Reimagining Adolescent Sexual and Reproductive Health Promotion in Pakistan:
Identifying Indicators, Overcoming Resistance, and Leveraging Social Media

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I.   **Paper 1:**

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II.   **Paper 2:**

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Abstract

Pakistan, like many other countries in South Asia, faces a pressing need to identify the patterns and determinants of sexual and reproductive health due to high fertility rates, high birth rates, and one of the world's largest adolescent populations. Despite this, promoting reproductive health, women's empowerment, and comprehensive sexuality education (CSE) has been a challenging task, given the societal opposition and widespread misconceptions. This dissertation aimed to address this issue by adopting a three-fold approach. Firstly, we developed a comprehensive list of adolescent sexual and reproductive health indicators for South Asia using a rigorous Delphi expert consultation process. Secondly, it aimed to understand community readiness and resistance to CSE in Pakistan. Finally, we developed, piloted, and evaluated the impact of an intervention to address community resistance by introducing CSE content using social media platforms. An expert group assessed a list of nine indicator categories comprising 41 adolescent health indicators. The findings were used to develop a list of key indicators for assessing adolescent sexual and reproductive health based on expert consensus and prioritization. By undertaking a cross-sectional community readiness assessment in Islamabad, Pakistan, it was found that the community was at the denial/resistance stage of community readiness, which is not conducive to the effective promotion and implementation of CSE in the school-based curriculum. Based on the community's readiness levels, focus group discussions with key stakeholders were held to develop an intervention for raising awareness and targeting community resistance. We developed two videos and disseminated them on social media platforms (Facebook, YouTube, and Instagram. The first and second videos received 432,457 and 735,563 views, respectively. The audience was receptive to the CSE promotion content, according to the findings, and these platforms have a substantial demographic and geographical reach. End-user feedback was positive, with a net sentiment score of 0.83, while audience comments revealed the reasons for positive and negative criticism. The findings revealed that social media networks offer a unique, albeit underutilized, opportunity to reach a broad audience in Pakistan for CSE promotion. The findings from the dissertation, overall, provide valuable insights for policymakers and health practitioners in Pakistan and other developing countries to promote adolescent sexual and reproductive health effectively.

Zusammenfassung

Pakistan, wie viele andere Länder in Südasien, steht vor einem dringenden Bedarf, Muster und Determinanten der sexuellen und reproduktiven Gesundheit aufgrund hoher Fruchtbarkeitsraten, hoher Geburtenraten und einer der größten Jugendbevölkerungen der Welt zu identifizieren. Trotzdem ist die Förderung der reproduktiven Gesundheit, des Empowerment von Frauen und der umfassenden Sexualerziehung (CSE) aufgrund der gesellschaftlichen Opposition und weit verbreiteter Missverständnisse eine schwierige Aufgabe. Diese Dissertation zielt darauf ab, dieses Problem durch einen dreifachen Ansatz anzugehen. Erstens haben wir mithilfe eines rigorosen Delphi- ExpertInnenkonsultationsprozesses eine umfassende Liste von Indikatoren für die sexuelle und reproduktive Gesundheit von Jugendlichen für Südasien entwickelt. Zweitens sollte sie zum Verständnis der Gemeindebereitschaft und -resistenz gegenüber CSE in Pakistan beitragen. Schließlich haben wir eine Intervention entwickelt, getestet und ausgewertet, um auf die Gemeinderesistenz zu reagieren, indem wir CSE-Inhalte über soziale Medienplattformen publiziert haben. Eine ExpertInnenengruppe bewertete eine Liste von neun Indikatorenkategorien mit insgesamt 41 Indikatoren für die Gesundheit von Jugendlichen. Die Ergebnisse des Delphiprozess zeigten, dass Demografie, reproduktive Gesundheit, Gewalt und Ernährung hohe Relevanz hatten. Die Ergebnisse wurden verwendet, um eine Liste von Schlüsselindikatoren für die Bewertung der sexuellen und reproduktiven Gesundheit von Jugendlichen basierend auf Expertenkonsens und Priorisierung zu entwickeln. Durch die Durchführung einer Querschnitts-Community-Readiness-Bewertung in Islamabad, Pakistan, stellte sich heraus, dass die Gemeinschaft sich im Verweigerungs-/Widerstands- Stadium der Community-Readiness befand, was nicht förderlich für die effektive Förderung und Implementierung von umfassender Sexualerziehung im schulischen Lehrplan ist. Basierend auf den Bereitschaftsstufen der Gemeinschaft wurden Fokusgruppendiskussionen mit wichtigen Interessengruppen abgehalten, um eine Intervention zur Bewusstseinsbildung und zur gezielten Verringerung des Gemeinschaftswiderstands zu entwickeln. Wir haben zwei Videos erstellt und auf sozialen Medienplattformen verbreitet (Facebook, YouTube und Instagram). Das erste und zweite Video erhielten jeweils 432.457 und 735.563 Aufrufe. Gemäß den Ergebnissen war das Publikum offen für die CSE- Förderungsinhalte, und diese Plattformen haben eine beträchtliche demografische und geografische Reichweite. Das Feedback der Endbenutzer war positiv, mit einem Netto- Sentiment-Score von 0,83, während Kommentare des Publikums die Gründe für positive und negative Kritik offenbarten. Die Ergebnisse zeigten, dass soziale Medien einzigartige, wenn auch zu wenig genutzte Möglichkeiten bieten, um eine breite Öffentlichkeit in Pakistan für die Förderung von CSE zu erreichen. Die Ergebnisse der Dissertation liefern insgesamt wertvolle Erkenntnisse für Entscheidungsträger und im Gesundheitswesen Tätige in Pakistan und anderen Entwicklungsländern.

List of abbreviations

ASRH	Adolescent sexual and reproductive health
COREQ	Consolidated criteria for reporting qualitative research
CRM	Community readiness model
CSE	Comprehensive sexuality education
ICC	Intraclass correlation
LMIC	Low- and middle-income countries
NGOs	Non-governmental organizations
PDHS	Pakistan Demographic and Health Survey
PSHE	Personal Social & Health Education
SDG	Sustainable Development Goals
STIs	Sexually transmitted infections
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

Foreword

This thesis comprises a collection of four original papers, three of which have been published (Papers 1, 2, and 3), while the fourth is currently prepared and submitted to a peer-reviewed journal (Paper 4). The first two chapters provide the necessary contextual background based on existing literature that underpins the research topic being investigated in this dissertation project. Chapter three highlights the project's three primary objectives, while chapter four presents a comprehensive description of the research methodology, including the study setting, recruitment techniques, and analysis carried out. Chapter five covers the research findings, and chapter six provides an in-depth discussion of the study's key strengths and limitations. The final two chapters, seven and eight, critically analyze the implications, future directions, and recommendations stemming from the research findings. Upon completing my master's degree in public health, I had the opportunity to work on a maternal morbidity study in Pakistan's Punjab province, where I visited various health care facilities in remote areas with limited healthcare resources and financial support. During these visits, I observed concerning health and social situation for mothers, children, and adolescents, caused by high fertility rates, low health literacy, particularly in sexual and reproductive health, a lack of understanding of birth spacing, and limited contraception use, especially among newly married adolescents or young adults. These concerns were further compounded by societal issues of early marriage and gender-based inequality that disadvantage women. This dissertation focuses on devising strategies to better engage communities in prioritizing adolescent health, particularly sexual and reproductive health rights, by exploring the implementation of sexual and reproductive health programs through schools, as well as monitoring and evaluating these programs using key indicators.

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Chapter 1: Background: The Importance of Adolescent Health Promotion and Addressing ARSH in South Asia, with a Focus on Pakistan

This chapter explains why adolescent health promotion is important and why investing in health promotion and prevention interventions is crucial for this age group. Later in the chapter, the current state of adolescent sexual and reproductive health (ASRH) in South Asia is discussed, with a specific focus on Pakistan. The current state and burden of ARSH in Pakistan throws light on difficulties adolescents encounter throughout puberty, early marriage, unintended pregnancy, unmet contraception needs, abortions, reproductive health rights, gender-based violence, and child abuse. This chapter describes the current situation and lays the groundwork for the discussion of research gaps in the following chapter.

1.1. Adolescence: A Multidimensional Developmental Stage

Adolescence is defined as:

"During the second decade of life, the period from the onset of puberty to the termination of physical growth and attainment of final adult height and characteristics." [1].

Even though adolescence is commonly associated with teenage years, physical and psychological manifestations can begin earlier and last until adulthood. Puberty often begins during preadolescence, with females usually experiencing it first [1,2]. Male physical growth and cognitive/psychological development can last into their early twenties or early adulthood. Thus, age is regarded as a general indicator of adolescence, and specialists struggle to come up with a precise description and categorization of adolescence [1,2]. Adolescence is typically classified into three age categories [3]:

1. Early Adolescence (Ages 11-14)
2. Middle Adolescence (Ages 15-17)
3. Late Adolescence (ages 18-21)

1.2. Adolescent Well-being: Five Interrelated Dimensions

Following a review of the literature and consultations with the United Nations H6+ Technical Working Group, youth networks, and adolescent-serving organizations, a simple and extended definition of adolescent well-being was developed [4,5]. On the basis of these findings, five interrelated dimensions for adolescent wellbeing were identified, as well as the needs for adolescents to achieve wellbeing within each of these areas [4]. Given that health is one of the five categories, it is important to note that it encompasses both subjective and objective aspects. Concerns like gender equality, human rights, and other issues are also essential considerations in these fields [4]. The following are the domains of adolescent well-being [4]:

1. Good health and optimum nutrition (Physical health and capacities, mental health, and capacities, optimal nutritional and status and diet)
2. Connectedness, positive values, and contribution to society
3. Safety and a supportive environment
4. Learning, competence, education, skills, and employability
5. Agency and resilience

1.3. Building a Supportive Environment for Adolescent Health and Well-being

To completely comprehend adolescence in a population, it is required to understand a variety of viewpoints on adolescence, including those from psychological, biological, sociological, educational, and anthropological perspectives [1]. Adolescence is often thought of as an interim or transitional stage between childhood and adulthood, taking into account all of the factors mentioned above [1]. Traditionally, it has been assumed that the cultural objective of this age group is to prepare children for adulthood [1]. School, training, work, unemployment, and relocation are all part of the process during this time of transformation [1]. All adolescents have the right to enjoy a high level of physical, psychological, and social health and well-being during their adolescence [6].

There is a significant proportion of the world's 1.2 billion adolescents who are on the brink of not reaching their full potential [4]. Over one million adolescents die each year from preventable causes, tens of millions are injured, and hundreds of millions engage in risky behaviors that have

both short- and long-term consequences [4]. During their second decade of life, adolescents may suffer difficulties that prevent them from achieving their full potential as truly informed, physically and mentally healthy, educated, skilled, and empowered adults [4]. Millions of adolescent girls are driven to the margins of society as a result of gender and age discrimination, where they are subjected to female genital mutilation, forced marriage, intimate partner violence, and other forms of human rights abuse [4,7]. The COVID-19 pandemic, which emerged in 2020 and spread around the world, was a devastating setback for a global health system and economy that was already straining, reversing previously achieved advances [4,8,9].

Each dollar invested on specific adolescent health interventions is estimated to yield a tenfold increase in health, social, and economic benefits for the adolescents [4]. Increased productivity and lower health-care expenditures, as well as decreases in intergenerational inequities, are all benefits of a healthy adolescent population [4,10]. In the absence of considerable increases in political priority and funding for adolescent well-being, mortality and morbidity among adolescents will continue to climb, particularly in low- and middle-income countries (LMIC) with rapidly growing adolescent populations [4,10].

All levels of society and government must work together to ensure that the current emphasis on the multifaceted nature of adolescent well-being is maintained and expanded upon in the future [4,10]. A secure and supportive environment that is free of violence, exclusion, and prejudice is essential for adolescents to thrive. This includes access to comprehensive health and social services as well as high-quality educational opportunities in a supportive environment [4,10]. A number of sectors, including health, education, water and sanitation, transportation, and social protection, must collaborate in order to improve the well-being and health of adolescents worldwide [4,10].

1.4. Adolescent Sexual and Reproductive Health: A Global and Regional Perspective

Suicide, complications during childbirth, and pregnancy are the leading causes of death among adolescent girls around the world [11,12]. Every year, around 16 million adolescent girls between the ages of 15 and 19 give birth, with 2.5 million giving birth to children under the age of 16 [12]. According to the World Health Organization (WHO), about 1 million girls under the age of 15 give

birth each year, and 3 million girls between the ages of 15 and 19 undergo unsafe abortions as a result of an unplanned pregnancy [12]. The consequences of unplanned and early pregnancy are not only harmful to the health of the young mother and child, but they can also have a negative impact on the social, physiological, and psychological development of young women [12]. The lack of awareness or destructive cultural norms in some countries is reflected in reports and literature: for example, two out of every three girls in LMIC were completely uninformed of what was happening to them when they first started menstruation [13–16]. More than half of young people (15-24 years) reported using a condom during their most recent high-risk sex in the previous year (with a non-marital, non-cohabiting sexual partner) [17], and nearly half of all girls worldwide believe that a husband or partner is justified in hitting or beating his wife or partner in certain circumstances [7].

According to the World Bank, approximately 20 percent of the world's population lives in South Asia, according to the World Bank, which had a population of 1788.38 million in 2019 [11]. South Asia is comprised of eight countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. In 2017, the annual population growth rate in South Asia was 1.2 percent, the fertility rate was 2.4 births per woman, and the fertility rate among adolescents (15-19 years) was 25.6 births per 1000 women, according to the World Bank [11]. Males between the ages of 10 and 24 account for around 28.7 percent of the entire male population in South Asia, while females between the ages of 10 and 24 account for approximately 27.7 percent of the total female population [11]. In light of the fact that over one-third of the population in the region is an adolescent or late adolescent, it is necessary to analyze their health status as well as the factors influencing their health. Due to the high fertility rates and the high frequency of unplanned pregnancies among adolescents in the region, it is necessary to better understand their sexual and reproductive health needs.

1.5. Challenges and Risks of Sexual and Reproductive Health Among Adolescents in Pakistan

Figure 1 shows Pakistan's location in South Asia [18]. According to the 2017 census, Pakistan has a population of 207,774,520 citizens, making it the world's sixth most populous country [19].

About 97 percent of Pakistanis are Muslims, with Christians and Hindus accounting for the remaining 3 percent [19]. Pakistan is a parliamentary federal republic, with English as the official language and Urdu as the national language, the most spoken languages in Pakistan are Punjabi, Pashto, Sindhi, Saraiki, Urdu, and Balochi [19]. Pakistan's international borders are shared with India, the Islamic Republic of Iran, China, and Afghanistan. Pakistan is divided into four provinces: Punjab, Sindh, Baluchistan, and Khyber Pakhtunkhwa. Islamabad is Pakistan's capital city.

Figure 1: Map of Pakistan (www.mapsofworld.com)

1.5.1. Navigating Puberty without CSE: Challenges and Consequences

According to a survey conducted in Pakistan, participants identified the specific health issues they face during puberty, but they also provided indirect insights into how a lack of open discussion

about sexual and reproductive health causes them to experience unnecessary shock, pain, and guilt as they navigate natural physiological changes [20]. For example, the majority of girls admitted that they were surprised when they began menstruation because they had not been informed [20]. A high proportion of men and women who fear they have sexually transmitted infections (STIs) do not seek medical attention, according to the Pakistan demographic and health survey (PDHS) [21]. In the absence of formal comprehensive sexuality education (CSE), adolescents rely on unreliable sources of information such as their friends, social media, the internet, and magazines to make decisions about their sexuality [22–25]. According to the findings of a study conducted in Karachi, in addition to exposing children to harm, disinformation, mistreatment, and exploitation, this may also result in mental health problems during puberty [22,24].

