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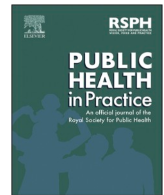

Interventions for adolescent mental, sexual and reproductive health in West Africa: A scoping review

Irene A. Agyepong [a,c,*], Emelia Agblevor [a], Selase Odopey [c,h], Selasie Addom [a,b], Nana Efua Enyimayew Afun [a], Mary Pomaa Agyekum [c], Paapa Yaw Asante [d], Grace Emmanuelle Aye [a,c], Natasha Darko [c], Aïssa Diarra [e], Ama Pokuaa Fenny [f], Annick Gladzah [c], Nassirou Ibrahim [e,j], Aline Kagambega [i], Lauren J. Wallace [c], Jacob Novignon [g], Maurice Yaogo [i], Roxane Borgès Da Sliva [j], Tim Ensor [k], Tolib Mirzoev [l]

[a] Ghana College of Physicians and Surgeons. (GCPS), Accra, Ghana
[b] Ghana Mental Health Authority, Accra, Ghana
[c] Dodowa Health Research Center, Ghana
[d] University of Health and Allied Sciences, Ghana
[e] Laboratoire d'études et Recherches sur les dynamiques Sociales et le développement local. (LASDEL), Niger
[f] University of Ghana, Institute of Statistical, Social and Economic Research (ISSER UG), Ghana
[g] Kwame Nkrumah University of Science and Technology (KNUST) Department of Economics, College of Humanities and Social Sciences, Ghana
[h] School of Public Health, University of Ghana, Ghana
[i] Institut National de Santé Publique, Observatoire National de Santé de la Population (IASP), Burkina Faso
[j] Université de Montréal Quebec, Canada
[k] University of Leeds, UK
[l] London School of Hygiene and Tropical Medicine, London UK Department of Global Health and Development London School of Hygiene and Tropical Medicine, 15-17 Tavistock Place, London, WC1H 9SH, UK

ABSTRACT

Objectives: A quarter of West Africa's population are adolescents 10–19 years. Their mental, sexual, and reproductive health is inter-related. We therefore aimed to examine published evidence on effectiveness of interventions for adolescent mental, sexual and reproductive health in the Economic Community of West African States (ECOWAS) to inform development, implementation and de-implementation of policies and programs.
Study design: The study design was a scoping review.
Methods: We considered all qualitative and quantitative research designs that included adolescents 10–19 years in any type of intervention evaluation that included adolescent mental, sexual and reproductive health. Outcomes were as defined by the researchers. PubMed/Medline, APA PsycINFO, CAIRN, and Google Scholar databases were searched for papers published between January 2000 and November 9, 2023.1526 English and French language papers were identified. After eliminating duplicates, screening abstracts and then full texts, 27 papers from studies in ECOWAS were included.
Results: Interventions represented three categories: service access, quality, and utilization; knowledge and information access and intersectionality and social determinants of adolescent health. Most studies were small-scale intervention research projects and interventions focused on sexual and reproductive or mental health individually rather than synergistically. The most common evaluation designs were quasi-experimental (13/27) followed by observational studies (8/27); randomized, and cluster randomized controlled trials (5/27), and one realist evaluation. The studies that evaluated policies and programs being implemented at scale used observational designs.
Conclusion: Research with robust evaluation designs on synergistic approaches to adolescent mental, sexual and reproductive health policies, interventions, implementation and de-implementation is urgently needed to inform adolescent health policies and programs.

Abbreviations: AMH, Adolescent Mental Health; ASRH, Adolescent Sexual and Reproductive Health; ECOWAS, Economic Community of West African States.

* Corresponding author. Ghana College of Physicians and Surgeons, 54 Independence Avenue, Accra, Ghana.
E-mail address: iagyepong@gcps.edu.gh (I.A. Agyepong).

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1. Introduction

Adolescence (10–19 years) is marked by rapid physical, cognitive, social, emotional and sexual development [1]. Health in this second decade of life affects health and wellbeing in the years that follow. The top 10 causes of disability-adjusted life years (DALYs) lost among adolescents globally include adolescent mental health (AMH) conditions such as unipolar depressive disorders, self-harm and anxiety disorders as well as adolescent sexual and reproductive health (ASRH) conditions such as HIV/AIDS [2]. There are gender and regional differences in the global aggregate figures on cause of adolescent morbidity and mortality, with the African region, having the highest rates of DALYs lost among adolescents [1]. Approximately a quarter of West Africa's population are adolescents (10–19 years) [3] and policies, programs and interventions to address AMH and ASRH are important for this sub-region [4]. There are inter-relationships between sexual and reproductive and mental health [5–9]. However traditionally, research, policies, programs and interventions have missed opportunities for holistic person centred approaches, vertically focusing on AMH or ASRH and neglecting exploration of synergies and intersections. [10,11]) [10,12–15], Research from sub-Saharan Africa appears to be limited and unevenly distributed with non-anglophone countries particularly under-represented [14]. About half of the population of the Economic Community of West African States (ECOWAS) lives in francophone countries.

For policies and programs to achieve intended impacts, they must be proven effective within context and implemented at scale. Studies of implementation have attracted increasing attention, driven by concerns about effective impacts from public health and clinical policies and programs [1]. Sometimes interventions already in place need to be discontinued or changed, the concept described as de-implementation [17–20]. [21], Rigorous research evidence on the effectiveness of interventions is critical to inform decisions on implementation and de-implementation. Against this background, we conducted a scoping review of documented effectiveness of interventions in the international peer-reviewed literature for improving AMH and ASRH in the countries of the ECOWAS.

2. Methods

A scoping review is a useful preliminary step in understanding the evidence base, and informing any further steps including a systematic review [22,23]. Since literature review suggested the evidence base might be limited we conducted a scoping review using the methodological framework proposed by Arksey and O'Malley [24] and the related Joanna Briggs Institute guidance for scoping reviews [25]. A study protocol was developed to guide the review but not registered since Prospero does not register scoping review protocols. The review team had a mix of Francophone, Anglophone and bilingual researchers and was multi-disciplinary with expertise in health policy and systems (IAA, TM), Health Economics (NI, APF, JN, RBD, TE), Medical Sociology and Anthropology (EA, AD, AK, LW, MY), Psychology (PYA, ND), Psychiatry (SA), Management (NEA, GA) and Epidemiology (MPA, SO).

