Government research / technology linked programmes specific on Women in STEM workforce

Manipal Academy of Higher Education (MAHE) has collaborated with multiple Government and public-sector research, health, science, technology and innovation programmes that contribute to women in STEM workforce development, women-centred STEM research, and gender-relevant scientific capacity building. The collaboration is visible through externally funded research projects, doctoral fellowships, clinical and translational studies, technology-development initiatives, public-health programmes, and research-career development opportunities supported by Government agencies and public research bodies.

The evidence shows sustained engagement with major Government research and technology-linked agencies, including DST, SERB/ANRF, ICMR/DHR-ICMR, DBT, DBT/Wellcome Trust India Alliance, CSIR-CDRI, BIRAC, MeitY, MoES, ICSSR, CCRAS, SPARC, VGST, Bureau of Indian Standards, Panchayati Raj, AIIMS, NIMHANS and other public or Government-linked institutions. These collaborations cover science, technology, engineering, medicine, public health, biotechnology, artificial intelligence, diagnostics, health technology assessment, digital tools, biomedical devices, climate and infection research, energy systems, language technology and community-based interventions. This demonstrates that the institution is actively connected to Government-supported STEM ecosystems rather than working only through internal or private sources.

The collaboration is relevant to Women in STEM workforce in two connected ways. First, the institution participates in research-career and capacity-building programmes such as DST INSPIRE fellowships, ICMR-JRF, DHR-ICMR short-term fellowships abroad, ICMR-Nurturing Clinical Scientists, SERB travel grants and other fellowship-linked project support. These programmes strengthen the STEM pipeline by supporting doctoral scholars, early-career researchers, clinical scientists and faculty members. They create opportunities for researchers, including women researchers, to enter, remain and advance in the STEM workforce through funded research, national and international exposure, advanced training and project-based skill development. Second, the institution undertakes Government-supported scientific projects directly addressing women, girls, adolescents, maternal health, reproductive health, cervical cancer, ovarian cancer, breast cancer, PCOS, HPV, pregnancy outcomes and women's health technologies. Such projects create research opportunities for faculty, clinicians, scientists, doctoral scholars, project staff, nurses, field staff and laboratory personnel, thereby expanding women-relevant STEM work at institutional and community levels.

Quantitative evidence from the available project list

The uploaded project/grant list provides the following minimum evidence counts. The counts are framed as minimum values because they are based on the project titles and agency names available in the shared list, and a final institutional audit may identify additional women-led or women-beneficiary projects.

Indicator	Minimum evidence identified	Evidence from records

Government/public research and technology agencies linked to projects	15+ agencies	DST, SERB/ANRF, ICMR/DHR-ICMR, DBT, DBT/Wellcome Trust India Alliance, CSIR-CDRI, BIRAC, MeitY, MoES, ICSSR, CCRAS, SPARC, VGST, BIS, Panchayati Raj, NIMHANS, AIIMS and others.
Research-career development and STEM workforce pipeline entries	15+ entries	DST INSPIRE doctoral fellowships, ICMR-JRF, ICMR-Nurturing Clinical Scientists, DHR-ICMR short-term fellowships abroad, SERB travel grants and related fellowship/project support.
Women/girls/adolescent/maternal/reproductive or women-specific health research projects	18+ projects	Projects on ART outcomes in young women, PCOS in adolescents and young women, cervical cancer, HPV, qHPV vaccine, breast cancer, ovarian cancer, maternal health, pregnancy-induced hypertension, obstetric ultrasound, maternal resuscitation and adolescent empowerment.
Technology-linked STEM areas with Government/public collaboration	Multiple domains	Diagnostics, genomics, biomedical devices, AI and digital tools, health technology assessment, biotechnology, vaccines, organoids, energy systems, language

		technology and community health interventions.

Qualitative evidence of collaboration

The qualitative evidence is reflected in the nature of the collaborations. The institution is not limited to single investigator research; it engages with national programmes that require project management, ethical approvals, research governance, clinical implementation, data collection, laboratory or technology development, reporting and dissemination. Projects supported by ICMR, DBT, SERB and DST include biomedical research, public-health implementation, translational research, clinical validation, technology development and capacity building. These activities build institutional capability and create research roles for faculty, doctoral scholars, project scientists, research assistants, technicians and field teams.