1.5.2. Early marriage and childbearing: Health risks and consequences

According to the PDHS (2017-18), the median age at first marriage is 20.4 years among women aged 25 to 49 and 25.9 years among men aged 30 to 49 [20,21]. In recent years, the singulate mean age at marriage has increased for both women and men, reaching approximately 23 and 27 years, respectively [20,21]. Despite this, 14 percent of female adolescents and 3 percent of male adolescents between the ages of 15 and 19 are currently married [20,21]. Approximately one-fifth of girls between the ages of 15 and 19 have begun childbearing [20,21]. Adolescent mothers give birth to 44 children for every 1,000 live births in the country [20,21]. They are three times more likely to be anemic, have a lower pre-pregnancy body mass index, and have chorioamnionitis (inflammation of the fetal membranes due to infection) than older mothers [26]. They are also three times more likely to have a miscarriage than older mothers [26]. Furthermore, their newborns are more likely to have preterm births and low birth weights, as well as a higher risk of dying during childbirth [26].

1.5.3. Challenges in Accessing Family Planning and Contraception Services in Pakistan

In Pakistan, around 97 percent of currently married women between the ages of 15 and 29 have heard of at least one method of contraception [20,21]. Women's knowledge levels increase consistently as they become older, from almost 91 percent of those in the 15 to 19 age group to nearly 99 percent of those in the 25 to 29 age group [20,21]. When compared to other regions,

Baluchistan and Sindh, which have the lowest human development index, have the lowest proportions of women who are aware of contraceptive techniques [20,21]. Knowledge of family planning among adolescent married women in the 15 to 19 age group is lowest in Gilgit-Baltistan, followed by Sindh and Baluchistan [20,21]. Almost 22 percent of married women between the ages of 15 and 29 use some form of contraception for family planning [20,21]. Contraceptive use among married women between the ages of 15 and 29 increases with age, is higher with better educational attainment and income, and varies by location of residency i.e. rural or urban [20,21]. Meanwhile, 17.9 percent of married women between the ages of 15 and 19, 18.6 percent of married women between the ages of 20 and 24, and 20.4 percent of married women between the ages of 25 and 29 have an unmet need for family planning (women who are sexually active but are not using any form of contraception) [20,21]. As a result, there are many unintended pregnancies, unintended births, and induced abortions. It's critical to improve and expand the availability of family planning services so that women and couples can have as many children as they want, when they want them [27,28].

Abortion is legal in Pakistan only to save a woman's life or to give "necessary treatment" early in pregnancy [27,28]. Due to a lack of clarity in interpreting the law, legal abortion services are difficult to come by, and the majority of women who seek an abortion do so covertly and by unsafe procedures [27,28]. Unintended pregnancies increased from 38 percent in 2002 to 46 percent in 2012, indicating that increases in contraception use have not kept up with the growing desire for smaller families [27,28]. Between 2002 and 2012, the rate of unplanned pregnancies increased, growing from 71 to 93 per 1,000 women aged 15–49. In Pakistan in 2012, there were around nine million pregnancies, with 4.2 million of those being unplanned [27,28]. Induced abortions accounted for 54% of these unintended pregnancies, while unplanned births accounted for 34%. The percentage of unplanned pregnancies that resulted in induced abortions differ significantly amongst provinces [27,28]. Sindh and Baluchistan had the greatest proportions (62 and 63%, respectively), while Khyber Pakhtunkhwa had the lowest (40%) [27,28]. In Pakistan, there were an estimated 2.25 million induced abortions in 2012 [27,28]. Overwhelmingly, these abortions were performed covertly, putting the mother's health and lives at risk. In 2012, there were 50 abortions per 1,000 women aged 15–49 in Pakistan [27,28]. The

highest rates of abortion were found in Baluchistan and Sindh (60 and 57 abortions per 1,000, respectively), while the lowest were found in Khyber Pakhtunkhwa (35 per 1,000) [27,28].

1.5.4. Adolescent Awareness of Sexual and Reproductive Health Rights in Pakistan

Adolescents, parents, and caregivers in Lahore, Pakistan, have a poor level of perception about ASRH rights, according to a recent cross-sectional survey [24]. Pakistan was placed 151st out of 153 countries in the World Economic Forum's gender parity report 2020 [29]. Females in Pakistan have less financial independence and little to no decision-making authority than their male counterparts [29,30]. There is also a high prevalence of early marriage, and there is little recognition that young girls need to be educated about their sexuality and reproductive health rights [30].

According to the findings of a qualitative study, adolescent boys and girls are generally aware of human rights, but they are more expressive about their rights as adolescents [20]. Girls spoke more frequently about their right to education and consent in their marriage, whereas boys spoke more frequently about their right to employment [20]. However, just a limited fraction of adolescents mentioned the right to be free from child labor, harassment, and violence, and none mentioned the right to be safe from domestic violence [20]. It is necessary to increase adolescents' awareness of their rights, laws, as well as justice institutions.

1.5.5. Gender-Based Violence, Child Abuse, and Cyberbullying in Pakistan

A recent international men and gender equality survey for Pakistan, conducted in 2018, found that over 59 percent of women had experienced some form of violence, while approximately half of men had perpetrated violence [31]. More than 10 percent of both men and women said they had been abused as children [20,21]. In addition, the survey found a high degree of intergenerational transmission of violence among respondents [20,21]. The practice of honor killing, marriage for the settlement of conflicts (vani), and bridal exchange (watta satta) are all examples of detrimental customs and practices that exist in Pakistan that are harmful to women and girls [20,21]. Furthermore, emotional violence is widespread. The most frequently cited causes of verbal spousal violence include financial difficulties, infertility, husband assaulting the children, and the wife's refusal to engage in sexual relations [20,21]. Similar to many other

regions, Pakistan has a problem with the underreporting of acts of physical, sexual, and other forms of violence, particularly by women who are victims [20,21].

Children's abuse was reported in 3445 instances in 2017, 3832 instances in 2018, 2846 instances in 2019, and 2960 incidents during 2020, according to Sahil foundation reports [32]. In nearly two-thirds of these instances, the offenders were acquaintances of the victims, or the victims' families [32]. These figures are generated by monitoring a variety of national and regional newspapers, but there is a significant gap in the data because there are no data registries accessible for monitoring and reporting the number of child abuse incidents in Pakistan, which is a major shortcoming. Underreporting is also a serious problem, especially as a result of the societal stigma associated with child abuse [32].

According to the findings of a qualitative study on cyberbullying, the vast majority of respondents stated that it is a prevalent behavior that is primarily perpetrated by males since they have greater access to mobile phones [20]. It is possible that girls will be deceived by fake accounts or harassed by ex-boyfriends who threaten to publish their personal images on the internet [20]. Parents' punishments can range from increased limits on their mobility and mobile phone use to physical abuse, being expelled from school, and even being forced into early marriage if the girls do not receive enough support from them [20]. With such a large proportion of adolescents utilizing social media sites, raising awareness about these networks and how to stay safe on these online platforms is critical.

Chapter 2: Comprehensive Sexuality Education in Pakistan: Implementation Challenges, Enhancing Evaluation, and Utilizing Social Media

This chapter aims to highlight the importance of CSE as a viable response to tackle the high prevalence of ARSH concerns in Pakistan, why CSE is vital in addressing sexual and reproductive health issues and why schools serve as appropriate venues for its delivery. Additionally, the chapter explores the challenges of implementing CSE in conservative settings, the significance of monitoring and evaluating ASRH programs, increasing community readiness for successful implementation, and the potential of social media as a platform for health promotion. This chapter serves as the foundation for the research questions addressed in this dissertation.

2.1. Understanding CSE: Addressing Adolescent Sexual and Reproductive Health Issues and Implementing a Human Rights-Based Approach

In 1994, the International Conference on Population and Development called on governments to educate and promote ASRH as a component of their overall development program [33]. Unfortunately, progress has been slow in many areas of the world due to widespread misconceptions, organized community opposition to CSE, and implementation challenges in many parts of the world [34,35].

According to the United Nations Educational, Scientific, and Cultural Organization's (UNESCO) revised technical guidance on CSE, it is a curriculum-based approach to teaching and learning that focuses on the cognitive, emotional, physical, and social aspects of sexuality [36,37]. The previous CSE guidelines were developed in response to HIV prevention, or with an emphasis placed on it [36,37]. Recent studies and practice, however, indicate that CSE is critical for the healthy development and overall well-being of children and adolescents [36,37]. To address these concerns more effectively, the revised guidance expands on key concepts and integrates additional material on early pregnancy, unsafe abortion, and gender-based violence, with an emphasis on prevention [36,37]. It lays a greater emphasis on gender issues and establishes a solid foundation for a human rights-based approach to sexuality, such that sexuality is a

fundamental aspect of human development, and that structured learning should be age- and developmentally appropriate [36,37]. The guidelines also address a number of Sustainable Development Goals (SDGs), with a particular emphasis on achieving good health and well-being (SDG 3), high-quality education (SDG 4), and gender equality (SDG 5) [36–38]. Schools provide an environment in which CSE can be implemented at an early age and gradually over several years, employing a spiral approach to content development [36,37,39]. Additionally, schools provide an active infrastructure, which includes teachers who are perceived by parents to be reliable and trustworthy sources of knowledge, as well as chances for long-term programming [36,37,39]. As a result, schools are crucial in the implementation of CSE, and the stepwise approach is centered on four age groups: Five to eight years, eight to twelve years, twelve to fifteen years, and fifteen to eighteen years [36,37,39].

CSE's primary objective is to better equip children and adolescents with the knowledge, skills, and attitudes necessary to appreciate their health and well-being; to maintain respectful social and sexual relationships; to comprehend and protect their rights; and to make informed decisions that affect their overall well-being [36,37,40]. The revised guidance is organized around eight key concepts: 1. Relationships; 2. Values, rights, culture, and sexuality; 3. Gender understanding; 4. Violence and staying safe; 5. Health and well-being skills; 6. The human body and development; 7. Sexuality and sexual behavior; and 8. Sexual and reproductive health [36,37]. The detailed topics covered by the key concepts are depicted in Figure 2.

1. Relationships

1.1. Families
1.2. Friendship, love, and romantic relationships
1.3. Tolerance, inclusion, and respect
1.4. Long term commitments and parenting

2. Values, rights, culture, and sexuality

2.1. Values and sexuality
2.2. Human rights and sexuality
2.3. Culture, society, and sexuality

3. Understanding gender

3.1. The social construction of gender and gender norms
3.2. Gender equality, stereotypes, and bias
3.3. Gender based violence

4. Violence and staying safe

4.1. Violence
4.2. Consent, privacy, and bodily integrity
4.3. Safe use of information and communication technologies

5. Skills for health and well-being

5.1. Norms and peer influence on sexual behaviour
5.2. Decision making
5.3. Communication, refusal, and negotiation skills
5.4. Media literacy
5.5. Finding help and support

6. Human body and development

6.1. Sexual and reproductive anatomy and physiology
6.2. Reproduction
6.3. Puberty
6.4. Body image

7. Sexuality and sexual behaviour

7.1. Sex, sexuality, and the sexual life cycle
7.2. Sexual behaviour and sexual response

8. Sexual and reproductive health

8.1. Pregnancy and pregnancy prevention
8.2. HIV and AIDS stigma, care, treatment and support
8.3. Understanding, recognizing, and reducing the risk of STIs, including HIV

Figure 2: Eight core key concepts of CSE guidelines (Source: UNESCO, 2018) [36]

With Pakistan's enormous adolescent population, preventing early marriage, high fertility rates among adolescent females, and sexual abuse against children and adolescents presents a significant challenge [41]. The evidence indicates that curriculum based CSE promotes outcomes such as delayed sexual intercourse initiation, decreased sexual intercourse frequency, decreased sexual partner count, decreased risk taking, increased condom use, and increased contraceptive use [36,37]. According to the literature, interventions such as sexual offender management and school-based education programs may help avoid abuse, and CSE programs have been found to effectively reduce child maltreatment, adolescent pregnancy, and STIs [42,43].

2.2. Community Perceptions and Resistance to CSE in Conservative Settings

According to a 2014 report by the UNESCO, there are just a few examples of scaled-up intervention programs addressing CSE. There is a considerable gap in school-based CSE, as well as its exclusion from official educational curricula, posing a significant hindrance to advancement in these domains [30,32]. As is the case in many conservative societies, Pakistan presents a difficult environment in which to adopt and promote reproductive health, women empowerment, and CSE [44,45]. It is taboo to address ASRH, and as is the case in many other countries, a widespread notion exists that exposure to CSE may result in unwanted behaviors [44,45]. According to the UNESCO, "there is less clarity on how to implement (CSE) and scale it up in varied environments," especially when confronted with community resistance [46]. Parents and religious institutions in some countries have expressed opposition to CSE, believing that families and parents have the right to give it and that early exposure to CSE leads to adolescents engaging in inappropriate sexual activity [34,44,47].

According to the literature, a sizable proportion of Pakistan's youth support the implementation of CSE [22,23,45]. In comparison, support from community influencers, decision-makers, and gatekeepers is particularly lacking, and a culture of silence around CSE is regularly seen [44]. Recent articles have highlighted the importance of community engagement and developing strategies to overcome widespread resistance to CSE, but large-scale interventions in Pakistan remain uncommon [34,44]. Two non-governmental organizations (NGOs), Aahung and Rutgers, attempted to address the issue of resistance in school-based and out-of-school ASRH interventions in Pakistan by utilizing a participatory approach in the development of life skills-based curriculum [44,47]. They succeeded in drawing attention to the vital role of community influencers and gatekeepers in spreading misinformation about the projects, arousing organized community resistance and precipitating an outpouring of resistance [44,47].

The UNESCOs 2021 global status report on CSE indicates that countries worldwide are progressing at varied rates [48]. As new health and well-being problems and the unique requirements of children and adolescents emerge, this journey must be adjusted to address those needs [48]. This includes ensuring that CSE is mandated by law and policy, with committed financing for the aim of expanding coverage [48,49]. The only way to accomplish this is to place

an emphasis on the quality of the content and its delivery through curricular reforms and investments in teacher education. As many countries progress toward CSE, it is critical to monitor their progress [48]. To accomplish this, it is vital to strengthen the use of validated indicators and to incorporate multiple perspectives, including those of parents, teachers, and community influencers [44,48,49].

In Pakistan, adolescent education curricula currently exclude information about sexuality and reproductive health [20]. Sexuality and ASRH are taboo topics in the classroom, with limited information available about substance abuse and STDs [44]. One of the major impediments is the low proportion of adolescents in Pakistan who complete middle and secondary school [50]. Despite global recommendations and evidence, there are few examples of scaled-up or comprehensive programs educating adolescents about reproductive health and sexuality. Understanding and prioritizing crucial challenges, as well as the local environment, is critical for adopting CSE in schools, as well as for integrating it into the existing system for long-term sustainability and scalability [44].

