Clinical Immunology at the same University. In relation to his recent work in the area of respiratory diseases, clinical immunology, and tobacco control, RP has received lecture fees and research funding from Pfizer, Boehringer Ingelheim, Duska Therapeutics, and Forest Laboratories. RP has also received grants from European Commission initiatives (U-BIOPRED and AIRPROM) and from the Integral Rheumatology & Immunology Specialists Network (IRIS) initiative. He has also served as a consultant for Pfizer, Global Health Alliance for treatment of tobacco dependence, CV Therapeutics, and Sermo Inc. RP is also founder of the Center for Tobacco prevention and treatment (CPCT) at the University of Catania and of the Center of Excellence for the acceleration of HArm Reduction (CoEHAR) at the same University, which has received support from Foundation for a Smoke Free World to conduct independent investigator-initiated research projects on harm reduction. RP currently involved in a patent application concerning an app tracker for smoking behavior developed for ECLAT Srl. RP is also currently involved in the following pro bono activities: scientific advisor for LIAF, Lega Italiana Anti Fumo (Italian acronym for Italian Anti-Smoking League), the Consumer Advocates for Smoke-free Alternatives (CASAA) and the International Network of Nicotine Consumers Organizations (INNCO); Chair of the European Technical Committee for standardization on "Requirements and test methods for emissions of electronic cigarettes" (CEN/TC 437; WG4). There are no other conflicts of interest to declare.


### Informed consent statement

Informed consent was obtained from all subjects involved in the study.

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