A major women-relevant area is reproductive, maternal and adolescent health. Examples from the records include SERB-supported work on genetic variants influencing ovarian response and pregnancy outcomes in young women undergoing assisted reproductive technology; ICMR-supported work on PCOS among adolescents and young women; ICMR-supported work on maternal and neonatal outcomes among pregnant women with pregnancy-induced hypertension; work on obstetric ultrasound research; and projects on maternal resuscitation training. These collaborations strengthen STEM engagement in medicine, public health, biomedical sciences, clinical research, nursing, diagnostics and implementation science. They also contribute to the generation of evidence for women's health priorities in India.

Another major area is cancer biology and women-specific cancer research. The records include projects on cervical cancer, HPV infection and integration patterns, qHPV vaccine safety, breast cancer, ovarian cancer and BRCA1/2 methylation testing. These projects involve advanced STEM skills such as molecular biology, genomics, sequencing, biomarker discovery, clinical trial coordination, data analysis, cancer biology, translational medicine and public-health screening. Through these Government/public-sector collaborations, the institution contributes to national scientific priorities while also creating opportunities for women and men researchers to work in women-centred STEM research areas.

The institution also demonstrates collaboration with Government technology-linked programmes beyond health. Examples include MeitY-linked language technology research, DBT/BIRAC-supported biotechnology and innovation projects, ICMR-supported diagnostic and health technology projects, BIS-linked energy systems research and MoES-linked prediction modelling. These programmes contribute to the broader STEM workforce by encouraging interdisciplinary work across engineering, health sciences, data science, AI, biotechnology, public health and social sciences. Such interdisciplinary projects are important for women in STEM because they create multiple entry points for participation, including laboratory research, clinical research, field research, computational analysis, project management, innovation and technology translation.

Overall, MAHE has active and demonstrable collaboration with Government research and technology-linked programmes that support the development of a gender-inclusive STEM ecosystem. The available records provide quantitative evidence through the number and diversity of Government agencies, fellowship/career-development entries, and women-focused research projects. The qualitative evidence is seen in the nature of the collaborations: doctoral and early-career training, clinical and translational research, technology development, public-health implementation, women's health research, adolescent empowerment and multi-institutional Government-supported programmes. These collaborations support equal opportunity in research participation and contribute to strengthening women-relevant STEM research and the wider STEM workforce pipeline.

PATENT DATABASE

Manipal Academy of Higher Educations (MAHE) organization has actively contributed to Government research and technology-linked priorities that promote Women in STEM and women-centred innovation through a multidisciplinary research, development and intellectual property ecosystem. The evidence submitted in the patent-title annexure demonstrates that the institution's STEM work is not limited to participation in programmes, but has resulted in tangible technology outputs in healthcare, biotechnology, medical devices, artificial intelligence, diagnostics, materials science and digital health. These outputs are relevant to national research and technology priorities because they address public health needs, affordable innovation, inclusive technology development and translation of academic research into usable solutions.

The patent-title dataset reviewed for this response contains 747 patent-title entries, of which 746 are unique invention titles. A keyword-based review of the titles identified 27 inventions that are directly related to women, girls, maternal health, reproductive health, gynaecology, menstrual health, breast cancer, ovarian cancer, cervical cancer, pregnancy and neonatal care. This provides quantitative evidence that women-related STEM innovation is present as a measurable component of the institution's wider technology portfolio. Since the evidence is available at title level, the patent list should be uploaded as an annexure along with available project sanction orders, government programme approvals, collaboration letters, MoUs or internal grant records wherever applicable.

The patent portfolio shows a clear women-centric technology focus. Examples include "Biodegradable Sanitary Napkin and Method for Preparing the Same," "A System and Method for Tracking and Improving Menstrual Health in Adolescent Girls," "Pantiliner," and "A Method for Surface-Specific Analysis of Menstrual and Non-Menstrual Blood Stains Using Imaging Techniques." These inventions indicate work in menstrual hygiene, adolescent girls' health, safe materials, forensic analysis and digital health tracking. Such technology areas align with Government-linked public health and innovation priorities because they support menstrual health awareness, affordable hygiene products, adolescent health monitoring and evidence-based solutions for women and girls.

The MAHE organization also has a strong technology pipeline in women-related oncology and precision medicine. The title-level evidence includes inventions such as "Composition of Drug Combination for Reversing Carboplatin Resistance in Ovarian Cancer Treatment," "A Method for Utilizing 1H-Indazole-3-Carboxamide Derivatives as GSK-3β Inhibitors to Treat Ovarian Cancer," "A Method and Composition for the Targeted Treatment of Triple-Negative Breast Cancer," "A System and Method for Detecting Breast Cancer in Dense Breast Tissue," "Cabazitaxel-Loaded Hydrogel for Sustained Drug Delivery in Breast

Cancer," "A System and Method for Portable Thermal Imaging Analysis for Breast Pre-Screening," "Device for Sampling Cervical Cells," and "A System and Method for a Palmtop Device for Screening Cervical Cancer with Integrated Hardware." These outputs demonstrate translational research in cancer detection, screening, therapeutic delivery and precision treatment. They also reflect the role of the institution in generating technologies that can support early diagnosis and improved access to screening for women.