Following a situation analysis conducted by the Population Council and the United Nations Population Fund on ASRH in Pakistan, it was recommended that the development of a locally owned narrative and blueprint of CSE for adolescents be the subject of an extensive consultative and participatory process, including religious clerics that would serve as the foundation for the curricula for life skills-based education to be imparted in schools [20]. Developing an acceptable and effective CSE education model requires collaboration with all the major sectors on which young people rely for guidance, including families, particularly parents; schools; the health community, which includes public and private sector physicians and health workers, religious scholars and leaders; and other stakeholders [20]. Leaders and religious scholars' engagement and support are critical to de-stigmatize discussions about ASRH and to increase the receptivity of young people, their families, and communities to the notion of CSE [20]. As a result, understanding community perceptions regarding CSE and, in particular, their aspects of resistance to CSE in Pakistan, is crucial for adapting CSE in schools.

2.3. Enhancing data-driven decision-making in adolescent sexual and reproductive health: the role of health indicators in South Asia

Reliable health indicators are required for accurate and reliable information on the health situation, patterns, and trends to develop appropriate responses at the national, regional, or global levels [10,51–53]. Health indicators are critical for analyzing a region's health situation because they provide an overview of important gaps and health inequalities [10,51–53]. Health indicators and datasets also aid in identifying the priorities for health spending, monitoring the health of a population, determining inequities for various population segments, and assessing whether health performance objectives are achieved [10,51–53]. Health indicator sets including a vast range of health dimensions may also help with evidence-based policy synthesis [54]. To do so, indicators should be developed and prioritized depending on consensus and relevance [53,55]. Stakeholders, experts, and policymakers have different views of what constitutes a perfect indicator [56,57]. This diversity may also be found around the globe, which can be related to regional differences in health literacy, health priorities, health determinants, cultural norms, and demographics [58].

Numerous constructs, definitions, and prioritizations of adolescent health indicators have been developed by international experts and organizations e.g., United nations international children's emergency fund (UNICEF) and WHO [10,52,59,60]. These efforts culminated in the development of a comprehensive adolescent health indicator list that includes several health and social developmental aspects [10,52,59,60]. Most of the already available lists of indicators for adolescent health are frequently used for LMICs but are not region specific, and the same is valid for the South Asian region [10,51,59,61,62]. However, research reveals that social determinants and contextual variables have a significant impact on reproductive health outcomes and service utilization, especially for adolescent population [63–65]. As a result, adolescent health determinants of social development, health, and wellbeing vary greatly among geographic regions. Regional sets of health indicators may be able to give a better understanding of specific populations' health needs, patterns, perspectives, and data gaps.

There are several methodologies and techniques for selecting and prioritizing indicators. Two techniques for prioritizing indicators include: 1. Academics and researchers simply select indicators that they believe are the most relevant, and 2. Participatory methodologies for identifying and prioritizing indicators [66,67]. Using the second method enhances the likelihood that the prioritized indicators will be considered more trustworthy and relevant [68]. There was no comprehensive ASRH indicator list for assessing sexual and reproductive health in south Asia, according to a literature review conducted in early 2019. Hence, through a rigorous participatory expert consultation process, we developed a comprehensive set of ASRH key indicators for south Asia (Paper 1).

2.4. Community Readiness Model: Enhancing Readiness for Health Interventions in Preventive Programs

Following a review of the literature, Stith and colleagues found that the following conditions are required for the successful implementation of community-based health programs: the community must be ready for the preventive program, community coalitions must be established, the program must be tailored to the community, adequate technical assistance must be available, and training/resources must be adequately allocated [69]. According to the concept of community readiness in preventive health programs, the goal is to increase community readiness so that people may more effectively engage in and be included in health interventions [70–72]. As a result, prior to implementing an intervention, it is crucial to assess community readiness and, if necessary, raise levels of readiness through increased awareness and community participation [70–72]. Several measures for assessing community readiness have been developed, but the community readiness model (CRM) is the most frequently used in health promotion, suicide prevention, HIV/AIDS prevention, and programs targeted at promoting physical activity uptake among various communities [71,73–75]. The CRM examines existing prevention initiatives, community awareness of those efforts, leadership, community climate, knowledge of issue, and resource availability, among other aspects [75]. As previously stated, there are numerous hurdles to implementing CSE in conservative settings, thus we used the CRM to assess the community's readiness to implement CSE in schools (Paper 2/3).

2.5. Utilizing Social Media for Health Promotion: Opportunities and Challenges

Given their large user demographics, online social media platforms, which have over 3.6 billion active users worldwide, have the potential to be successful vehicles for health promotion, including sexual health [76]. Current primary research on the use, advantages, and limitations of social media for health communication and promotion is limited, particularly on health care professionals or members of the general public [76,77]. The body of knowledge on the use of social media for health promotion is currently limited, with the majority of studies being exploratory and descriptive in nature [76,77]. To mention a few examples, some of the most frequent uses of social media for health communication are to improve interactions with individuals and to advocate, exchange, and receive health information [77]. Improved interactions with others, increased information dissemination, increased accessibility to health information, peer or emotional support, public health surveillance, and the potential to influence public health policy through advocacy are all aspects of social media platforms that promote health and connectivity [77].

Among other aspects, social media has been used to advocate for, increase awareness of, and combat sexual harassment and violence against women [78]. Several studies have shown optimistic conclusions, and there is emerging evidence that utilizing social media may have a beneficial impact on sexual health [76]. More studies that clearly analyze theoretical frameworks and apply robust research methodologies would be required to add to the body of evidence on the use of social media platforms in health promotion [76].

Social media is a powerful technology that allows users to engage and serves as a vehicle to create interpersonal ties for a wide spectrum of people in today's day and age [77]. Although there are various benefits to using social media for health communication and promotion, the quality and reliability of the information provided, as well as the anonymity and privacy of users, must be monitored for effectiveness and reliability. There is a need to establish the relative effectiveness of various types of social media for health communication, as well as study potential mechanisms for monitoring and enhancing the quality and dependability of health communication via social media [77]. More thorough and extensive research and analysis,

including a range of approaches, is required to evaluate whether social media improves health communication practice in the short and long run [77].

Pakistan has around 169 million cellular subscribers, 85 million 3G/4G users, and 87 million internet users [79]. Pakistan is on the rise in terms of internet users and population penetration, making it an appropriate setting for digital health initiatives, as evidenced by the country's ranking as the tenth most populous in the world. Digital platforms, particularly in conservative environments, can be utilized to engage stakeholders, particularly gatekeepers and influencers who are difficult to reach otherwise [49]. As a result, the purpose of Paper 4 was to design, pilot, and evaluate the impact of an intervention based on community readiness level. The intervention should address community resistance by explaining CSE contents (results from Paper 2/3), their expected benefits, and addressing current misconceptions using awareness and promotion content for digital platforms developed through the complex health intervention development co-creation process.

Chapter 3: Aims and Objectives

The main objectives of the dissertation project were:

I. To develop a comprehensive set of relevant and prioritized indicators for measuring and monitoring ASRH in South Asia through a rigorous participatory expert consultation process (Paper 1).

II. To investigate and enhance systematic understanding of community readiness, community resistance, and strategies for implementing school based CSE in Pakistan (Paper 2 and Paper 3).

III. To develop, evaluate, and assess the impact of an intervention tailored to community readiness levels, emphasizing CSE contents, addressing common misconceptions, and promoting anticipated benefits through awareness campaigns on digital social media platforms (Paper 4).

Chapter 4: Materials and methodology

This chapter explains the methodology and analysis used to perform the Delphi study for indicator prioritization, assessing community readiness for CSE implementation, and developing, piloting, and evaluating the co-creation of social media content for CSE awareness and promotion. Primary data collection was required for all aspects of the study, and a participatory methodology incorporating both quantitative and qualitative analysis was employed. Ethics approval for this study was granted by National Bioethics Committee (NBC) at the Pakistan Health Research Council (Reference number: No.4-87/NBC-453/20/1815).

4.1. Modified Delphi technique and initial list of indicators (Paper 1)

The Delphi technique is a method for arranging a group communication process and allowing participants to work together to solve an intricate issue [80–83]. The Delphi technique has multiple benefits, including ease of implementation, gathering views from a large number of participants with diverse experience situated in different geographical regions, and maintaining anonymity throughout the process [80–83]. A multidisciplinary panel of experts was identified and recruited for the aim of prioritizing and selecting ASRH indicators for South Asia. We used an online survey with a group of international experts, and the Delphi technique was appropriate since the experts did not have to meet face-to-face throughout the Delphi process [81]. We had three Delphi rounds. The first two rounds, which were conducted in complete anonymity, allowed experts to score indicators. Several modifications to the original Delphi have been used in the past to perform consensus exercises [82,83]. The third round of group discussion was the key modification to the original Delphi technique, in which we asked experts to discuss the findings from a broader regional perspective. A comprehensive literature search for existing lists of key indicators provided the first list of indicators. The major source of this list was determined to be a WHO report of a technical consultation on indicators for adolescent health [10]. In the first round of rating, 27 adolescent health indicators on health determinants, outcomes, and service delivery – organized into nine categories – were drawn from this report [10,51].

4.1.1. Expert inclusion criteria, identification, and recruitment

The survey's experts were identified and recruited using the purposive sampling approach. Experts were defined as follows:

1. Health researchers with a focus on South Asia who published a peer-reviewed publication (any author position) on adolescent health or sexual and reproductive health.

2. Public health professionals in South Asia working in the areas of adolescent health, sexual and reproductive health (i.e., regional/national specialists, representatives of technical organizations, NGOs, public sector, and health department/health ministry officials).

Internet searches were carried out to identify experts who met the inclusion criteria. Email addresses were obtained from author lists or organization websites. Snowballing was also used to find experts.

4.1.2. Delphi rounds

As previously stated, the first round utilized 27 indicators on adolescent health from the WHO report. Experts were asked to rate the indicators based on their relevance to ASRH in South Asia on a Likert scale (5 = high relevance, 4 = relevant, 3 = moderate relevance, 2 = low relevance, and 1 = not relevant). During the first round, experts were also given the option to propose any additional indicators that they thought were relevant. In the second round, a list of 14 indicators recommended by experts were rated. Experts were invited to a group discussion session to discuss the findings of the prioritized indicators using the specificity, measurability, achievability, relevance, and targeted (SMART) approach. A discussion guide was developed, which contained questions on indicator categories, indicator ranking, survey data availability in south Asia, data collecting hurdles for adolescent health indicators, and a thorough discussion on the findings of the first and second rounds. For coding and interpreting the qualitative data from the third round as well as the additional comments sent by the experts, qualitative content analysis was used [84].

According to the inclusion criteria, 76 experts were identified as being eligible to participate. Fifteen email addresses found through internet search were invalid. Therefore, 61 invitations to the first round were sent. For the first round, twenty-one experts responded. Snowballing

resulted in the referral of ten more experts, three of whom responded. The experts who took part were from Australia, Bangladesh, Brazil, India, Nepal, Pakistan, Switzerland, the United Kingdom, and the United States (Figure 3). Twenty experts consented to take part in the second round, and 16 responses were received. The group discussion included six of the ten experts who agreed to participate in the third round. The Delphi was conducted between March and August of 2019.
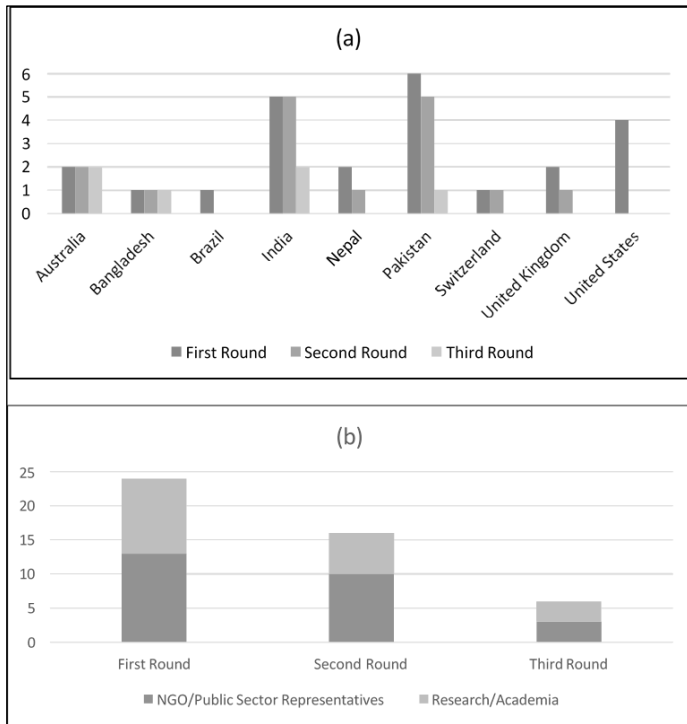
Figure 3(a): Number of participating experts and their country of origin for all Delphi rounds. (b): Number of participating experts and their background based on inclusion criteria for all Delphi rounds.

4.1.3. Statistical analysis

The priority of indicators was determined using mean Likert scores whereas consensus among experts was assessed using Kendall's coefficient of concordance (Kendall's W) [85]. Kendall's W

is a non-parametric statistic used to assess agreement among raters. Its value ranges from 0 to 1 and the values were interpreted using the following cutoffs: 0.9 = unusually strong agreement, 0.7 = strong agreement, 0.5 = moderate agreement, 0.3 = weak agreement, and 0.1 = very weak agreement [85]. Kendall's Tau (Tau-a and Tau-b) and Spearman's Rank Correlation Coefficient were used to assess the strength of the relationship between the first-round indicator ranking and WHO indicator ranking [85,86]. The statistical analysis was conducted using Stata 14.2 (Stata, College Station, TX).

4.2. Community readiness assessment (Paper 2/3)

4.2.1. Study setting: Islamabad

Our study was based in Islamabad, Pakistan's capital city. Islamabad has a population of over 2 million and 0.3 million households, according to the 2017 census [19]. There are 367 primary (grades 1–5), 162 middle (grades 6–8), 250 high (grades 9–10), and 75 higher secondary (grades 11–12) schools in the city, with the highest literacy rate in the country of 88 percent [50,87]. According to the literature, Islamabad and Rawalpindi (adjacent cities) provide a similar picture in terms of the ASRH concerns discussed in chapter 1. According to a survey performed in Rawalpindi, 48.6 percent of females only have a basic understanding of puberty and menstruation [88]. Another study on the attitudes of parents and teachers about CSE in Islamabad and Rawalpindi found that 76.1 percent of parents and 64.4 percent of teachers supported the introduction of age-appropriate CSE in schools [89].

4.2.2. Tiered approach for assessing community readiness using the socio-ecological model

According to Mouli et al., there are different tiers of the society that influence the environment of adolescents' access to CSE in Pakistan [44,47]. The several tiers, which correspond to the socio-ecological framework, are divided into five tiers: society, community, organizational, interpersonal, and individual [44]. Except for the individual tier, we grouped key respondents from Islamabad for each tier because our focus was on gatekeepers and influencers. Respondents were selected in each tier based on existing research about stakeholders who play an important role in influencing decisions about the implementation of health interventions, particularly ASRH [44,47]. Key respondent interviews were used to conduct a cross-sectional community readiness

assessment for implementing school based CSE in Islamabad. The CRM handbook was utilized to adapt the semi-structured interview guide [75]. The questionnaire included both open-ended and closed-ended questions about the community's attitudes, knowledge, and beliefs about implementing CSE in Islamabad, and it addressed five key dimensions: knowledge of efforts, leadership, community climate, community knowledge of the issue, and resources [75].