2.1. Review questions

Our principal review question was: "what interventions are evaluated (regardless of the quality of the evidence) in the international peer-reviewed literature for improving AMH and ASRH either individually or together in the countries of the ECOWAS." In the context of a scoping review and limited published research in the ECOWAS in relation to our review question we included observational studies, since they would be useful to help identify future research agendas and areas for co-production and rigorous evaluation of interventions.

2.2. Identifying relevant studies

We searched four electronic databases -PubMed/Medline, APA PsycINFO, CAIRN and Google Scholar - for publications in English and French; the common official languages in West Africa. In our experience, these four databases are the most common repositories of health research papers from West Africa. Keywords relating to the concepts corresponding to the review question were entered into Microsoft Excel and the Power Query command in Excel used to generate all possible combinations of keywords. Twenty-one keyword combinations were formed. Search strategies using the Boolean operators "AND" and "OR" were used to combine the generated keywords during the search process except for CAIRN, where each keyword was searched singularly because the keyword combinations were not generating any results. During the search process in PubMed/Medline and APA PsycINFO, keywords were specified as a database-controlled vocabulary, such as MeSH or MA MeSH subject heading respectively. The search terms and keyword combinations are provided in Table 1.

In terms of eligibility criteria, we included all studies published in English or French between January 1, 2000 and November 9, 2023. Our choice of the start date of 2000 reflects the start of the MDG era. Our population was the age group 10–19 years and our general context the 15 countries of the ECOWAS namely: Benin, Burkina Faso, Cabo Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Studies that covered our target population (10–19 years) and other age groups, were included since our target group was part of the population studied. The setting of interest was multi-level from community and primary care to first level referral hospitals. We did not assess the quality of articles or risk of bias since our primary interest was in scoping what literature was available. We defined an intervention as an *action taken in relation to a particular issue of interest with intention to achieve desired outcome(s)*. In terms of measures of effectiveness, we were interested in outcomes as defined by the researchers.

2.3. Screening and selection

We initially identified 1526 abstracts. After exporting abstracts into Rayyan software [26], and removing duplicates, the number fell to 1237. Screening of titles and abstracts was done in Rayyan guided by a study selection flowchart (Fig. 1) and using a two-step screening process with research team members (IAA; EA; SO; SA; NEA; MPA; PYA; GEA; NAD; APF; AG; NI; AK; LW; JN) working in pairs. The first step was blinded; with each member of the reviewer pair independently screening approximately 200 titles and abstracts. The second step was unblinded and online via Zoom in several 2-h sessions. Titles and abstracts with agreement between reviewer pairs were included or excluded without further discussion. Where there were disagreements between reviewer pairs, these were resolved via discussions amongst all reviewers.

2.4. Data extraction and charting

257 titles and abstracts were included for full text screening after titles and abstracts screening. The eligible papers were assigned to team members working in pairs to extract data using a Microsoft Excel template with themes related to the review question. The merged spreadsheet of extracted summaries was cross reviewed by the team. Only twenty-seven (27) papers met all inclusion criteria and were included in the scoping review after initial full text screening. The papers that were dropped did not clearly describe an intervention and an attempt to evaluate the intervention. Three systematic reviews were excluded. In two of them, there were no relevant papers in their reference list to add to the full papers screening [27]., [28]. In one of them [29], a study from West Africa on an mHealth Interventions on sexual and reproductive health in emerging adulthood [30] was identified and included.

Table 1
Search Terms and Search term combinations.

Search terms and search term combinations
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*, SERVICE* “MENTAL HEALTH” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “MENTAL WELLBEING” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “MENTAL DISORDER” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* EMOTIONAL DISORDER” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “PSYCHIATRIC DISORDER” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “DEPRESSION” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “PSYCHOSIS” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “BIPOLAR DISORDER” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “POST TRAUMATIC STRESS DISORDER” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “SUBSTANCE USE DISORDERS” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “ALCOHOL USE DISORDERS” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “OBSESSIVE COMPULSIVE DISORDER” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “EATING DISORDER” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “ANXIETY DISORDER” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “SUICIDAL BEHAVIOR” OR “SUICIDALITY” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “SELF HARM” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “SEXUAL AND REPRODUCTIVE HEALTH” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “SEXUAL HEALTH” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “REPRODUCTIVE HEALTH AND WELLBEING” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “REPRODUCTIVE HEALTH” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS
ADOLESCENTS, YOUNG ADOLESCENTS, OLDER ADOLESCENTS POLIC*, PROGRAM*, INTERVENTION*,SERVICE* “PRIMARY CARE” “WEST AFRICA” OR GHANA OR NIGER OR BURKINA FASO OR ECOWAS

Assessment of methodological quality was not done to exclude studies based on quality scores since our objective was to gain a broad picture of the available literature. Fig. 2 summarizes the information on how we arrived at the final set of papers in the review using a Preferred Reporting Items for Systematic Review and Meta Analysis (PRISMA) flow diagram.

We used thematic content analysis of the article text to synthesize and report findings from the 27 papers in the second round of full text review. Themes were deductively derived from the research questions and literature review, and inductively from the 27 papers. For quality assurance and validation, working in pairs the authors read one to two papers each and IA read across all the papers and analysis.

3. Summarizing and reporting results/review findings

Table 2 summarizes key information for the 27 papers.

3.1. Context

The studies were conducted in Bénin, Burkina Faso, Côte d'Ivoire, Ghana, Guinée, Mali, Niger, Nigeria, Sénégal, Sierra Leone, Togo; eleven of the fifteen countries that comprise the ECOWAS. Two thirds of the papers (18/27) were from anglophone West Africa with 8 each from Ghana and Nigeria respectively and 2 from Sierra Leone. Interventions to influence AMH, ASRH individually or together were diverse and implemented at multiple health system levels including community or micro-level e.g. Refs. [31,32]; health facility and educational institution or meso level e.g. Refs. [33–35]. [36] and national policy making or macro-level e.g. Refs. [37,38].