Maternal, pregnancy and newborn care are also reflected in the patent evidence. Relevant titles include "A System and Method for Dynamic Risk Assessment and Prevention of Gestational Diabetes in Pregnancy," "System and Method for Providing Personalized Maternal and Baby Care," "A Device and Method for Non-Invasive Optical Detection of Bilirubin Levels in Neonates," "A Device and Method for Non-Invasive Saliva-Based Detection of Neonatal Jaundice Using Electrochemical Sensing," and "System and Method for Non-Invasively Determining Bilirubin Concentration in a Neonate." These inventions indicate development of risk prediction, non-invasive diagnostics and mother-and-child care technologies. This is important qualitative evidence because it shows that the institution's innovation activity is directed toward real health-system challenges and community needs.

Qualitatively, the above inventions demonstrate collaboration across STEM disciplines rather than isolated research activity. The titles reflect the convergence of medicine, pharmacy, biomedical engineering, biotechnology, artificial intelligence, sensor systems, materials science, nanotechnology, imaging, wearable technologies and digital health. This multidisciplinary pattern is important for Women in STEM workforce development because it creates opportunities for women faculty members, doctoral scholars, postgraduate students, clinicians, engineers and technology developers to contribute to problem identification, prototype development, validation, intellectual property filing and translational research. The patent evidence therefore supports both women-focused outcomes and women's participation in advanced STEM domains.

The quantitative evidence further supports the scale of activity. Out of the 747 patent-title entries reviewed, 27 directly women/maternal/reproductive-health-specific titles represent a defined women-focused innovation cluster. In addition, the broader dataset contains many inventions in artificial intelligence, IoT, sensors, diagnostics, assistive devices, electric vehicles, drones, biomedical materials and energy systems, showing that women-focused research is embedded within a larger STEM innovation environment. This is significant because women in STEM workforce initiatives are strengthened when women researchers and students are exposed not only to health sciences but also to engineering, data science, device development, automation, sustainability and product-oriented research.

The institution's collaboration with Government research and technology-linked priorities can therefore be described as outcome-oriented and inclusive. The work supports national goals such as affordable health technology, early disease detection, maternal and child health, menstrual hygiene, cancer screening, digital health solutions, medical device development and innovation-led capacity building. The inventions also reflect socially relevant problem-solving, especially in areas affecting women and girls across life stages: adolescence, reproductive years, pregnancy, motherhood and cancer care. These outputs can be considered qualitative evidence of meaningful STEM engagement because they show problem selection, interdisciplinary design, potential societal benefit and movement toward intellectual property protection.

Overall, the evidence demonstrates that the organization has collaborated with and contributed to Government-linked STEM priorities through a sustained portfolio of patentable technologies. The submitted patent-title data provides quantitative evidence in the form of a large patent portfolio and 27 directly women-focused invention titles, while the qualitative evidence is reflected in the nature of the technologies developed: menstrual health solutions, gynaecological monitoring, reproductive health research, pregnancy risk assessment, maternal and neonatal care, breast cancer screening, ovarian cancer therapeutics and cervical cancer screening. These outputs collectively indicate that the institution is strengthening Women in STEM through research participation, technology development, innovation translation and intellectual property generation.

Representative patent-title evidence

- Biodegradable Sanitary Napkin and Method for Preparing the Same
- A System and Method for Tracking and Improving Menstrual Health in Adolescent Girls
- Device for Monitoring Gynaecological Disorders
- A System and Method for Providing Multilingual Health Information on Women's Hormonal Issues
- A Device for Dynamic Uterine Artery Monitoring and a Method for Enabling Obstetric Complication Detection
- A System and Method for Dynamic Risk Assessment and Prevention of Gestational Diabetes in Pregnancy
- System and Method for Providing Personalized Maternal and Baby Care
- A System and Method for Detecting Breast Cancer in Dense Breast Tissue
- A System and Method for Portable Thermal Imaging Analysis for Breast Pre-Screening
- A System and Method for a Palmtop Device for Screening Cervical Cancer with Integrated Hardware