4.2.3. Recruitment strategy and data collection

Purposive sampling was used to identify the relevant respondents. Potential respondents were identified through online searches of institutions involved in CSE and/or policymaking. In addition, searches were done to identify community members who may serve as gatekeepers. Snowballing was also utilized to find and recruit new respondents. Five to six key respondents were recruited for each tier of the community, as recommended by the CRM handbook [75]. An invitation to participate in the study was sent to the respondents, along with a participant information sheet and a supplementary fact sheet on CSE. Informed written consent was received via email prior to the interview. From April to July 2020, interviews were conducted online. All interviews were recorded and transcribed by a professional transcribing service.

4.2.4. Rapport building and snowballing

The study's topic was expected to be difficult to discuss, so certain steps were taken to build rapport with respondents [89,90]. When the online call began, the interviewer discussed the factsheet and the study's objectives. Before the recording began, participants were given some time to settle in. To reinforce trust, they were reminded of the importance of confidentiality/anonymity prior to the recording and informed that whatever communicated will be utilized strictly for research purposes. We were only able to identify and contact 15 potential respondents using internet searches, with only 10 responses. It was challenging to find potential study participants through internet searches. As a result, when the recording had ended, respondents were asked to suggest participants based on the inclusion criteria. Participants recommended a total of 28 candidates, and 25 of them responded.

4.2.5. Community readiness scoring system and data analysis

The scoring system that was used was adapted from the CRM handbook [75]. Each interview transcript was scored to provide a readiness level for the five dimensions, using a nine-point rating system: 1 (No awareness), 2 (Denial/Resistance), 3 (Vague Awareness), 4 (Preplanning), 5 (Preparation), 6 (Initiation), 7 (Stabilization), 8 (Expansion/Confirmation), and 9. (Community ownership). The interview transcripts were rated separately by two raters [75]. Although self-reported respondent data gives fascinating insights into community perceptions, only consensus scores by raters were used to assign readiness scores to dimensions [75].

The intraclass correlation (ICC) was used to test the reliability of the two raters' independent scores. ICC is used to determine inter-rater reliability since it measures the reliability of two independent raters [91]. The robustness of the scores among raters is determined using inter-rater reliability measures [92]. We used the two-way mixed-effects model to estimate the ICC because all of the interviews were scored by the same two raters [93]. Furthermore, the relevant estimate is dependent on the two raters' absolute agreement. The ICC estimates ranged from 0.42 to 0.60 across all dimensions. Based on these estimates, the inter-rater reliability can be classified as fair by Cicchetti and Sparrow [94], fair to good by Fleiss [95], moderate by Landis & Koch [96], and good by Regier et al. [91]. As suggested by the CRM handbook, the two raters discussed and developed a consensual score for each dimension and interview [75]. The readiness global score was determined by taking the arithmetic mean of the five dimensions.

Regression analysis was used to investigate the association between respondent characteristics and the consensus scores for each dimension and the global score. Even though the sample size of 35 respondents is a limitation for regression analysis, it can still provide some intriguing insights into how the respondent's characteristics affect the scores. The dependent variables range from 1 to 9 because the scores were given on a nine-point scoring system. A linear model cannot be used to estimate such models because the predicted values from a linear model can exceed the range of 1–9 [97]. Furthermore, because the consensus scores are continuous, ordered regressions cannot be used. As a result, the following transformation was employed:

$$Z = \frac{(Y-1)}{8} \quad (1)$$

In Equation (1), the transformed variable Z lies in the interval [0, 1] if Y lies in the interval [1, 9]. As a result, we use a fractional regression model with the logit link function, transformations for each dimension, and the global score as the dependent variable. Explanatory variables included the respondent's tier, age, duration of stay in the community, and biological sex. Stata 14.2 was used for the entire analysis (Stata Corp., College Station, TX, USA).

4.2.6. Qualitative content analysis (Paper 3)

Qualitative content analysis allows for the inter-subjective and systematic formulation of inferences from verbal, visual, or written data [84]. This method was utilized to evaluate and interpret the interview data in order to investigate community perceptions that contribute to resistance around CSE and to investigate implementation strategies [84]. MAXQDA Analytics Pro 2020 was used to code and maintain the dataset. An open coding technique was paired with an inductive manifest analysis approach to develop the initial coding system [84]. Each code was explained and defined at the decontextualization stage. After eliminating the uncoded data segments, second coder independently examined the coding process and segments for reliability and trustworthiness [84]. The coded segments and system were revised by mutual agreement during the recontextualization stage among the two coders. The research team then evaluated all of the code summaries to determine homogeneous groups of codes that could be utilized to triangulate the data for interpretation during the categorization stage [84]. During the compilation stage, the findings were drafted after the categories had been developed [84].

4.2.7. Network analysis of inter-code relationships (Paper 3)

The number of times the same interview segment was coded for several codes during the content analysis was used to explore the links across codes using code relation data produced by MAXQDA Analytics Pro 2020 [98]. This is essentially code overlap for the same interview segments, and we utilized it to investigate how participants spoke about different themes connected to the topic, as well as how interrelated these topics were based on the coding overlap [98]. However, because code relation statistics do not adequately depict the intricacies of inter-code relationships, network analysis was used [98]. The statistics for inter-code relationships only illustrate the relationship between two codes and are based on the frequency of overlap. In comparison, network analysis for the same statistics reveals detailed inter-code relationships

that go beyond inter-code relationship matrices [98]. Although both indicate relationships between pairs of codes, the network graph offers the relationship between a specific pair of codes in context as well as in relation to all the other codes in the network [98]. Each code was regarded as a network node, with undirected edges utilized to depict inter-code relationships [98]. To assess the strength of the inter-code relationship, Pearson correlation coefficients were calculated. Pearson correlation coefficients were computed using Stata 16.0, and network analysis was performed using Gephi 0.9.2. To represent the strength of association between nodes/codes, the absolute value of the Pearson correlation coefficient was utilized as the weight of the undirected edges [98]. To estimate the size of each node, the average weighted degree, which takes into account the weight of all edges connected to a node was used [98–100]. The color of the nodes was determined by the modularity class, which divided the network into clusters of highly connected nodes [98–100]. The resolution of modularity can be modified to identify a varied number of clusters; increasing the resolution decreases the number of clusters and vice versa. The modularity resolution was set to 1.

4.3. Co-creation (Paper 4)

4.3.1. Co-creation of health interventions

The intervention for this study was developed with the involvement of all key stakeholders, utilizing the framework proposed by Leask et al. for conducting and documenting the process of co-creating complex health interventions [101]. The PRODUCES statement, which focuses on defining the problem, objective, design, end-users, co-creators, evaluation, and scalability, was developed by all co-creators (Table 1).

PRODUCES	
Problem	In Islamabad, Pakistan, there is a lack of community readiness to implement school-based sexuality education.
Objective	To create digital content that will promote, raise community awareness, and prepare students for sexuality education in schools. Partner with social media influencers to explore online digital platforms for health promotion (Influencer marketing).
Design	Participatory action research (PAR)
End Users	Community influencers, gatekeepers, parents, teachers
Co-Creators	Researchers, social media influencers, parents, teachers, health department reps, and community leaders.
Evaluation	Process evaluation/Impact evaluation
Scalability/Dissemination	Dissemination on Facebook, YouTube, and Instagram

4.3.2. Co-creators and recruitment

This study's participants were identified and recruited via purposive convenience sampling. Participants from the CSE readiness (Paper 2/3) in Islamabad were asked if they wanted to participate in this study, and those who replied yes were sent an invitation [49]. Snowballing was also used to identify and engage new participants. Co-creators included researchers/academics, parents, teachers, Pakistani health department professionals, NGO representatives, and social media influencers.

4.3.3. Focus group discussions and intervention development phase

An online focus group discussion (FGD) was held in January 2021 to discuss awareness messages while keeping the local context in consideration. The conversation centered on the CSE contents, as well as any misconceptions that needed to be addressed, as well as various internet platforms for intervention dissemination. Based on the findings of the first focus group, video content was developed in partnership with a social media influencer [102,103]. The second FGD with the co-creators took place in June 2021, and all co-creators were invited to assess and critique the video content, resulting in the video's content being refined. The FGDs were transcribed by a professional transcribing service. The FGD data was evaluated using qualitative content analysis.

Two independent researchers assessed the qualitative data and developed the coding system. An open coding approach was used with an inductive manifest analysis to develop the initial coding system in MAXQDA Analytics Pro 2020 [84].

The two videos shed light on the debate over CSE in educational settings. The first video presents an active classroom scenario in which a determined teacher tries to explain various aspects and significance of CSE to a group of students (https://www.youtube.com/watch?v=aOBPWy1cEm0&ab_channel=DaktarSaab). Through a carefully put together discussion, the teacher addresses the common misconceptions associated with discussing sexuality among youth. By highlighting CSE's role in enhancing informed decision-making, the teacher articulates the curriculum's important components, which range from gender equality and puberty education to reproductive health and the prevention of sexually transmitted infections.

However, the instructional state of the classroom is interrupted by the unexpected arrival of law enforcement, as represented by the arrest of the teacher by a police officer. This sudden turn of events highlights the societal concerns and resistance that frequently precede discussions over CSE implementation. The conflict between education and authority captures deeper tensions and varied viewpoints among communities over the appropriateness and necessity of CSE in schools.

In the next video, the story continues within the confines of a police station, as Inspector Irshad interrogates the detained teacher about suspicions of spreading "obscenities" to impressionable young minds (https://www.youtube.com/watch?v=5WE90v1vcy0&ab_channel=DaktarSaab). The discussion that follows is an in-depth examination of societal attitudes, cultural sensitivities, and policy consequences of CSE. Inspector Irshad's probing questions and the teacher's passionate responses are an illustration of the larger cultural debate on CSE.

Throughout the discussion, themes of responsibility, cultural relevance, and collaboration emerge as critical foundations for navigating the multifaceted nature of implementing CSE. The discussion emphasizes the importance of integrating CSE initiatives with cultural and religious norms while also appreciating the diversity of viewpoints and sensitivities among groups. Furthermore, the discourse emphasizes the necessity for developing collaborations between

parents, educators, religious leaders, and policy makers to build a conducive climate for the implementation of CSE initiatives.

In conclusion, the two videos highlight the complex interplay of education, societal norms, and institutional frameworks in influencing the discourse on CSE. By addressing the complexities and challenges inherent in CSE implementation, policymakers, educators, and stakeholders can work to develop inclusive, evidence-based, and culturally sensitive approaches to CSE, empowering youth to make informed decisions and navigate the complexities of modern society. The narrative and video's contents were carefully developed and scripted in accordance with the state of community readiness. The community readiness assessment revealed that the community is in the resistant and denial stage of readiness and that careful awareness of CSE is necessary, keeping in mind cultural norms and clearing up misconceptions.

4.3.4. Evaluation framework

The feasibility and piloting phases include assessing the intervention's intended impact and testing procedures for process evaluation of intervention development [101,104]. A pilot study does not have to be a scaled-up version, but it should address the key uncertainties that arise throughout the development and piloting phases [101,104]. To evaluate complex health interventions a combination of qualitative and quantitative methodologies is likely to be required [101,104]. As a result, we developed a comprehensive evaluation framework for FGD process evaluation and a detailed impact evaluation of the intervention with feedback from the co-creators, which is discussed below.

4.3.4.1. Process evaluation of intervention development

A process evaluation evaluated the robustness of the co-creation process, and participant input on the sessions was obtained via an online survey. During the second FGD, the co-creators evaluated the videos using a modified version of the Kowatsch et al. assessment criteria [105]. The ease of use, content quality, aesthetics, perceived effectiveness, perceived enjoyment, safety, negative connotations, and cultural context were all scored by participants.

The performance indicators and metrics used to assess the impact of the videos were modified from Neiger et al.'s approach for evaluating social media health promotion initiatives [106]. Social media influencers were also asked about performance indicators and metrics in the second FGD. Information from social media platforms was used to assess the impact of the videos. Table 2 shows the developed framework for assessing the impact of health promotion content and key performance indicators.

Table 2: Framework for evaluating the health promotion impact of social media content.

Key Performance Indicators	Definition	Metrics
Audience exposure, engagement, and reach	Exposure: The number of times content on social media is viewed. Engagement: The number of people who participate in creating, sharing, and using the content. Reach: The number of people who have contact with the content.	Number of views Likes Comments Shares Engagement Engagement per 100 views Reach Reactions (Emoji reactions)
Audience demographics	Audience-specific factors such as age, gender, and geographical location data.	Audience age Audience gender Audience geographical location
Audience retention	The duration of the video that was watched by the audience.	Average seconds audience watched the video The average percentage of the video watched by the audience
Insights	Audience feedback from social media platforms	Sentiment analysis of audience feedback Qualitative content analysis of audience feedback

4.3.5. Sentiment analysis and qualitative content analysis of audience feedback

We performed sentiment analysis and qualitative content analysis on the received comments to gain audience insights. Sentiment analysis is a technique for investigating the opinions, sentiments, emotions, and attitudes expressed in textual data [107–109]. As a result, it is a convenient way of evaluating incoming comments and computing a numeric score for the associated sentiment [107–109]. For sentiment analysis, we employed a lexicon-based technique that includes matching a lexicon of sentiment words to the text under evaluation. We used the Bing lexicon, which contains around 6800 words and was developed for assessing customer feedback [107–109]. Each matched Bing lexicon word is assigned a positive or negative

sentiment. The net-sentiment for each comment was then computed by subtracting the number of negative words from the number of positive ones. If a comment's net-sentiment is positive, zero, or negative, it is classified as positive, neutral, or negative [107–109]. Since some of the comments were in Urdu, they were reviewed and translated into English by a native Urdu speaker. The lexicon-based sentiment analysis was carried out using RStudio Version 1.3.1093.

Viewers' comments were also evaluated utilizing qualitative content analysis to go deeper into the audience's emotions and feedback [84]. An intuitive coding scheme was developed using the NRC lexicon taxonomy [110]. Fear, joy, trust, anger, sadness, disgust, anticipation, and surprise were all coded, as were positive and negative sentiments. Curses and suggestions were also introduced to the coding system. Two researchers independently assessed the coding system and data for rigor. The comments/feedback were analyzed and maintained using MAXQDA Analytics Pro 2020.

Chapter 5: Key results and findings

This chapter summarizes the important findings and results. The results of the Delphi exercise used to prioritize key indicators for assessing ASRH in South Asia are described first. Following that, community readiness assessment and resistance dimensions, as well as possible implementation approaches, are outlined. Finally, the findings of the co-created intervention piloted on social media are presented including impact, process evaluation, and development phase.