3.2. Types of interventions

Eight interventions addressed AMH, 17 ASRH and 2 AMH and ASRH together (Fig. 3). We categorized the interventions into three thematic areas of (i) service access, effectiveness, quality, utilization (n = 16); (ii) knowledge and information provision (n = 6) and (iii) intersectionality and social determinants (n = 5). (Fig. 4).

3.2.1. AMH service access, quality, utilization

Three interventions in this category were from Nigeria and two from Sierra Leone. From Nigeria were the partnership in coping intervention that targeted bio-physiological, cognitive–emotional, social and environmental coping to improve psychosocial well-being in mental health service users with schizophrenia, depression, mania, anxiety disorders, and drug induced psychosis [33]; psychoeducation plus cognitive behavioural therapy for small groups of depressed adolescents already on regular doses of anti-depressants [34]; and increasing the knowledge of school nurses and teachers and enabling them to provide resilience training and peer support for the psychosocial needs of vulnerable children [39]. Both interventions in Sierra Leone addressed post-traumatic stress disorder in war affected youth [40]. [31].

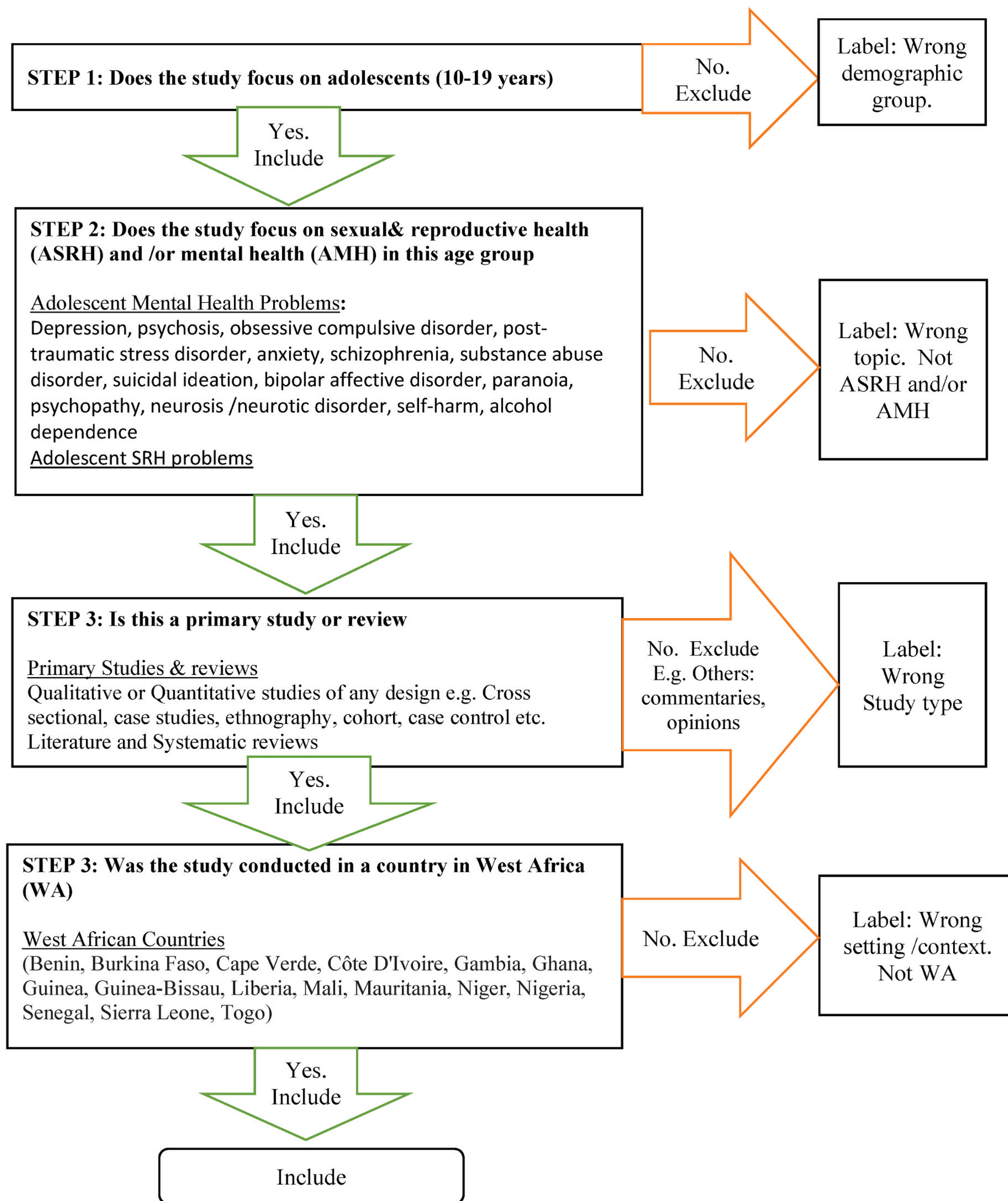

Fig. 1. Study Selection Flow Chart: Adolescent mental, sexual and reproductive health and wellbeing in West Africa.

3.2.2. AMH information and knowledge

The only intervention in this category involved three consultants in child and adolescent psychiatry, jointly delivering a single 3-h session to increase mental health literacy and reduce negative views about persons with mental illness for school adolescents in Southwestern Nigeria with small groups discussions and feedback [36].

3.2.3. Intersectionality and social determinants of AMH

An intervention to improve the mental health of children from ultra-poor households in rural Burkina Faso strengthened the economic status of their female guardians and care givers with a combination of strategies comprising savings group formation and training, livelihood training and planning, provision of seed capital grants and monthly one-on-one mentoring and coaching sessions [32]. In Ghana, the 3 R (Rescue, Rehabilitation, Reintegration) intervention provided social support, coping and community reintegration for girls and women who had experienced human trafficking to address post-traumatic stress disorder (PTSD) [41].