5.1. Indicators for assessing ASRH for south Asia (Paper 1)

5.1.1. Indicator categorization, descriptive statistics, and ranking

Indicator categories developed by the WHO were used to group indicators for statistical analysis [10]. The categories were further divided based on whether the indicator was on the WHO list (first round 27 indicators) or on expert recommendations (second round 14 indicators). Appendix 1 shows the ranking of indicators, the WHO ranking (only for first-round indicators), mean Likert scores, standard error, and confidence intervals. Figure 4 shows the indicator category rankings, mean scores, and confidence intervals. The categories of demographic and reproductive health indicators were ranked highest, whereas parental connection/regulation and mortality indicators were rated lowest.
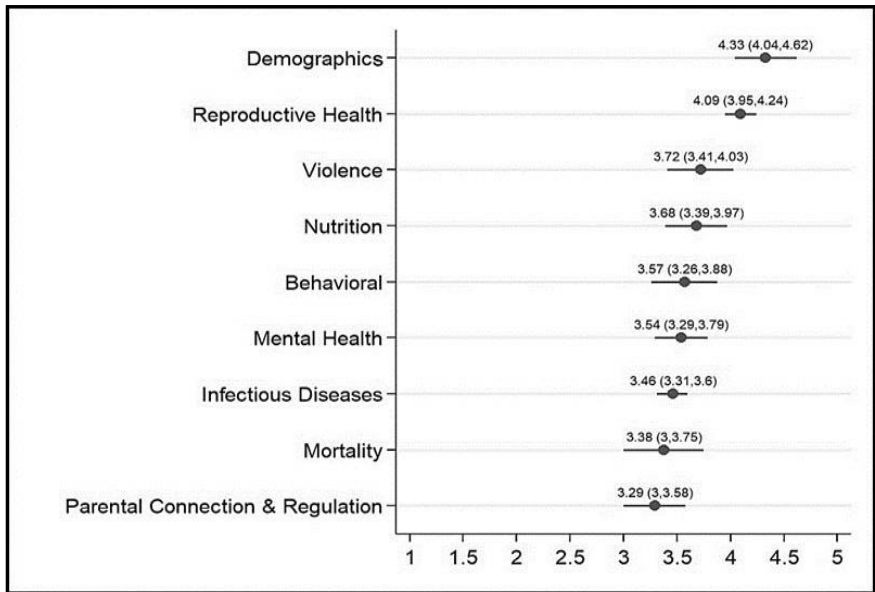
Figure 4: Indicator Category Ranking, mean scores, and confidence interval plot.

One potential concern with ranking first and second round indicators was that the number of experts in the second round dropped from 24 to 16. As a result, we looked at the correlation between the two groups of experts: the 24 experts who participated in the first round and the 16 experts who participated in the second round. Kendall's Tau (Tau-a and Tau-b) and Spearman's rank correlation coefficients were used to compare the two rankings. According to Kendall's Tau-b, the two groups of experts were 73.8 percent (p<0.01) more likely to agree than disagree on the ranking of first-round indicators.

5.1.2. Need for regional indicators and consensus among experts

We compared the ranking of first-round indicators to the WHO's ranking of indicators using Kendall's Tau-b and found that these rankings are only 27% (p<0.01) likely to agree on the importance of the first-round indicators. Kendall's Tau-a and Spearman's Rank Correlation remained similar: 27% (p<0.01) and 29% (p<0.01), respectively. Secondly, 12 of the 14 new second-round indicators suggested by the experts were ranked among the top 20. (Appendix 1:

Indicator category, ranking, and descriptive statistics (Delphi exercise). The low estimated Kendall's W values (W=0.29, P<0.01) indicate that there was little consensus among experts when it comes to ranking individual indicators. The consensus on indicator categories, on the other hand, was much stronger. Parental Connection/Regulation (W = 0.85, P<0.01), Behavioral (W = 0.71, P<0.01), Mortality (W = 0.69, P<0.01), Nutrition (W = 0.67, P<0.01), and Infectious Diseases (W = 0.67, P<0.01) all had high levels of agreement.

5.1.3. Relevance vs. consensus

We observed that demographics, reproductive health, violence, and mental health scored highest in terms of relevance based on mean scores, however there was weak agreement among experts for these categories (Kendall's W < 0.5) (Figure 5). The relevance of the nutrition, behavioral, infectious disease, and mortality indicator categories ranged from high to moderate, with moderate agreement among experts (Figure 5). The experts had a strong agreement on the relatively low relevance of the parental connection/regulation indicator category (Figure 5). Kendall's W is sensitive to the number of indicators, therefore this variation in agreement across experts could be due to the varying number of indicators in each category.
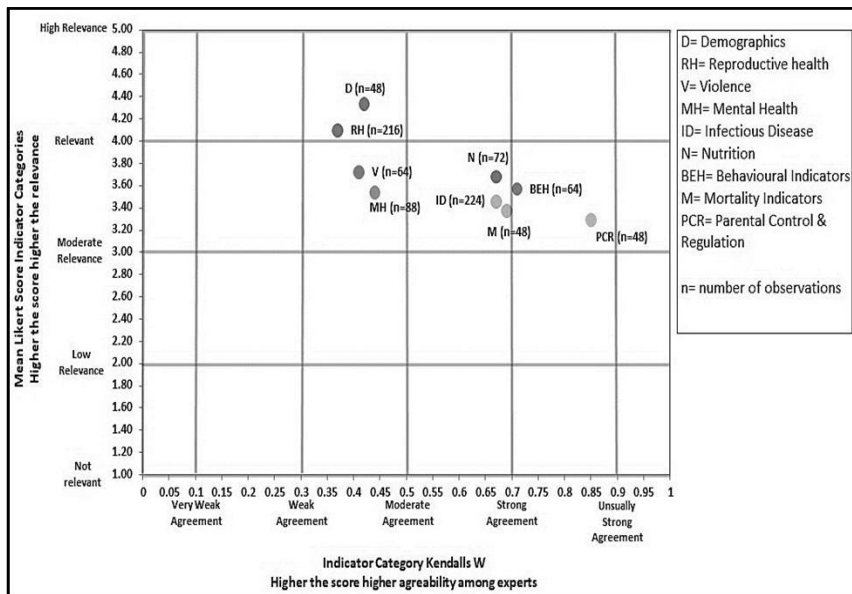
Figure 5: Assessing consensus (Kendall's W) in contrast to relevance (Mean Likert scores) of indicator categories.

5.1.4. Group discussion session

The group discussion included six experts. The experts agreed that specific regional priorities for indicators based on relevance should be developed concurrently with our findings. A lack of funding and dedicated trained human resources, non-existent data registries, cultural taboos, legal impediments, and a lack of political commitment for sexual and reproductive health were also cited as barriers to data availability and health interventions for adolescents. Adolescents are currently underrepresented in the region's current national-level health surveys, and efforts should be made to improve their inclusion and participation. Experts from Bangladesh, India, and Pakistan highlighted that national-level health surveys do not include the early adolescent group (10–14 years), but only the middle/late adolescent group (15–19 years). Child marriage, lack of access to contraception, and violence have also been cited as key issues affecting female adolescents in south Asia, according to experts.

5.2. Community readiness assessment (Paper 2)

5.2.1. Characteristics of study participants

35 online interviews were conducted, with a mean age of 31.77 years for 20 females and 15 males. The average length of the interviews was 30.78 minutes. The number of participants in each ecological tier and the descriptive statistics for the consensual score depending on dimensions, respondent category, and tiers are presented in Table 3.

Despite using a tiered approach to recruit all of the appropriate stakeholders and gatekeepers, as well as mapping the participants based on previous literature from Pakistan indicating which gatekeepers influenced access to CSE in Pakistan, we were only able to recruit one religious scholar and no legislators from the national assembly. One explanation for this was that the interviews were performed online during COVID, making it harder to reach and recruit participants.

5.2.2. Community knowledge of efforts

Only ten of the 35 respondents said that there were currently efforts in Islamabad to address CSE. On a scale of one to ten, respondents assigned a mean value of 4.37 to how much of a concern CSE is to Islamabad residents. The community's awareness of efforts was rated from 'none' to 'a few' community members in terms of having heard of efforts, knowing the purpose of efforts, knowing who the efforts are for, knowing how the efforts work, and the effectiveness of the efforts. The education department representative had the highest community readiness scores for knowledge of efforts, while the religious scholar had the lowest (Table 3). Overall, the community readiness score for the dimension 'knowledge of efforts' was 2.03, corresponding to the community readiness stage of denial/resistance (Table 3).

5.2.3. Leadership

Almost two-thirds of respondents believed the leadership in Islamabad is not supportive of expanding efforts to address CSE. On a scale of one to ten, respondents in Islamabad rated the level of concern about CSE for leaders as 3.66. In terms of leadership, the health department representative rated the highest score, while the community leader and school heads gave the

lowest scores (Table 3). The overall score for the leadership dimension was 2.50, corresponding to the community readiness stage of denial/resistance (Table 3).

Table 3: Community readiness dimension score, respondent category readiness scores, and tier wise readiness scores descriptive statistics based on rater consensus scores.

Community Readiness Dimension Score Descriptive Statistics			
Community Readiness Dimensions		Mean	Std. Dev.
Knowledge of Efforts		2.03	1.27
Leadership		2.50	0.99
Community Climate		3.37	0.69
Knowledge of issue		2.06	0.54
Resources		2.89	0.88
Global Score		2.57	0.55
Respondent Category Readiness Scores and Descriptive Statistics			
Socio Ecological Tier	Respondents	Mean	Std. Dev.
Interpersonal Mean=2.27 Std. Dev.=0.35	Parent (n=6)	2.27	0.35
Organizational Mean=2.59 Std. Dev.=0.69	NGO (n=5)	2.68	1.01
	Teacher/Rural (n=4)	2.48	0.42
	Teacher/Urban (n=4)	2.83	0.64
	Head of School (n=2)	2.15	0.21
Community Mean=2.51 Std. Dev.=0.37	Social Media Influencer (n=2)	2.35	0.21
	News channel (n=1)	2.30	NA*
	Doctor (n=2)	2.45	0.21
	Religious Scholar (n=1)	2.40	NA*
	Community Leader (n=1)	3.30	NA*
Society Mean=2.83 Std. Dev.=0.44	Education Department (n=1)	3.20	NA*
	Political activist (n=2)	2.80	0.28
	Health Department (n=4)	2.75	0.56

5.2.4. Community climate

When asked to rate the priority of CSE for community members in Islamabad on a scale of one to ten, respondents gave a mean score of 2.89. In terms of community members' willingness to pay more in taxes to support fund community efforts related to CSE, respondents indicated that none to a few would be willing to do so. They also believed that only a few community members would support expanding CSE initiatives in Islamabad. Political activists had the highest readiness score for this dimension, while teachers from rural Islamabad gave the lowest. The overall score for the community climate dimension was 3.37, which corresponded to the community readiness stage of vague awareness (Table 3).

5.2.5. Knowledge about the issue

The level of community members' knowledge of CSE in Islamabad was assigned a mean value of 3.97 on a scale of one to ten. Community members, according to the respondents, know nothing to a little about the topics and contents of CSE, the benefits of school-based adolescent health interventions, adolescent health issues in the community, how adolescent health can be improved, and information about the age-appropriateness of CSE. The education department representative gave the highest readiness score for this dimension, while NGO representatives gave the lowest (Table 3). The overall readiness score for knowledge about the issue dimension was 2.06, equivalent to the community readiness stage of denial/resistance (Table 3).

5.2.6. Resources for efforts

Regarding resources for efforts, respondents believed that there were few volunteers and little space in Islamabad for conducting CSE initiatives. They believed that resources for addressing CSE in Islamabad, such as financial donations, grant funding, and the availability of experts, were non-existent. Respondents also believed that no efforts were currently being made in Islamabad to seek volunteers, solicit donations for expanding initiatives, develop grant proposals, train community members to become experts, or recruit experts. Community leaders had the highest readiness score for this dimension, while social media influencers and the education department had the lowest (Table 3). The score for the resources for efforts dimension was 2.89, which corresponds to the community readiness stage of denial/resistance (Table 3).

5.2.7. Regression analysis

In terms of the respondents' tier and biological sex, the community tier and female were used as the base in the regression. For coefficients that are significant at the 5% level, the following conclusions were reached: The findings demonstrate that respondents in the interpersonal tier (parents) scored lower on knowledge of efforts, leadership, resources for efforts, and global score than respondents in the community tier. Respondents in the organizational tier, on the other hand, gave a higher global readiness score than those in the community tier. Furthermore, respondents in the society tier were more optimistic about leadership and global score than respondents in the community tier. In general, older respondents were more optimistic about efforts and less optimistic about resources, regardless of their tier. Respondents who had lived in the community for a longer period were more optimistic about the community's climate and resources. In terms of biological sex, male respondents were more skeptical of the knowledge of issue dimension.

5.3. Community readiness assessment: Qualitative content analysis (Paper 3)

Five main categories were identified during the categorization phase of qualitative content analysis. Figure 6 depicts the content analysis-based coding system and categories. Only key findings are reported below; for further details, see Paper 3:
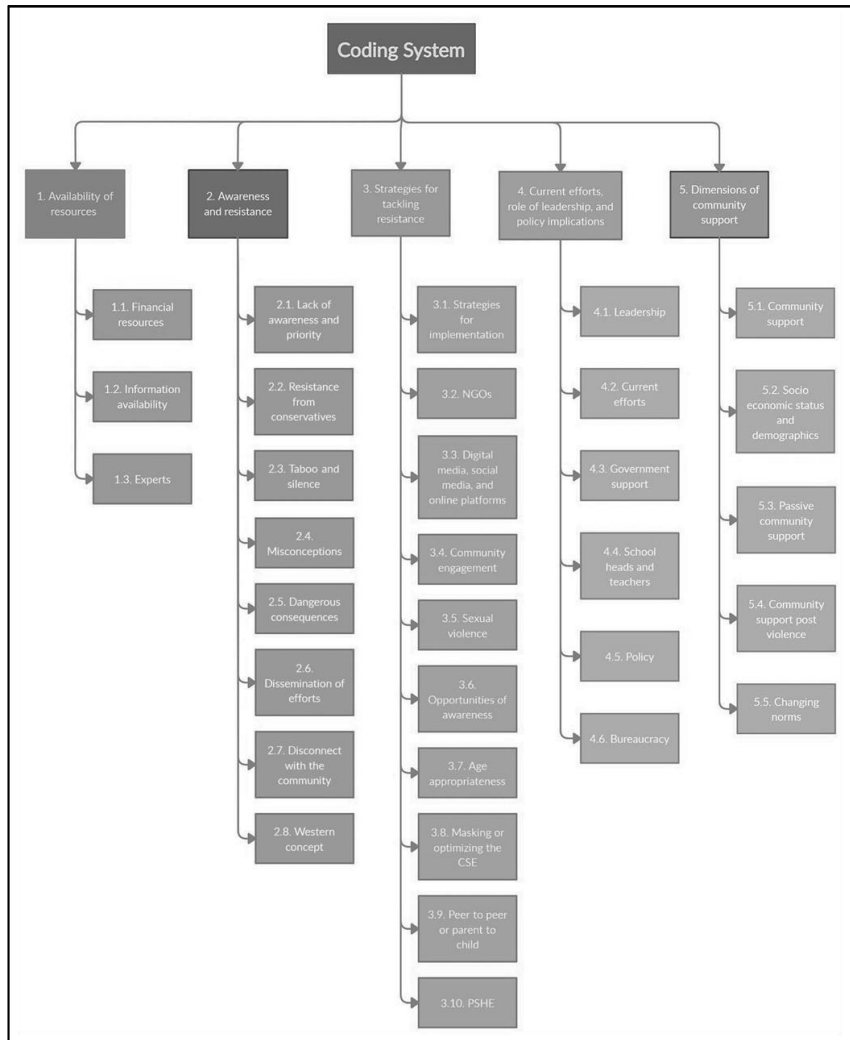
Figure 6: Coding system (Paper 3)

There are almost no resources available, particularly from the government and leadership is also financially unsupportive towards CSE. Most of the financing originates from international donor

agencies and is allocated to NGOs working on such issues. Not much information regarding CSE is accessible to the community.