3.2.4. ASRH service access, quality and utilization

The PASSAGE program in Mali and Burkina Faso networked public and private health and social service providers providing ASRH to improve integration of services, continuity of care, access and the utilization of social and health services [42]. The Navrongo experiment in Ghana tested multiple approaches for family planning service delivery to induce and sustain reproductive change including reorienting existing

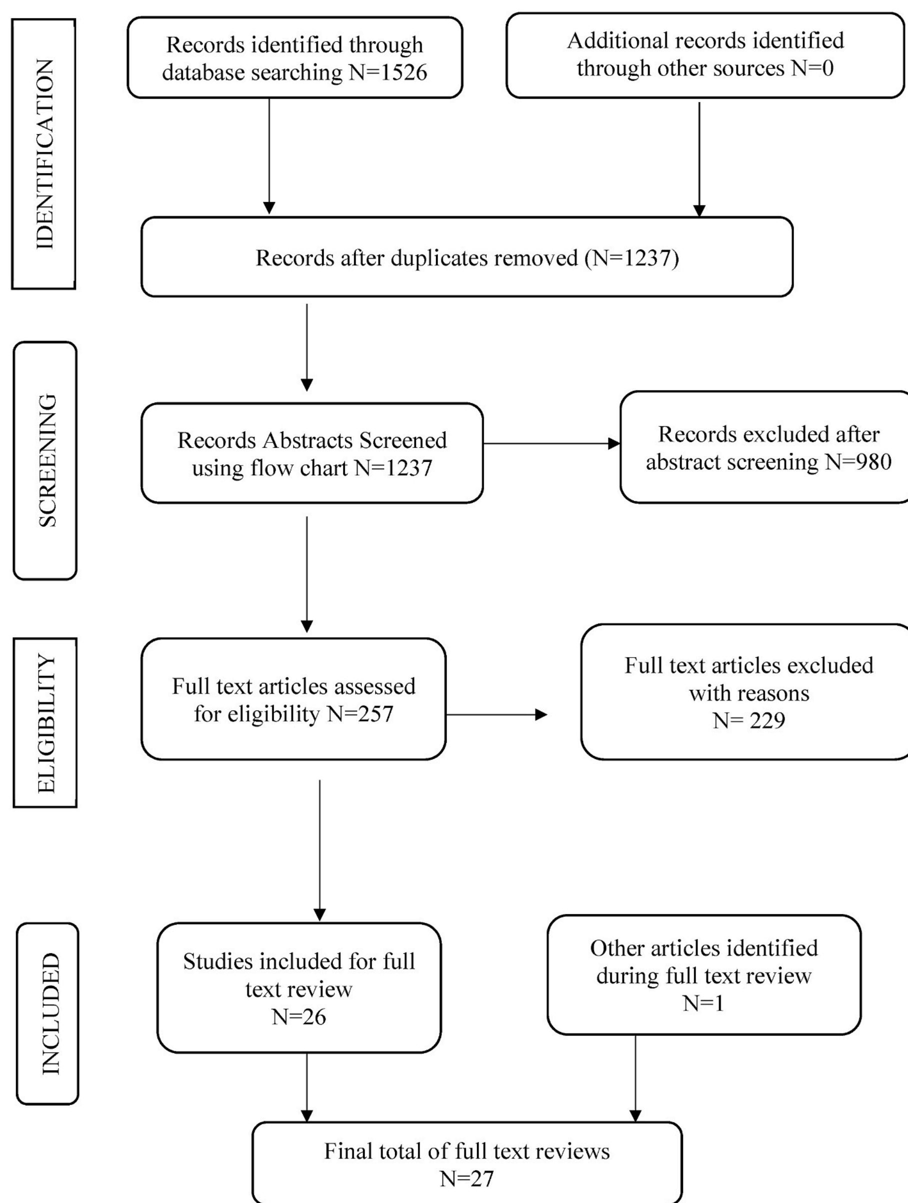

Fig. 2. Preferred Reporting Items for Systematic Review and Meta Analysis (PRISMA) flow diagram for scoping review of adolescent mental, sexual and reproductive health interventions in West Africa.

community health nurses to community health service delivery, and mobilizing cultural resources, systems and social networks to build residents' trust in and support for the program [43]. The Senegal Urban Reproductive Health Initiative worked with Muslim religious leaders to become Family Planning champions; conducted mass media adverts and discussions, and trained community-health volunteers to share information about family planning [44]. In rural Burkina Faso exemptions from all family planning related user fees in public health facilities with information provision to health personnel and communities was implemented and evaluated [38]. An intervention to remove barriers to contraceptive use in Burkina Faso included a behavioural board game for girls in school aided by a trained facilitator to lead discussions on contraception and pregnancy risk; a health passport to ensure quick and confidential services, posters at health facilities advertising ASRH and nametags identifying youth friendly providers [45]. A social accountability intervention to improve contraceptive uptake in Ghana involved a structured program of meetings with local community leaders and health service providers; health rights and civic education of these actors, followed by joint action planning and implementation in the priority areas identified over a 12 months period [46].

In Dosso, Niger monthly household visits to individual couples only, single sex small group sessions moderated by trained male and female community members only or a combination of household visits and group sessions; monthly community dialogues, home visits and counselling were implemented to increase modern contraceptive use and decrease intimate partner violence among married adolescent girls [47].

The French Muskoka Fund, used UN agency (WHO, UN-Women, UNICEF and UNFPA) coordination mechanisms to maximize use of technical expertise and resources and avoid duplication as well as joint monitoring and reporting of results and financial execution, and synchronization of country and inter-country activities; to strengthen national health systems for the health and well-being of several groups including adolescents in Francophone West Africa [37].

A community health fund, engagement of transport owners on emergency transport of pregnant women to primary health centres with the use of text messaging, drug revolving fund, community education,

Table 2
Summary of the key information extracted from papers reviewed categorized by intervention theme.