There is a lack of specific understanding, and several misconceptions persist regarding CSE among community members. Conservatives are generally opposed to CSE, and religious leaders are particularly loud in their opposition. Social media initiatives are supported by media influencers, entertainers, and leaders. Many people use social media, particularly Facebook and Twitter, to passively support controversial but important issues such as CSE, but this is primarily due to its trending nature.

Some strategies for dealing with resistance towards CSE were proposed; the topic should be handled sensitively, with evidence, and in accordance with cultural/religious sensitivities, and leaders should be involved and made aware to gain their support. CSE topics are extensively discussed on social media, and social media influencers play a key role in promoting awareness. Numerous people appear to be uninformed of the content's age appropriateness, leading to many misconceptions; hence, educating about it may be effective in overcoming resistance.

The national political leadership seems apprehensive about implementing CSE. Leadership is unwilling to overtly endorse and advocate the cause due to religious concerns and societal stigma. However, because of their influence and authority, leaders play an important role in implementing CSE. As the community engages with health issues, the Ministry of Health's leadership is supportive, and specific programs, particularly on child abuse, violence, and menstrual hygiene, are being implemented. Teachers and the community usually have a strong connection. Prior to any implementation, in each municipality, area education officers (AEO) must be taken on board. AEO may not get directly involved due to the risk of stigma, but they can assist NGOs and get community members involved.

5.3.1. Network Analysis

Figure 7 shows the network for the inter-code relationship statistically significant at 1% level. When the modularity resolution was set to 1, five distinct clusters of interconnected nodes/codes were identified. The following node/code clusters were identified: NGOs, misconceptions, resources and policy, strategies, and community support, and PSHE and current efforts (Figure

7). The size of nodes is determined by their average weighted degree, suggesting that larger nodes are more connected and correlated within the network. Cluster 4 (Strategies and community support) is the sole cluster that is not linked to any other cluster, suggesting that it has no statistically significant correlations with any other cluster. When compared to other codes, strong correlations were seen between dissemination of efforts and bureaucracy, PSHE and masking/optimizing the CSE, western concept and socio-economic status and demographics, and misconceptions with western concept. The network also shows that financial resources, NGOs, PSHE, and misconceptions were the most important nodes in the network, and that implementers should prioritize engaging with or addressing these while focusing on CSE initiatives. Five codes were excluded from the network analysis because they had no linkages at the 1% significance level.
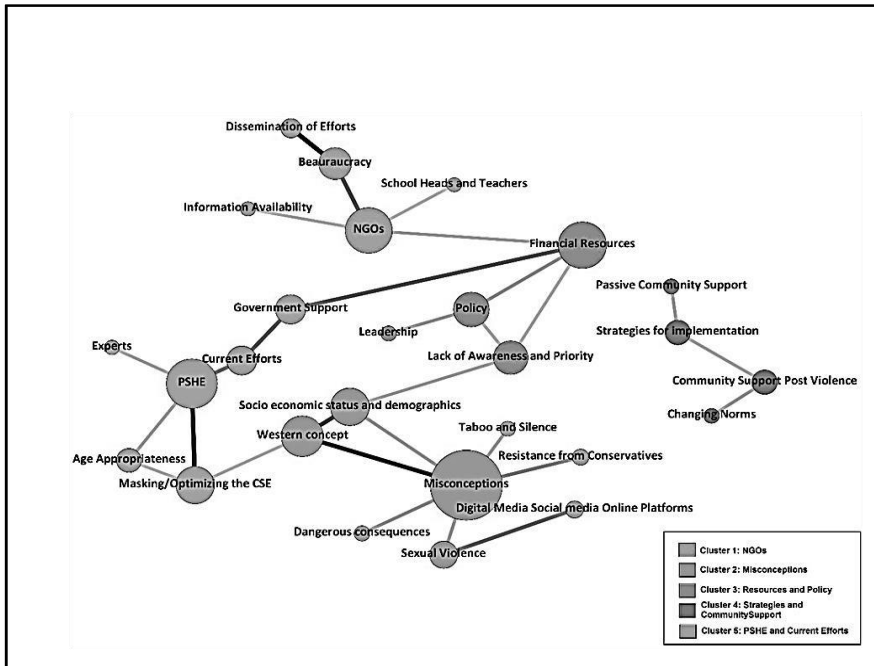
Figure 7: Network graph for inter code relationships using Pearson correlation.

5.4. Co-creation for developing online social media CSE awareness content: development and impact evaluation (Paper 4)

5.4.1. Participant information

A total of 15 participants volunteered to take part in the first FGD, with 11 of them participating. A total of 19 participants agreed to participate in the second FGD, and 16 of them participated. Participants in the FGDs included public health researchers, Ministry of Health officials, social media influencers, NGO representatives, political scientists, and teachers.

5.4.2. Intervention development: first and second FGDs

Panelists recommended that the target audience should be narrowed down to influencers and gatekeepers. According to the panelists, one of the approaches being utilized to provide contraceptive education in Pakistan is storytelling. When producing video content, it was determined that targeting misunderstandings was crucial. Participants believed that community leaders, parents, teachers, and young adults, rather than the public, should be the target audience. Based on the panelists' thoughts and opinions, it was decided to develop two videos, one focusing on what CSE is and the other on the misconceptions surrounding CSE in Pakistan. The first video provided information on CSE and its benefits, while the second addressed common misconceptions.

As there were some new participants, the second FGD began with a brief overview of CSE and a recap of the last FGD. The PRODUCES Framework and an outline of the co-creation process were presented to the group. After that, the group was guided through the process of scripting, translating, and producing videos in collaboration with the social media influencer. Following that, the group was shown the two videos. After watching the videos, participants were asked to complete a feedback form evaluating the videos (Figure 8). The participants then debated the order in which the videos should be released, with some believing that the second video on misunderstandings should come out before the first. The first video, according to the participants, had too many concepts, making it less engaging. It was also advised that the first video include some infographics to make it more interesting. Then there was a discussion about how to evaluate the impact of videos and what different metrics can be used to evaluate social

media content. Some of the key indicators that social media influencers use to evaluate their content and how to interpret them were used to develop the framework for evaluation of the health promotion content.

Diverging stacked bar chart for Likert scale
■ Very Low   ■ Low   ■ Moderate   High   ■ Very High

Category	Values
Culture	14.3% 28.6% 50.0% 7.1%
Negative associations	14.3% 64.3% 14.3% 7.1%
Safety	14.3% 21.4% 64.3%
Perceived enjoyment	14.3% 50.0% 35.7%
Perceived effectiveness	14.3% 35.7% 42.9% 7.1%
Aesthetics	7.1% 78.6% 14.3%
Content quality	7.1% 21.4% 57.1% 14.3%
Ease of use	7.1% 21.4% 35.7% 28.6% 7.1%
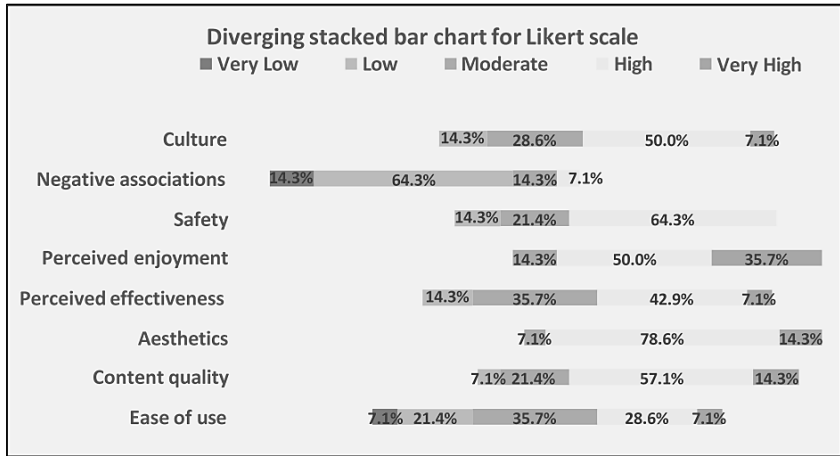
Figure 8: Evaluating the videos, responses by the co-creators during the second FGD as a diverging stacked bar chart (Likert scale).

5.4.3. Impact evaluation

5.4.3.1. Audience exposure, engagement, and reach

Data from social media platforms were analyzed to determine video exposure, engagement, and reach (Table 4). The videos were the most popular on Facebook and least popular on YouTube. Views on Facebook and Instagram, on the other hand, require a 3-second view duration, whereas YouTube requires a 30-second view duration. In terms of numbers, Instagram had the highest audience engagement for the first video, while YouTube had the lowest. The second video received the highest engagement on Facebook. In terms of number of views, Instagram had the highest engagement per 100 views, followed by YouTube, while Facebook had the lowest. On YouTube, the percentage of likes versus dislikes for the first and second videos was 100 and 99.5 percent, respectively.

Instagram	Metrics	First Video	Second Video
	Number of views (views at 3-second duration)	17486	10035
	Like	1705	1668
	Comment	38	37
	Share	590	740
	Save to collection	414	495
	Engagement	2747	2940
	Engagement per 100 views	15.71	29.30
	Reach	97457	59265
YouTube	Metrics	Video 1	Video 2
	Number of views (views at 30-second duration)	1422	4017
	Likes vs Dislike percentage	100%	99.50%
	Likes	175	363
	Comments	18	35
	Engagement	193	398
	Engagement per 100 views	13.57	9.91
	Reach	20100	98900
Facebook	Metrices	Video 1	Video 2
	Number of views (views at 3-second duration)	169600	317300
	Shares	178	264
	Comments	70	152
	Reactions	1800	2900
	Likes	1300	2300
	Laugh	150	72
	Heart	313	493
	Wow	9	8
	Sad	0	6
	Engagement	2000	3300
	Engagement per 100 views	1.18	1.04
	Reach	314900	577398

5.4.3.2. Audience demographics and regional scope

Figure 9 below shows the age groups of YouTube, Instagram, and Facebook audience. The 18 to 24 age group had the most views on YouTube and Instagram, while the 25 to 34 age group had the most views on Facebook. Gender distributions across all platforms were comparable, with males watching the video more than women. Instagram had the highest proportion of female audience, although still about 17.8 percent. The provinces of Punjab and Sindh had the highest

proportion of viewers for Facebook and YouTube. Other countries accounted for 5942 and 13005 Facebook views for the first and second videos, respectively.

	Age distribution in percentage of audience total views												
	Instagram			YouTube			Facebook						
	18-24	25-34	35-44	18-24	25-34	35-44	13-17	18-24	25-34	35-44	45-54	55-64	65+
First Video	69.0	28.8	2.1	60.9	39.1	0.0	0.4	40.0	51.9	6.6	0.6	0.2	0.2
Second Video	65.7	32.2	1.9	66.9	31.0	2.1	14.7	22.7	50.3	10.4	1.1	0.4	0.3
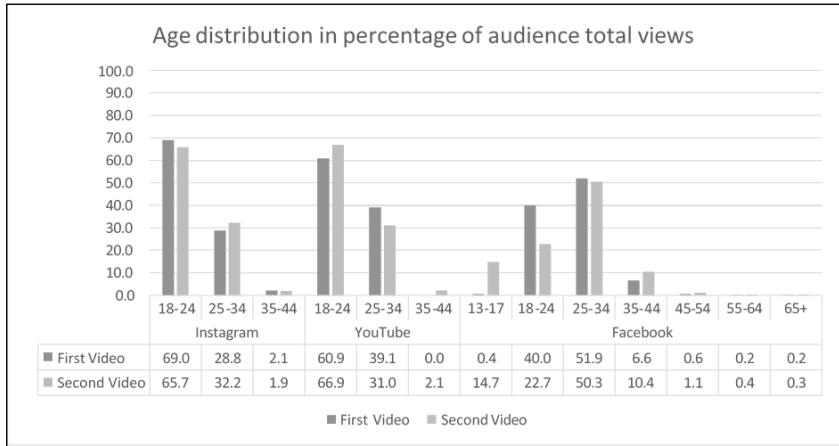
Figure 9: Audience age group demographics on Instagram, YouTube, and Facebook who viewed the videos.

5.4.3.3. Audience retention

The first video's audience retention on Instagram was 3%, whereas the second video's audience retention was 7%. Audience retention on Facebook was also low, at only 3% for the first and second videos. Despite having the lowest views, the videos on YouTube had the highest audience retention, with 45 and 38 percent for the first and second videos, respectively.

5.4.3.4. Insights: audience feedback sentiment analysis

The videos were interacted with and by audiences on Facebook, Instagram, and YouTube in several ways, including comments, tags, and likes/reactions. The videos received a total of 222 comments across the three social media platforms, with episode one receiving 64 comments and episode two receiving 158 comments. After removing comments that contained only tags and emoticons, we were left with 187 comments: 121 on Facebook, 19 on Instagram, and 47 on YouTube. A total of 126 comments were found to match the Bing lexicon (83 on Facebook, 14 on Instagram, and 29 on YouTube). The overall mean of the net-sentiment was 0.83 (St. Dev. 1.46), suggesting that the general sentiment of the audience comments and feedback was positive.

Depending on the social media platform, YouTube (Mean=1.55, St. Dev. 1.24) had the most positive sentiment and Facebook seemed to have the least positive sentiment (Mean=0.59, St. Dev. 1.55). The first and second episodes received positive sentiment feedback with a mean of 0.86 (St. Dev. 1.31) and 0.81 (St. Dev. 1.53), respectively.

5.4.3.5. Insights: audience feedback qualitative content analysis

Most of the positive feedback was appreciative in tone, with expressions of joy and trust in the content. Some teachers who commented on the videos stated it was an important issue to tackle and that teaching such topics in the classroom had been challenging. The audience felt joy and trust in the videos because they were interesting, raised awareness, generated counter-narratives, and considered cultural context, in addition to having high quality content, screenplay, and production. Much of the negative response was filled with anger, fear, and disgust. The audience was dissatisfied with the content and relevancy of CSE. The audience's harsh comments ranged from profanity to threats. Those in the audience who disagreed with the content suggested teaching children about sexuality at home, teaching religion, and following a road of abstinence. Some viewers were also concerned that endorsing CSE would encourage vulgarity and corrupt their children's minds. Another concern raised was that CSE might cause children to initiate sex at a younger age. In this sense, parallels were drawn between the introduction of CSE in the West and children having their first sexual interaction at a young age. There were some suggestions for improving the editing of the videos and delivering the topic more thoroughly. Because of its informative nature, some people even requested that this content be continued. Some were surprised that this topic was even being discussed on social media, while others offered religious scriptures as a counter-narrative. Some viewers were pleasantly surprised because the subject was so different from what they had previously seen, and they appreciated learning about it. Some viewers thought this was the right path to take, while others questioned if CSE would be good.

Chapter 6: Strengths and limitations

As with any research methodology, the methodology used to undertake the studies had strengths and limitations, which will be reviewed and highlighted in this chapter. As is common with the Delphi technique, participation decreased for consecutive rounds, which can be considered one of the study's limitations. Although eight to twelve participants are regarded an appropriate minimum for the Delphi technique, we attempted to recruit as many experts as possible who met the inclusion criteria in order to address the decline in response rate in subsequent rounds [80–83]. This also provided us with a diverse panel of subject experts to help us with the consensus process. The Delphi method also allows experts to anonymously iterate their assessment of the relevance of indicators, minimizing bias and peer influence. For decision-making, the Delphi technique relies on group consensus among experts. The average Likert score was used to prioritize the indicators, but these values could be impacted by the individual expertise of the contributing expert, resulting in bias based on personal preferences. As a result, the Delphi method requires the formation of consensus among the experts. We found low consensus among experts for individual indicators, which was expected given that the indicators cover a wide range of health issues and experts were not expected to agree on the importance and relevance of all of them. Experts reported a strong to moderate consensus on the majority of indicator categories. We were also able to reflect on the results from a broader geographical perspective by including the group discussion session. The slightly reduced participation was not considered as a major limitation during the third round, because it was a qualitative round, and the session had no impact on the indicator ranking or the establishment of consensus among the expert panel.