Context	Study Population	Intervention	Evaluation
Theme 1. ADOLESCENT MENTAL HEALTH (AMH)			
Subtheme 1.1 AMH Service Access, Quality, Utilization			
1.1.1[1] Country: Nigeria. State: Kaduna	•N = 230 •Sex: 120 Males & 110 females •Ages: 16–60yrs with 13 (6 %) 16–25 years.	Multidimensional and multifaceted with components including: 1. Biophysiological coping. 2. Cognitive–emotional coping. 3. Social and environmental coping.	Design: Quasi-Experimental Pre-test posttest, with control group Outcome(s): mental health recovery.
1.1.2[2] Country: Nigeria. State: Benin City	•N = 18 •Sex •Ages: 13–18 yrs. Mean (SD) 15.5 (1.54)	Pyscho education and cognitive behavourial therapy sessions of 30–40 min delivered weekly to groups of 8–10 participants by a psychiatrist, over four weeks using interactive lectures and group discussions.	Design: Quasi-experimental pre-test post-test, no control group Outcome(s): Symptoms of Depression, Knowledge of Depression, Attitude to Medication Adherence
1.1.3[3] Country: Nigeria State: Osun Ife North and Oriade Local Government Areas (LGAs)	•N = 109 •Sex •Age: 10–17 years.	School nurses were trained for 3 days on the psychosocial health and support needs of vulnerable children. The nurses then trained teachers using the same modules. The trained teachers worked within their schools with the school nurses to identify vulnerable children and support their needs.	Design: Quasi Experimental pre-test posttest with control group Outcome(s): Vulnerable children's resilience and psychosocial outcomes (anxiety, depression, self-esteem, and social connectedness).
1.1.4 [4]Country: Sierra Leone	•N = 436 •Sex Male (237) Female (199) •Age 15–24 years Mean 18.0(SD2.4)	Psychoeducation about trauma and its impact on interpersonal relationships; self-regulation and relaxation skills; cognitive restructuring; behavioral activation; communication and interpersonal skills; and sequential problem solving; delivered over 10 to 12 sessions. Community and family meetings to enhance engagement and social support.	Design: Randomized controlled trial Outcome(s): Post traumatic stress symptoms
1.1.5 [5]Country: Sierra Leone	•N = 315 •Sex: 50 % male 50 % female •Age: 8–17 years	Eight (8) 60-min structured trauma healing activities administered over 4 weeks focused on reducing emotional distress and post-traumatic stress reactions that often interfere with learning	Design: Quasi-experimental post-test, no control group Outcome(s): Feeling better, reduced school concentration problems, bad dreams, nightmares and sadness.
Sub-theme 1.2 Empowering adolescents with AMH Information/knowledge			
1.2.1[6] Country: Nigeria	•N = 154 •Sex: Not stated •Ages: 10–18 years.	3-consultants in child and adolescent psychiatry, jointly delivered a single 3-h session on mental health awareness to small groups of students with plenary discussions	Design: Quasi-experimental Pre-test Posttest, no control group. Outcome(s): Knowledge about mental health, attitude & social distance towards people with mental health difficutlies
Sub-theme 1.3 Intersectionality and social determinants of AMH			
1.3.1[7]	•N = 360 •Sex: Not stated •Ages: 10–15 years.	Economic intervention for female caregivers of adolescents in ultra-poor households involving: 1. Savings group formation and training 2. Livelihood training and planning 3. Seed capital grants 4. Monthly one-on-one mentoring & coaching on development of livelihood activities	Design: Cluster Randomized Trial Outcome(s): Depressive Symptoms and self esteem in adolescents
1.3.2[8]	•N = 144 •Sex: All female •Ages 17 to 30+ 16 (11 %) aged 17–19years.	The 3 R'S: 1. Rescue and Protect, 2. Rehabilitate, and 3. Reintegrate into society) model involving social support, coping and community reintegration for girls and women who have experienced human trafficking.	Design: Cross sectional Observational Outcome(s): Scores on Post-Traumatic Stress Disorder (PTSD) symptom scale; 28-item Brief cope dysfunctional coping scale, Multidimensional Scale of Perceived Social Support; and Level of community reintegration scale.
THEME 2. ADOLESCENT SEXUAL AND REPRODUCTIVE HEALTH			
Sub-theme 2.1 ASRH Service Access, Quality and Utilization			
2.1.1[9] Countries: Mali, Burkina Faso and Cameroon	•Sex: Male and Female •Age: 15–24 years •25 KI in Mali and 24 KI in Burkina Faso •2 FGD with 16 people in Mali and 2 FGD with 20 people in Burkina Faso	Networking of actors involved in reproductive health for adolescents	Design: Realist Evaluation Outcome(s): Access to and utilization of ASRH services
2.1.2[10] Country: Ghana. Region: Upper East District: Kassena Nankana	•N = 9421 (baseline), 6927 (endline) •Sex: All female •Age: 15–49 years. Age specific fertility rates are provided for 5 year age groups including ages 15–19 years	"Community health service" component reoriented community health nurses, equipped them with improved logistics, and assigned them to live and work in village locations. "Zurugelu" (togetherness) component mobilized traditional cultural resources, social networks and volunteerism, to support program.	Design: Quasi experimental pre-test post-test time series data analysis with control group. Outcome Measures: Family planning use, Fertility
2.1.3[11] Country: Senegal	•N = 9614 (baseline), 9412 (endline) •Sex: All female Age: 15–49 years	Demand side activities involving working with Muslim religious leaders to become Family Planning champions, Radio, television, and print media adverts and discussions, training community-health volunteers to share Family Planning information through one-on-one and small group discussions; additional to supply-side activities.	Design: Pre-test, posttest. No control groups. analysis of longitudinal data (time series), Outcome Measures: Modern Contraceptive Use

(*continued on next page*)

Table 2 (*continued*)

Context	Study Population	Intervention	Evaluation
2.1.4[12] Country: Burkina Faso	•N = 901 members of 696 randomly selected households •Sex = Female •Age 15–49 years •3 MOH officials •10 healthcare workers	Exemption family planning (FP) from user fees in public health facilities. Information provision on the intervention to health providers through official channels and to the population through radio messages and community awareness campaigns by health providers.	Design: Observational study. Mixed methods cross sectional process evaluation Outcome measures: (i) obstacles and facilitators to implementation, (ii) coverage (iii) perceived quality of FP services among the targeted population.
2.1.5[13] Burkina Faso Ouagadougou and Bobo-dioulassou	•N = 41 Unmarried adolescent girls in 9th and 10th grades •Age15–25 Implementers 15 health facility workers; 4 Pathfinder staff; Other stakeholders: health-facility managers, school principals, parent-association members, Officials from the Ministries of Education and Health. (14)	1) Behavioral board game for girls to play in school during free periods, aided by trained facilitator to stimulate discussions on contraception and pregnancy risk; 2) Health passport, girls can show at health facilities to ensure quick and confidential services; 3) posters at health facilities advertising contraceptive and non contraceptive services for girls, 4) nametags identifying healthcare providers trained to provide youth friendly services.	Design: Posttest (Endline) cross sectional qualitative interviews. No pre-test. No control groups. Outcomes: Perceptions of the attitudes and practices of others in their communities around girls' use of contraception and sexual activity. Girls current and intended future contraception use and sexual activity. Reflection on experiences with the program. Barriers to girls' contraceptive uptake.
2.1.6[14] Ghana	•N = 800 for cohort study & 750 for cross sectional study in Ghana & Tanzania •Sex: Female •Age: 15–49 years old in Ghana and Tanzania	Structured 8 step program of meetings with local community leaders and health service providers. Health rights and civic education of these actors, followed by joint action planning in the priority areas identified by all actors and assignment of implementation roles.	Design: Quasi-experimental pre-test posttest with control group. Interrupted time series design Outcome: Number of new users of contraception amongst women 15–49 years old determined and recorded monthly by facility staff.
2.1.7[15] Niger, Dosso	•N = 25 households with Married adolescent girls and their husbands •Ages: 13–19 (adolescent girls)	Arm 1- monthly household visits to individual couples, Arm 2.- single sex small group sessions. 10–13 participants per session with moderation by trained male and female community members (mentors). Twice monthly for females and monthly for males. Arm 3: household visits and group sessions. Cross cutting: Monthly community dialogues with 2 trained facilitators	Design: Randomized controlled trial. Outcome: Primary-Current use of modern contraceptives among married female adolescents. Secondary-Past year intimate partner violence, knowledge of modern contraceptive methods, attitudes towards family planning, community norms regarding contraception use.
2.1.8[16] Bénin, Burkina Faso, Côte d'Ivoire, Guinée, Mali, Niger, Sénégal, Tchad et Togo	•Mothers, New Borns, Children and Adolescents •More detail not available	French Muskoka Fund coordination mechanism for technical expertise and resources of 4 UN agencies (WHO, UN-Women, UNICEF and UNFPA), and enabling of joint monitoring and reporting of results and financial execution, as well as synchronization of country and inter-country activities for reproductive, maternal, neonatal, child and adolescent health and nutrition (RMNCAH and Nutrition);.	Design: Observational Outcome(s): harmonized technical support to countries; jointly develop complementary regional and national strategies, national policies, technical and financial resources; accountability and traceability of funding at all levels, South-South collaboration; ownership of the RMNCAH and Nutrition by political decision-makers.
2.1.9[17] Nigeria Esan Southeast and Etsako East local government areas in Edo State, Nigeria	•N = 1408 ever married women from 3462 households in these 20 communities 1450 •N = 1411 women from 3116 households in 20 communities. •Sex: Female •Age: 15–45 years	Seven community-led interventions consisting of a community health fund, engagement of transport owners on emergency transport of pregnant women to primary health centres with the use of rapid short message service (SMS), drug revolving fund, community education, advocacy, retraining of health workers and provision of basic equipment.	Design: Quasi-experimental. Separate sample Pretest–post-test. No control group Outcomes: number of women who used the primary health centres for skilled pregnancy care and immunisation of children aged 0–23 months.
Sub-theme 2.2 Empowering Adolescents with ASRH information/knowledge			
2.2.1[18] Country: Ghana Region: Greater Accra	•N = 756 •Sex: All female •Ages: 14–24 years	Unidirectional intervention participants sent 1 reproductive health message weekly via text. Interactive intervention Participants sent 1 multiple choice question weekly via text to respond to free of charge with up to 2 reminder messages. Upon responding, confirmatory text message with correct answer and additional information sent. For every 2 correct responses, airtime credit of US $0.38 provided.	Design: Cluster–randomized controlled trial Outcome Measures: Reproductive Health Knowledge
2.2.2[19] Country: Nigeria	•N = 1000 •Sex: 636 male, 364 female •Age: Young people (age not specified) in senior secondary schools	Students in secondary schools trained as peer educators to facilitate discussions on sexuality, HIV/AIDS, STIs, and reproductive health issues in school with other students with an editorial committee gathering reports from the groups to produced a monthly newsletter Talk2Me.	Design: Observational, cross sectional. Outcome(s): Perceptions of the intervention processes and their usefulness and value of the newsletter
2.2.3[20] Country: Nigeria. State: Saki	•N= Unavailable •Sex: Unavailable •Age: Unavailable (full paper could not be obtained)	Peer education on reproductive health knowledge	Design: Quasi-experimental, Pre-test, posttest, control group. Outcome(s): Knowledge of reproductive health
2.2.4[21] Country: Ghana Lower Manya Krobo district	•N = 20 students •Ages: 11–19 •Additionally, 10 school-based health co-ordinators and 1 other	School-based sex education program in public junior high schools in Ghana.	Design: Cross sectional Observational Outcomes: Educators and students' engagement with the HIV/AIDS curriculum (qualitative)
2.2.5[22] Togo	•2200 male and females 18–49 years •Disaggregated data by age not provided	Confiance Totale radio campaign involving 45-s radio public service announcements to provide information on safety and efficacy of FP methods, where they can be accessed and provider hotlines	Design: Observational. Cross-sectional survey Outcome(s): hearing about the campaign. Ideational and behavioral outcomes including

(*continued on next page*)

Table 2 (*continued*)