The Delphi rounds and findings show that the approach was successful in generating and fostering agreement on a complete set of prioritized ASRH indicators. For this purpose, a diverse team of experts made up the panel, and through the Delphi rounds, they were able to prioritize a set of 41 indicators. The Delphi method helped in the systematic development of consensus and indicator prioritizing. The Delphi technique also makes it simple to use an online survey to perform a consensus exercise with an international expert panel. The convenience and efficiency of the process was improved by having the rounds online, particularly data gathering, analysis,

and communication with the expert panel across rounds. Multiple indicator categories were able to be agreed upon by the experts. The selected set of 41 indicators will allow for a comprehensive assessment of ASRH in south Asia. The priority list includes health outcomes, lifestyle and health behaviors, healthcare services, and demographics that influence the health of the region's adolescent population.

Although the CRM provides a systematic process for assessing a community's readiness for a specific issue, it does have some limitations. CRM is a subjective tool for conducting a cross-sectional assessment of community readiness [75]. The fact that the community and the issue vary with each application of the tool, according to the authors of the CRM handbook, this restricts the assessment of the model's scientific validity. They term the assessment tool "Broad Scale Theory," suggesting that it incorporates various phenomena in terms of views and facts and attempts to find plausible linkages between the phenomena. Since the CRM is based on detailed interviews with a small sample of respondents in a geographically localized region, the results in terms of readiness scores cannot be generalized to other communities [75]. However, the model has been effectively applied to a wide range of health, social, and environmental issues in many geographical settings, adding to its credibility and validity [75]. The findings of this study point to potentially significant concerns regarding community readiness and the implementation of CSE in Islamabad. We were able to recruit respondents from various strata of the community by incorporating the socio-ecological model into the community readiness assessment. The tiered approach considered the perspectives of many community influencers and gatekeepers, offering a comprehensive picture of the communities' current stages of readiness. Furthermore, the CRM assessment tool's organized approach made assessing the readiness level for different dimensions efficient and gave respondents the opportunity to share their perspectives about their communities.

The qualitative methodology provided rich information about resistance aspects and prospective future actions. The CRA questionnaire aided in the collection of data on leadership, policy issues, current activities, topic awareness, and resources. The qualitative methodology gives in-depth insights, viewpoints, and opinions of respondents; nevertheless, maintaining rigor, researchers' personal bias, generalizability, and reproducibility can be challenging. To address these concerns,

two coders coded the data to improve rigor and limit personal bias, and discussions among the study team during the categorization stage resulted in triangulating the findings. The consolidated criteria for reporting qualitative research (COREQ) guidelines for standardization were followed while planning the study, analyzing data, and drawing the conclusions [111].

We were able to enhance the transparency and rigor of the research findings, interpretation, and conclusions by using network analysis to visually represent qualitative data [98]. Furthermore, because the measures derived from inter-code relationships and network analysis are data-driven, others will be able to replicate the graphs using the same data [98]. The correlations between dissemination of efforts and bureaucracy, PSHE and masking/optimizing the CSE, western concept and socioeconomic status and demographics, and misconceptions with the western concept were substantially stronger. The network analysis, which depicts strong relationships between codes and links it to the qualitative findings, complements the qualitative conclusions, as discussed in the results section.

The majority of the limitations of utilizing social media platforms for health promotion are related to concerns of quality, as well as a lack of reliability, confidentiality, quality monitoring, and privacy [76,77]. Keeping these issues in mind, a collaborative co-creation approach provided transparency and a mechanism for attempting to address these concerns. Co-creation is a method for generating complex health interventions that has been found to increase uptake and user engagement. Engaging a diverse range of stakeholders, particularly social media influencers, throughout the intervention development phase provided in-depth viewpoints, particularly for developing a health promotion intervention on social media platforms. The FGDs also allowed participants to explore topics such as content, cultural sensitivity, influencer marketing, and the development of an impact evaluation framework. Adapting Neiger and colleagues' evaluation framework provided a foundation for assessing the impact of the videos [106]. The use of mixed method approaches in the evaluation framework, particularly sentiment analysis and qualitative content analysis, allowed for a more in-depth understanding of the audience feedback. Other key performance indicators and metrics give a more comprehensive quantitative approach to assessing the impact of content shared on social media platforms. However, the results of the pilot study should be interpreted with caution when planning an upscale [104]. As when the

intervention is upscaled, its impact may be less or more varied, and response rates may be lower [104]. While bearing in mind that the efficacy of the intervention was not evaluated during the piloting stage, and only process and impact evaluation was conducted, for the feasibility of the intervention, is one of the major limitations of the study. Despite this, the comprehensive evaluation framework and intervention development phase tried to address many of the uncertainties that may occur during upscaling, offering rich data and deeper insights on user engagement, audience feedback, and stakeholder perspectives.

Chapter 7: Implications of the findings

7.1. ASRH indicator ranking in context of south Asia

This was one of the first studies in South Asia to use the Delphi method to prioritize ASRH indicators. The demographics category received the highest ranking, which is consistent with the literature, as demographics, such as age at first birth, literacy rate, and marital status among adolescents, have major implications for overall population health outcomes, particularly major negative consequences on reproductive health outcomes and service utilization [63–65]. Although ranked first and second, the demographics and reproductive health indicator categories showed lower expert agreement. There could be a range of factors for the lack of expert agreement; one possibility is that both categories included a wide range of indicators, which could have contributed to the lower consensus. In comparison to other categories, the experts believed that parental connection/regulation and infectious disease have a lower relevance. HIV/AIDS was connected to eight indicators in the infectious disease category, and experts appear to concur with its lower ranking due to the disease's low prevalence in south Asia [112,113].

Due to the high fertility rates in South Asia [11], experts ranked the adolescent fertility rate second among all indicators. Adolescent girls using hygienic sanitary pads and adolescents with improved knowledge and attitudes of menstrual hygiene management practices were ranked eleventh and eight, respectively. Due to societal stigma, there is a culture of silence in south Asia on girls' menstrual health [13–16,114]. As a result, many girls do not understand their periods and are unaware of menstrual hygiene, which adds to girls' non-attendance at school. Menstruation is estimated to keep girls out of school for 20% of the school year in the region. Because of the cost, lack of understanding, and societal stigma, girls and women in the region have limited access to safe sanitary pads [13–16,114].

Sexual abuse and abortion rates among adolescents were ranked first and third, respectively, by the experts. Almost half of the world's children are exposed to severe violence (physical, sexual, or emotional), with south Asia accounting for 64 percent of these children [115]. Sex-selective abortions and abortions due to unplanned pregnancy are frequent in south Asia, accounting for

nearly half of all unsafe abortions in LMICs [116,117]. Unfortunately, there is a lack of evidence-based information on these issues, making collecting reliable data challenging. Adolescents in the region have limited or no access to CSE and reproductive health services due to community resistance, gaps in domestic legislation, non-existent national plans of action, poor law enforcement, and non-operational child protection systems. This reduces the likelihood of significant advances in these areas in the region [118–120].

The lack of data on adolescent health indicators was linked to lack of funding, a scarcity of dedicated skilled human resources, non-existent data registries, and cultural constraints influencing sexual and reproductive health during the discussion session. The absence of indicator data in national representative surveys is aggravated by the exclusion of the early adolescent group and unmarried females. These constraints and barriers should be investigated further to see whether there are any potential facilitators or explanations for improving data availability on adolescent health indicators.

We found a low correlation between the WHO adolescent health indicator ranking and the first-round indicator ranking when we compared the two rankings. The expert panel proposed 14 second round indicators, 12 of which were ranked in the top 20. Despite the fact that the WHO ranking was established for adolescent health, and we focus specifically on ASRH, the low correlation of the rankings and the additional second-round indicators with high mean Likert scores support the need for regional prioritization of indicators in accordance with WHO and expert recommendations [10,51]. A universal survey tool is currently in use by Demographic Health Survey and Multiple Indicator Cluster Survey for collecting health indicator data across LMICs [61,62]. These tools make it possible to monitor, evaluate, and compare health indices across countries and regions. Although regional indicator priority may give valuable information on health patterns and trends, they make comparisons across countries and regions tricky.

The study's significant features include using an online platform, engaging a diverse group of experts, and developing a comprehensive and detailed list of key indicators for evaluating ASRH. The Delphi rounds were also systematic and well-structured, adding to the credibility of the

study's conclusions. More research is needed to see if tailored region-specific surveys might provide greater insights on population health, for example, in terms of policy implications.

7.2. Denial/resistance stage of community readiness and its implications

The denial/resistance stage of community readiness implies that some members of the community acknowledge the issue under discussion but do not comprehend its full significance due to a lack of awareness and the prevalence of misconceptions in society [75]. The CRM handbook proposes that interventions might be used to increase community readiness levels at stage two of readiness before implementing health promotion interventions [75]. Collaboration with leaders to identify priority issues, carefully considering sensitivities, tactfully framing issues, engaging community influencers, and improving media presence are some of the strategies that can be used to confront resistance to CSE in conservative settings such as Pakistan, according to Mouli et al. [44]. The authors also recommend that, when it comes to interventions involving controversial or taboo topics, the reasons for low levels of community readiness be investigated, and interventions be tailored with careful stakeholder participation from the community so that the intervention is not dismissed outright.

The fact that less than a third of the 35 respondents were aware of any community efforts addressing CSE in Islamabad, and that the lowest readiness score across all dimensions was observed for community knowledge of efforts, could be attributed to the associated stigma, which leads to a lack of public dissemination of information about these efforts. The lowest awareness of efforts score also corresponds to respondents' perceptions that CSE is not a concern or priority for Islamabad's leadership. However, in recent years, Pakistan's Ministry of National Health Services, Regulation, and Coordination has undertaken a significant amount of work on sexual and reproductive health [121]. Programs combining leadership support on ASRH, concentrating on service delivery and utilization, are underway in cooperation with international organizations. This explains why, of all groups of respondents, health department representatives gave the highest score to the leadership dimension. Unfortunately, no efforts are currently being undertaken to integrate CSE into the school-based curriculum.

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7.3. Community climate and current initiatives

Although the community climate received the highest score among all the dimensions, it only corresponds to a general awareness among community members. The respondents' perception that CSE is a low priority for community members in Islamabad, and that community members may passively support efforts in this regard rather than being actively involved in developing and implementing such efforts, resonates with the general stigma and resistance to such efforts in the Pakistani community [44]. The low priority community members stated for the expansion of initiatives involving CSE, as well as the opinion that few would be ready to pay extra for this, reflect further resistance. Recent community concerns about violence against women and children have been highlighted by community efforts such as the "Aurat (Woman) March" and online platforms by influencers who have been successful in sparking, typically passive, dialogues on online platforms [122,123]. A recent case of and murder of a six-year-old girl in Kasur, Punjab, known as the "Zainab case," has brought such issues to national level platforms, leading to an increase in community and leadership support for developing legislation on child and women protection in the form of the "Zainab Bill" [124,125]. Although such demonstrations generate momentary efforts, they fail to transform the momentum into long-term, structured attempts such as incorporating CSE themes into school-based curricula. These efforts are aimed at mitigating such unfortunate events and do not imply the start of long-term efforts toward important initiatives culminating in community promotion and preventive measures.

7.4. Lack of awareness, priority, and resources

Community members highlighted a lack of understanding of CSE, the benefits of school-based adolescent health interventions, adolescent health issues in the community, ways to improve adolescent health, and information about the age appropriateness of CSE. These are some of the underlying determinants of community resistance. Although there is evidence that CSE has the potential to improve adolescent health while also empowering adolescents to make healthy and right choices as they grow older and develop, there is concern among parents that the content of CSE may lead to unintended consequences and is not age-appropriate or culturally sensitive [36,44,126]. Although there are few upscale examples from Pakistan where CSE has been implemented as a curriculum, the UNESCO guidelines on developing CSE curriculum emphasize

a gradual age-appropriate approach. Prior to the interviews, when the respondents were given a brief introduction to CSE emphasizing the age-appropriateness of the contents, the majority of them were astonished that age-appropriate content could be developed for adolescents. This emphasizes the fact that a lack of awareness is a major cause of misconceptions and organized community resistance. The low priority assigned to CSE in the community and by the leadership is reflected in the low resource dimension score. One of the major factors that makes launching programs and initiatives challenging is a lack of funding. There is a need for improved awareness and priority-setting strategies to mobilize community and leadership commitment to developing and incorporating CSE within the curriculum.

Only a few community members think that such education is essential for adolescents and children, and that schools are the optimum setting to provide it. One of the reasons teachers are hesitant and unsure about teaching CSE is a lack of adequate training. Thorough teacher training to deliver CSE contents has also been underlined as an essential component of successfully integrating CSE [127–130]. One of the significant challenges highlighted in a study done in Sub-Saharan Africa was teachers' reluctance to teach CSE effectively [127–130]. The authors argued that teachers' discomfort may foster students' perceptions that sexuality-related topics are inappropriate. One of the reasons for this reluctance to teach CSE was most likely a lack of training and abilities to effectively introduce sexuality-related concepts to children, as inadequate or no teacher training is a typical barrier when implementing CSE programs in LMICs [127–130]. Furthermore, without a clear priority and enough resources, teacher training for CSE implementation in schools is unlikely.

7.5. The Potential of Social Media for Sexual Health Promotion in Conservative Settings
Online social media platforms, which have an ever-increasing number of active users throughout the world, have the potential to be effective vectors for health promotion, including sexual health [76,77]. The evidence supporting the positive impacts of social media interventions in enhancing sexual health is emerging, but there is still a scarcity of research that explicitly analyzes theoretical frameworks and employs rigorous study procedures [76,77]. Also, there is a lack of primary research on the applications, advantages, and limits of social media for health promotion and stakeholder communication [76,77]. The methods and outcomes of this study attempted to

fill a critical gap in the literature in this aspect [76,77]. Although this was an exploratory pilot study to see how social media platforms could be used to raise awareness about CSE, the findings show that these forums can be effective tools for engaging and reaching a large audience for sexual health promotion, particularly in conservative settings like Pakistan. In comparison to previous similar research, in terms of exposure/views, two Australian studies that used YouTube videos to promote sexual health received 5300 [131] and 30000 [132] views, respectively [76]. Similarly, an Irish study used a YouTube film for abortion awareness that had over 75000 views [76,133]. This highlights that using social media platforms and collaborating with social media influencers for health promotion and communication has a significant advantage, including improved interactions and engagement, improved information dissemination, increased access to health information, and the ability to create counter narratives for stigmatized health issues.

The videos were disseminated on a variety of social media platforms, allowing for a comparison of which content would perform optimally on which platform. Since the videos were more than five minutes in length and thus deemed as lengthy content, viewer retention was highest on YouTube. There was also a substantial difference in retention on YouTube versus Facebook and Instagram. This suggests that lengthier content retention is considerably higher on YouTube, whereas shorter content may perform better on Facebook and Instagram. Facebook is also one of the most popular sites for sharing health-related content [76,106]. In terms of reach, it was found that Facebook had the largest reach, suggesting that Facebook might be the best medium for reaching a broader audience. This can also be seen on Facebook when looking at demographics, audience reach, and exposure to content. When it came to audience distribution throughout the world, Facebook had a greater reach. Unfortunately, there was no geographical data available for the YouTube audience to compare to other platforms.