Context	Study Population	Intervention	Evaluation
Lomé (Agoé Nyivè) and Blitta Ville (Blitta) in Togo		for clients to discuss concerns related to these methods.	current use of a facility-dependent family planning method.
Sub-theme 2.3 Addressing intersectionality and social determinants of ASRH			
2.3.1[23] Country: Ghana. Region: Central	•N = 11. •Sex: All female. •Age: 5 of the 11 participants were 18–19 years.	international treaties on child marriage in Ghana and strategies by government to end child marriage as per international treaties ratified.	Design: Observational Outcomes: Perceptions of the adequacy of the laws, status of implementation and challenges in implementation
2.3.2[24] Country: Nigeria. State(s): Ogun, Oyo and Osun	•N = 345 (baseline), 374 (endline). •Sex: All female. •Age: Mean age 23.5 years. Range not provided.	(1) Engagement of stakeholder groups with power to help prevent violence against young female hawkers such as drivers and officers of Union of Road Transport Workers, Older female traders, police and judicial officers. (2) Provision of IEC, skills training programs, opportunities to continue education and Micro Credit Facilities	Design: quasi-experimental pre-test post test. No control group Outcome(s): knowledge of, and perceived vulnerability to physical and sexual violence and consequences; prevalence of different forms of physical and sexual violence; proportion who sought redress and where redress was sought.
2.3.3[25] Countries in West Africa: Mali and Niger	•N= •Age: 12–19 years. •Sex: Female.	Girls' empowerment clubs and livelihood training to empower girls to make more informed decisions about marriage and their SRH, and enhance alternatives to child marriage, and create an enabling environment in which girls can claim their rights.	Design: Quasi-experimental (matched) pre-test, post-test, control group. Outcome(s): Proportion of girls ever having been married or living together with a partner as if married, ever pregnant, currently enrolled in school, and ever worked for income.
THEME 3. COMBINED AMH AND ASRH			
Sub-theme 3.1 AMH and ASRH Service Access, Quality and Utilization			
3.1.1[26] Country: Ghana Region: Brong Ahafo	•N = 21,135 •Sex: All female •Ages: 15–45 years.	Training of Community Based Surveillance Volunteers (CBSVs) to identify pregnant women in their community and conduct five focused home visits, two during pregnancy and three on days 1, 3 and 7 after birth.	Design: Cluster randomized controlled trial Outcome(s): prescence of either major or minor depression
3.1.2[27] Country: Ghana. Ashanti and Greater Accra regions	•N = 1080 •Sex: All female •Age: 15–24 years	Scale to measure perceived stigma of adolescent SRH along three major domains of: enacted stigma, internalized stigma, and stigmatizing lay attitudes.	Design: Cross sectional. Outcome(s): conceptual and statistical relevance of the scale.

advocacy, retraining of health workers and provision of basic equipment were provided to increase the access of rural women including adolescents to antenatal, intrapartum, and postpartum services in primary healthcare facilities in Edo State, Nigeria [48].

3.2.5. *ASRH information and knowledge*

Unidirectional and interactive text messaging interventions were compared for improving ASRH among adolescent girls in the Greater Accra region of Ghana [30]. The abstinence only policy of the Ghana Education service in public junior high schools was qualitatively evaluated in the Lower Manya Krobo district of the Eastern region of Ghana from the perspectives of students and educators [49]. Two studies in Nigeria evaluated the impact of interventions involving peer educators [50]. [51], The Confiance Totale radio campaign in Togo, promoted messages that family planning methods were safe and effective, could be accessed from pharmacies, and that providers and hotlines were available to speak to clients about their concerns [52].

3.2.6. *Intersectionality and social determinants of ASRH*

Implementation strategies used by the government of Ghana, progress made in enforcing laws to end child marriage and the contributions of development partners in addressing the problem of child marriage were qualitatively evaluated in a study in the Central region [53]. A cluster of interventions to reduce the incidence of violence against young female hawkers in motor parks in Ogun, Oyo and Osun States of Nigeria included engagement of stakeholder groups with power to help prevent violence against young female hawkers as well as directly targeting young female hawkers with Information, education and communication, awareness raising and skills training, opportunities to continue education and access to Micro Credit Facilities [54]. The More Than Brides Alliance (MTBA) in Mali and Niger used adolescent girls' empowerment clubs and livelihood training to help them to make more informed decisions about marriage and ASRH, enhance alternatives to child marriage, and raise community awareness about the issues [55].

3.2.7. *Interventions targeting both AMH and ASRH*

Only two interventions addressed AMH and ASRH together. Both were focused on improving service access, quality, and utilization in Ghana. One in the Brong Ahafo region trained Community Based Surveillance Volunteers to identify pregnant women and conduct home visits pre and post partum to detect and manage depression [56]. The second developed a formal scale to measure perceived stigma of ASRH and quantitatively test a conceptual model of stigma as a barrier to family planning [57].

3.3. *Evaluation designs*

The most common evaluation design was quasi-experimental (n = 13) with 6 studies using a pre-test post-test with control group [33,35,43,46,51,55]; 5 a pre-test post-test no control group [34,36,44,48]; and 3 a post-test no control group [31,45,54] design. The next most common designs were observational (n = 8)[41], [37,38,49,50,52,53,57]. This was followed by randomized and cluster randomized controlled trials (n = 5)[40] [30,32,47,56],. One paper used a theory driven realist evaluation design [42].

Over half (17/27 i.e. 63 %) of studies involved older age groups as well as adolescents [30,33,37,38,40–46,48,52–54,56,57]. Sometimes a specific age range was not stated with the population described as 'young people' or 'adolescents' [50,51]. The number of adolescents 10–19 years in the sample was sometimes very small or the analysis not disaggregated for that age group. Where studies included both male and female participants, analysis by the sex and or gender was limited or missing.

3.4. *Effectiveness at scale*

Most interventions were implemented as small scale research. In the three studies where interventions implemented at scale were evaluated [37,38],[53]; the observational design provided useful information on