Most of the audience had a positive sentiment towards the content developed, according to audience feedback and sentiment analysis. Sentiment analysis of audience response gives a quantitative estimate of the overall sentiment of the feedback [107]. Although it gives an overall numerical representation, it fails to reflect the complexities of the audience's motives and perspectives [107]. A qualitative content analysis was undertaken to better grasp the deeper reasoning and emotions underlying the viewers' responses. Much of the negative response was

attributable to widespread societal preconceptions about CSE, which were conveyed as negative feedback and occasionally as profanities and insults. Given the topic at hand, this was anticipated, however, careful scripting and consideration of cultural sensitivity throughout the intervention development phase resulted in a more sympathetic approach to the subject. Positive response also demonstrated that the audience understood the importance of the topic, with most comments expressing joy, confidence, and trust in the content.

Chapter 8: Future directions and recommendations

8.1. Cultural Context and Implementation Approaches of CSE

CSE programs must be tailored and optimized in the local context, culturally and religiously, according to UNESCO's international technical guidance on CSE [36,37,48]. The significance of stakeholder participation at the policy and community levels in sustaining CSE in national-level projects has been demonstrated by community readiness assessment and literature. In their analysis of large-scale CSE programs conducted in Pakistan, Chandra-Mouli et al. found two primary approaches that were evaluated and implemented by NGOs: human rights-based and conservative religious-based [44,47]. While the conservative religious-based strategy may be able to deal with resistance, the reliability of the content and syllabus may be debatable, as it is difficult to ensure the trustworthiness of the content and context of the CSE syllabus using this approach [44]. Furthermore, an upscale study from Pakistan found that the syllabus lacked clarity in themes such as sexual diversity, contraception, and abortion, which is common when using a religious approach to CSE [44,47]. During the focus groups for intervention development (Paper 4), it was suggested that a combination of conservative and human rights-based approaches would be effective. Positive feedback from the audience suggests that the combined strategy may be able to overcome resistance and raise public knowledge about CSE (Paper 4).

8.2. Engaging Stakeholders and Raising Awareness for Successful Implementation

Prioritizing CSE should begin with increasing awareness, community engagement, clarifying misconceptions, and rebranding CSE in the local context. However, there is substantial community and religious clergy opposition, which can be addressed by enhanced involvement and confidence-building initiatives. While various NGOs are working on such issues, they are unable to disseminate their programs to the general population [44]. Meaningful stakeholder participation is critical for long-term planning and execution of SRH programs [20,44]. NGOs and governmental organizations are partnering on a number of reproductive and sexual health projects. NGOs may provide pre-existing infrastructure, networks, knowledge, and skills for future initiatives and health programs that already have community and stakeholder partnerships.

Although the political and religious leaders appear to be opposed to CSE, their backing is crucial because of their community influence. A recent UNESCO CSE report also stressed the need to have leadership on board for defining priorities and sustaining such initiatives [4]. Bureaucracy and government agencies are crucial stakeholders, and no initiative can be implemented without their approval and support. NGOs collaborate with the government on specific health issues, but they face challenges such as obtaining NOCs and setbacks such as the termination of a CSE implementation agreement in Punjab in 2010 [44]. Keeping these factors in mind, better engagement and endorsement from the leadership and bureaucracy is critical for executing CSE programs.

School-level implementation obstacles are only a minor part of the obstacles that impede CSE program implementation. Other challenges to overcome include policy level planning, leadership participation, community mobilization and support, and financial allocation. For CSE to be implemented successfully, an enabling environment must exist, which includes legislative and community support, as well as infrastructure support. As of now, the community readiness level in Islamabad for the successful implementation of CSE has been determined to be low. Efforts should be made to raise awareness, gaining support, and prioritizing CSE at various levels of the community. Innovative marketing and rebranding are critical for setting priorities and engaging communities in conservative settings and when faced with resistance, particularly for CSE development and implementation. Some of the suggested approaches and methods include community sensitization through strategic awareness campaigns, leveraging existing established infrastructure and NGOs, endorsement by key stakeholders and decision-makers, and utilizing digital platforms for enhanced dissemination.

8.3. Community Attitudes and Support for CSE Implementation

Sexual violence has recently received a lot of attention on social media in Pakistan. Even the leadership has prioritized sexual violence after many incidents were reported nationwide [123–

125]. However, the support is reactive, passive, and inconsistent. Nonetheless, such incidents can be strategically used to raise community awareness and support CSE and SRH. Despite the fact that community support and debates about sexuality have evolved through time in Pakistan, the support is primarily passive and online. Demographics and socioeconomic status have an impact on support, which should be considered when developing interventions. The norms, perceptions, acceptability, and understanding of sexuality of the target audience should be extensively examined before developing content and interventions. Attempts should be made to rebrand CSE in order to get greater community support and engagement. Since the word "sexuality" has a negative connotation in the society, rebranding and promoting it in a more culturally sensitive manner may be advantageous in gaining community support.

According to the qualitative findings of the community readiness assessment, the bureaucracy is taking steps to involve the community through disseminating information and increasing support for health ministry initiatives (Paper 2/3). Misconceptions and resistance to CSE, as well as characterizing it as a Western agenda, are quite widespread; qualitative data and network analysis suggest that they are significantly linked to community members' socioeconomic status and demographics. The network analysis also reveals that the most important nodes in the network were financial resources, NGOs, PSHE, and misconceptions, and that implementers should prioritize engaging with or addressing these while considering school-based implementation (Paper 3).

8.4. Social Media for Increasing Awareness of CSE

Overall, the findings of the process and impact evaluation show that confronting such culturally sensitive topics with careful stakeholder participation and novel ways to health intervention development may be a path forward in addressing stigmatized health issues. Digital health solutions and interventions also provide an opportunity for health communication and promotion in settings such as Pakistan, where the people are increasingly using digital and social media platforms [79]. The findings are equally encouraging, and it can be stated that social media platforms are a strong and viable way of generating community support, engagement, and raising awareness for supporting CSE when faced with resistance. Future research is needed to assess

the efficacy of such interventions over time, particularly in terms of audience behavior and perception.

8.5. Recommendations and conclusions

I.   Prioritized list of ASRH indicators for South Asia: The prioritized list of ASRH indicators developed using the Delphi technique can be used to assess the existing status and factors influencing ASRH in South Asia. Efforts should be made to include the adolescent age group in national-level surveys to improve data availability.

II. Awareness and promotion: Misunderstandings about CSE and limited access to information are major challenges. Future initiatives should focus on boosting awareness by clarifying misunderstandings, introducing CSE content, and emphasizing its spiral and age-appropriate approach.

III. Context-Specific Material: Participatory approaches should be employed to develop context-specific material, keeping religious and cultural sensitivities in mind. Indigenous material developed through a participatory approach may be better suited to overcoming resistance.

IV. Existing Networks and Infrastructure: Existing networks, partnerships, and infrastructure, such as NGOs engaged in communities, should be considered when planning an intervention due to their extensive expertise and well-established community penetration.

V.   PSHE: Private schools that already teach PSHE provide an opportunity to connect the existing curriculum and the teachers who teach it to widen and add CSE content.

VI. Considerations while executing or designing a community-based intervention: Bureaucracy, PSHE, masking/optimizing the CSE, western concept, socioeconomic status, and misconceptions are the most important aspects of CSE according to the network analysis and must be considered while executing or designing a community-based intervention.

VII. Co-Creation for CSE Promotion on Social Media: Co-creation is an effective way to develop and evaluate complex health interventions for CSE promotion on social media platforms.

VIII.   The internet and online social media platforms such as Facebook, Instagram, and YouTube, among others, provide a unique and underutilized opportunity to reach and engage community members to build awareness and readiness for CSE implementation.

IX.   Long-Term Success: Future research is required to determine the long-term success of such upscaled interventions, especially in terms of end-user behavior and perception changes.

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10. Appendices

Table: Indicator category, ranking and descriptive statistics.

Indicator	Indicator Category	Ranking based on mean Likert score	WHO Ranking (n/a for second round indicators)	N	Mean	Std. Err.	95% Conf. Interval	
Sexual abuse among adolescents	Violence	1	n/a	16	4.50	0.22	4.02	4.98
Adolescent fertility rate	Reproductive Health	2	7	24	4.46	0.17	4.11	4.81
Percentage of ever-married adolescents	Demographics	3	n/a	16	4.38	0.18	3.99	4.76
Abortion rates among adolescent girls (legal/illegal)	Reproductive Health	3	n/a	16	4.38	0.15	4.05	4.70
Adolescent maternal mortality ratio	Reproductive Health	5	6	24	4.33	0.21	3.89	4.78
Age at first birth among adolescents	Demographics	6	n/a	16	4.31	0.30	3.68	4.95
Literacy rate among adolescents	Demographics	6	n/a	16	4.31	0.27	3.74	4.89
Percentage of adolescents with improved knowledge and attitudes of Menstrual hygiene management practices	Reproductive Health	8	n/a	16	4.25	0.23	3.75	4.75
Demand for family planning satisfied with modern methods	Reproductive Health	9	14	24	4.12	0.26	3.59	4.66
Antenatal care coverage rate among adolescents	Reproductive Health	10	n/a	16	4.09	0.22	3.64	4.55
Percentage of deliveries by female adolescent attended by skilled birth attendant	Reproductive Health	11	n/a	16	4.06	0.21	3.61	4.52
Prevalence of intimate partner	Violence	12	13	24	4.00	0.21	3.57	4.43

violence among adolescents								
Prevalence of anemia among adolescents	Nutrition	13	9	24	3.96	0.22	3.50	4.42
Percentage of adolescent girls using hygienic sanitary pads	Reproductive Health	14	n/a	16	3.91	0.22	3.45	4.36
Prevalence of Reproductive tract infections among adolescents	Reproductive Health	14	n/a	16	3.91	0.27	3.32	4.49
Post natal care coverage rate among adolescents	Reproductive Health	16	n/a	16	3.84	0.29	3.22	4.47
Early initiation of sexual activity	Reproductive Health	17	11	24	3.83	0.25	3.33	4.34
Adolescent mortality rate from suicide	Mental health	18	4	24	3.79	0.23	3.31	4.27
Knowledge about HIV transmission among adolescents	Infectious/Communicable Diseases	18	18	24	3.79	0.23	3.33	4.26
Prevalence rate of suicide attempts among adolescents	Mental health	20	n/a	16	3.78	0.23	3.30	4.27
Condom use at most recent sex among adolescents with multiple sexual partnerships in past 12 months	Reproductive Health	21	12	24	3.75	0.28	3.18	4.32
Prevalence of underweight among adolescents	Nutrition	22	8	24	3.71	0.25	3.19	4.23
Current alcohol use among adolescents	Mental health	23	16	24	3.67	0.24	3.17	4.16
Adolescent mortality rate	Mortality	24	1	24	3.62	0.24	3.13	4.12
Smokeless tobacco prevalence among adolescents (pan, gutka, chalia, chewable tobacco products etc.)	Behavioral	25	n/a	16	3.59	0.30	2.95	4.23
Prevalence of insufficient physical activity among adolescents	Behavioral	26	17	24	3.58	0.25	3.06	4.11

Current tobacco use among adolescents	Behavioral	27	15	24	3.54	0.28	2.97	4.11
Prevalence of HIV infection among adolescents	Infectious/Communicable Diseases	28	21	24	3.50	0.23	3.03	3.97
Adolescents living with diagnosed HIV infection	Infectious/Communicable Diseases	28	23	24	3.50	0.22	3.05	3.95
HIV testing among adolescents	Infectious/Communicable Diseases	30	22	24	3.46	0.23	2.98	3.94
Antiretroviral therapy coverage of adolescents	Infectious/Communicable Diseases	31	24	24	3.42	0.22	2.97	3.86
Prevalence of overweight and obesity among adolescents	Nutrition	32	10	24	3.38	0.27	2.81	3.94
Parental connection with adolescents	Parental Connection and Regulation	32	19	24	3.38	0.22	2.93	3.82
New patients on antiretroviral therapy	Infectious/Communicable Diseases	34	25	24	3.33	0.21	2.89	3.78
HIV viral load suppression among adolescents	Infectious/Communicable Diseases	34	26	24	3.33	0.21	2.89	3.78
Human Papillomavirus vaccination coverage among adolescents	Infectious/Communicable Diseases	36	n/a	16	3.22	0.31	2.55	3.89
Parental regulation of adolescents	Parental Connection and Regulation	37	20	24	3.21	0.20	2.80	3.62
Adolescent mortality rate from HIV/AIDS	Infectious/Communicable Diseases	38	3	24	3.17	0.27	2.61	3.72
Adolescent mortality rate from road traffic injuries	Mortality	39	2	24	3.12	0.28	2.54	3.71
Current cannabis use among adolescents	Mental health	40	27	24	3.00	0.28	2.43	3.57
Adolescent mortality rate from homicide	Violence	41	5	24	2.92	0.24	2.42	3.41

Appendix 2: Paper 1

Title:

Key indicators for appraising adolescent sexual and reproductive health in South Asia: international expert consensus exercise using the Delphi technique.

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Appendix 3: Paper 2

Title:

A Cross-Sectional Community Readiness Assessment for Implementing School-Based Comprehensive Sexuality Education in Islamabad, Pakistan

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Appendix 4: Paper 3

Title:

Understanding community resistance to sexuality education and exploring prospective implementation strategies in Pakistan: A content and network analysis of qualitative data

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Author contributions:

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11. Versicherung der eigenständigen Verfassung

Hiermit versichere ich, dass ich die vorliegende Dissertation selbständig verfasst und keine weiteren als die angegebenen Quellen und Hilfsmittel verwendet habe. Alle Stellen, die ich wörtlich oder sinngemäß aus anderen Werken entnommen habe, sind unter Angabe der Quellen als solche kenntlich gemacht.

Diese Arbeit hat in gleicher oder ähnlicher Form noch keiner anderen Prüfungsbehörde vorgelegen.

Bremen, 20.8.2024   *Furqan Ahmed*

_____   _____

Ort und Datum   Unterschrift

Author contributions:

Paper 1: HZ and TB supervised FA in developing and performing the Delphi study process. FA developed the questionnaires, collected the data, FA and GA analyzed the data. FA wrote the first draft. GA, TB and HZ contributed to reviewing the final manuscript.

Paper 2: Conceptualization, F.A. and T.B.; methodology, F.A. and T.B.; software, F.A. and G.A.; validation, F.A.; formal analysis, F.A., G.A. and K.P.; investigation, F.A.; resources, F.S.-Z., F.A. and T.B.; data curation, F.A. and G.A.; writing—original draft preparation, F.A. and F.S.-Z.; writing—review and editing, F.A., G.A., K.P., F.S.-Z. and T.B.; visualization, F.A., G.A., K.P., F.S.-Z. and T.B.; supervision, F.S.-Z. and T.B.; project administration, F.A., F.S.-Z. and T.B.; funding acquisition, F.A. and F.S.-Z.

Paper 3: FA and TB: conceptualization, methodology, resources, and project administration. FA and GA: software and visualization. FA: validation. FA, JS, GA, and TB: formal analysis. FA: investigation and data curation. FA, JS, and TB: writing--original draft preparation. TB: supervision.