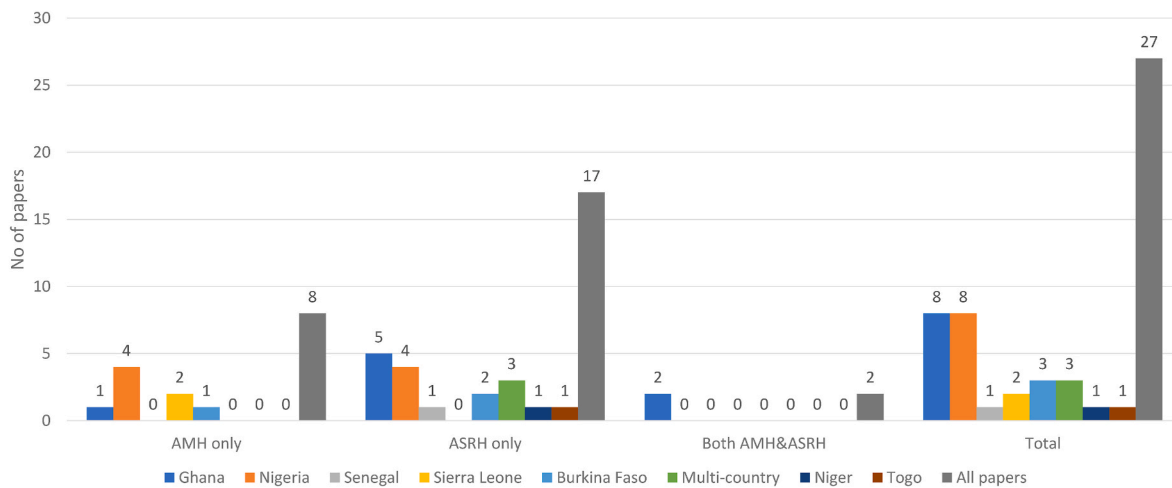

Fig. 3. Papers by focus (AMH, ASRH or both) and by countries where study conducted.

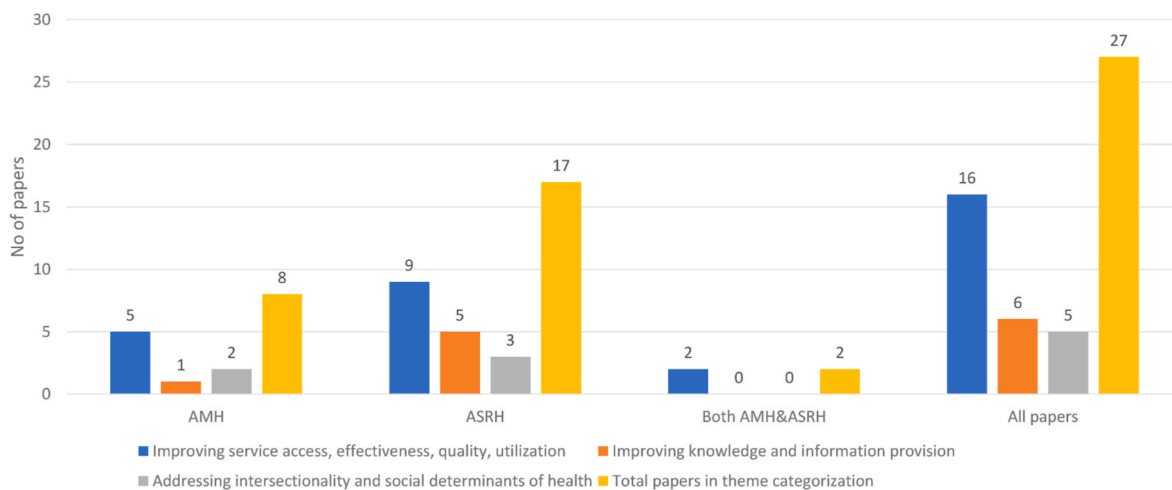

Fig. 4. Categorization of papers on AMH and ASRH by underlying theme of the intervention.

what worked and why; but was inadequate for providing evidence of effectiveness.

4. Discussion and implications

The themes of the interventions in the 27 papers reviewed were interrelated and often mutually reinforcing; for example, improved knowledge and awareness can lead to increased utilization. The interventions varied from simple uni-dimensional intervention e.g. Ref. [36] to complex multi-faceted interventions e.g. Ref. [32] in a wide variety of settings such as schools e.g. Ref. [36], clinics e.g. Ref. [33], communities e.g. Refs. [32,40] and national health systems [37]. Most evaluations were of small-scale experimental interventions rather than interventions implemented at scale.

The issues around appropriate study designs and rigor in policy, program and intervention evaluation are not new [58–61]. There are methodological strengths and limitations in the papers reviewed, which can inform future research agendas. The studies with observational and evaluation designs e.g. Refs. [37,38,41,49,50] and the realist evaluation [42] with its theory driven approach provided in-depth understanding of how and why interventions worked in context. This information is critical to inform scale up, implementation and de-implementation. However, generalizable data on effectiveness in relation to desired outcomes, is also necessary to inform decision making. The studies with designs that could potentially do this, sometimes had limitations. Quite apart from the small numbers, the aggregations of the data across multiple age groups in the analysis made it difficult to separate out adolescent-specific issues. Quasi-experimental studies have the advantage of being useful where randomization is not possible. Within quasi-experimental study designs, inclusion of a control group, and of pre-test and post-test data reduces threats to internal and external validity [62,63]. In several of the papers, quasi-experimental study designs such as no control group, and post-test only limited internal and external validity; and the ability to be conclusive that the interventions are had caused observed outcomes or to generalize beyond the small study population. Future research should consider using and triangulating results from observational designs to provide insights into how and why interventions work in context with rigorous quantitative design to provide conclusive evidence about impact on outcomes and generalizability.

Policies and programs need to be implemented at scale to be effective and achieve intended impacts [16]. Evaluations needs to be built into implementation as an integral part of policies and programs development at scale in the health system. This will require strong links between researchers, policy and program developers and implementers. Such links will also increase the chances that proven effective interventions in research projects inform policies, programs, and implementation at scale. It is also important that future research pays attention to sub-group analysis, with analysis by age and sex at a minimum. AMH remains marginalized relative to ASRH. As part of more holistic

approaches, it will be important to balance the research and implementation focus and pay attention to the neglected intersections between AMH and ASRH e.g. Refs. [5,7,10],[11(p32)] [10,12–15], [64,65], and interventions synergistic across AMH and ASRH.

The strengths and limitation of this review are similar to those documented in the literature for scoping reviews [23,66]. The review followed a standard, rigorous and carefully documented procedure that can be replicated and has helped to map the volume, breadth, depth and focus of published studies of evaluation of interventions for AMH and ASRH in West Africa. It has however been time consuming, requiring a large team. We have identified gaps and research that needs to be conducted rather than contributed new research using approaches such as meta-analysis.

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Disclosure of potential conflicts, real and perceived for all named authors

We declare that we have no potential conflicts.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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