Enterprise and Innovation: Role of Corporate investments in addressingfemale reproductive-health research shortcomings

Bindu J
Assistant Professor
Department of Biotechnology, SJCE
JSS Science &Technology University, Mysuru

Raghu Nataraj
Assistant Professor
Division of Molecular Biology, SLS, Mysuru
JSS Academy of Higher Education & Research, Mysuru.
raghun@jssuni.edu.in

Abstract

Being a woman has implications for one's health. In contrast to men's health, the reproductive system is crucial to the health of women, both in terms of its function and its disorders. The reproductive system, female's ability to reproduce, and how society views them due to their gender, all play a significant role in the illness burden that affects women. The issues have been addressed across various research and development programs under academic settings across the country with minimal productivity under the umbrella of research fund shortage and lack of quality parallel collaborations. The review stresses out the dearth in sophisticated research facilities, funding models and collaborations in hampering the core solution addressing issues across academic platforms and need for industrial and corporate collaborative support for academic research. The lacunas can be potentially addressed by the interventions of meticulously monitored corporate investments of time, collaborative knowledge, identify shared goals, leadership and investments in the women heath research in universities, so the beneficiaries of female reproductive research would be entailed with early solutions to various reproductive health issues across cutting edge technology innovations and solutions.

Keywords*: Corporate leadership, Female health, Investments, Funding models, Technology, Research, Life sciences.*

Introduction

Reproductive health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes **(WHO, 2024).** Being a woman has implications for one's health. In contrast to men's health, the reproductive system is crucial to the health of women, both in terms of its function and its disorders. The reproductive system, females' ability to reproduce, and how society views them due to their gender all play a significantrole in the illness burden that affects women**.** Infertility is a medical condition that can cause psychological, physical, mental, spiritual, and medical detriments to the patient **(Walker,2022).** The fundamental population health improvement will require multisectoral partnerships **(Posner, 2010)** and the role of corporate sectors in such partnerships is less well explored. In a recent, McKinsey Health Institute report it has been estimated that "five percent of women's

health burden is attributable to women's sexual, reproductive and maternal health" **(weforum.org, 2024).** Universities have become a crucial player for the 'knowledge-based economy' as both the generators of knowledge that will eventually turn into products, services and economic growth and the training ground for skilled professionals **(Hunter, 2013).** The involvement of business with health care and public health is often focused on reducing health care costs and improving employee productivity **(Baicker et al, 2010),** but whenever the word healthcare surfaces, the general understandingis all about the patient care in hospital settings and negligible or no consideration of research activities in any mention of "healthcare". There is no shared understanding of who "owns" the health improvement space in communities. In some sense, the community health improvement "sandbox" still seems largely controlled by health care and public health, with business sector participation limited due to fear of meddling, revenue loss, or disruption of anecosystem configured to maximize success for a designated few **(Kindig, 2013).** This limitation of corporate sector participation is another dimension to gaze of what could have been potential flow of investments towards community health research activities in addressing women health. According to Andrew Webber, President and CEO of the National Business Coalition on Health, "Business leaders must understand that an employer can do everything right to influence the health and productivity of its workforce at the worksite, butif that same workforce lives in unhealthy communities, employer investments can be seriously compromised" **(Webber and Mercure, 2010).** The idea of corporate investments inboosting female reproductive health research is not always about pooling monetary funds but is beyond that. There is enormous amount of learnings life science researches can imbibefrom the corporate sectors which will be the topic of this review.

Shortcomings

1) **Infrastructure:** Infrastructure is the oxygen which makes any research lab breathe adequately even in the crisis of funds/grants. Establishment of optimised research labs with decarbonization technology instilled "smart" building is a dream for any university principal investigator. Most of the research labs across universities face the hindrance of well curated ventilation system to generate a controlled environmental setup within lab space. Such insufficient insightfulness of developing optimised research labs with HVAC ceiling, anti-fire systems and access controls would directlyimpact the research outcomes. Sustaining the high-end reproductive biology research works with a manually curated laboratory settings is seemingly impossible in a long run. Most of the modern-day instrumentations have developed into automation machineries raking the cost sky-high. So, any scientist dreaming an inciteful productive reproductive biology work in his basic lab set up dearly needs the support of corporate sectors to join hands to reap the fruit of his scientific intellect through the establishment of smart labs with minimal optimisation in catering the basic needs of a researcher.
2) **Funds –** Generating capital space for reproductive biology research is the utmost priority in the current global scenario of rising women health issues in the growing economy. Universities have always sponsored budget in taking research and activities across various women health aspects in general. Even with university sponsored seed funds, lacunae of capital exists within lab set ups across various issues such as,limited budget to spend upon advanced study designs, chemical purchases, lack of funds for calibration of research equipment on a regular basis, lack of funds tomaintain laboratory personnels apart from mentor and mentee which definitely directly or indirectly responsible for contributing to the increase in the equation of women health gaps cited across various global metrics.

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3) **Trained personnel –** Female reproductive biology anywhere is an umbrella program under which several speciality areas converge and diverge in its own sub areas. Value tensions exist across academia and research settings simultaneously which is well known fact that always not ends sweeter in both the parts of mentor and mentee. Apartfrom regular academic publications and research findings much of the works which happens in universities is never publicised due to many holding factors. Connectivity is among the major factor, wherein comparatively volunteer activities, philanthropy, outreach programs always stay minimal among university research in comparison to corporate sectors.

Corporate Interventions

To bring in enhance female reproductive research productivity, the stakeholders from both corporate and university research sectors have to come together to envisage ways to bring corroborative ideas and strategies which can be implemented for future dividend. Identifying the right investor is a key to foster individual research labs of which informing the investor ofthe concept about the research activity conducted in the lab stands prime most aspect. Apart from the basic setup of infrastructure and necessary commodities, every lab always is in seek of micro-investments to meet the ends of a research work, be it in the shortage of chemical supply, glassware and analytics fee for outsourced works etc. If these micro necessaries couldbe addressed in a more diligent way by the inception of corporate sectors, the difference would be definitely massive and encouraging in the face of modern life science research in general.

To improve health equity and foster economic growth, stakeholders must develop a cooperative and comprehensive strategy to, McKinsey has come up with the following sets ofactions:

- Invest in women-centric research to fill the knowledge and data gaps in women-specific conditions, as well as understand sex-based differences in diseases affecting women differently and/or disproportionately
- Systematically collect and analyse sex-, ethnicity-, and gender-specific data to have more accurate representation of women's health burden and the impact of different interventions
- Enhance access to gender-specific care, from prevention to diagnosis and treatment
- Incentivize new financing models and establish business policies that support women's health
- Raise awareness and support advocacy to bring attention to the women's health gap (McKinsey & Company, 2024).

As mentioned, the idea of corporate investments in boosting female reproductive health research is not always about pooling monetary funds but is beyond that. Enormous amount oflearnings we life science researcher can imbibe from corporate sectors. Creating a long-term strategy that considers sustainability in every process of research from start to finish is the need of the hour. The idea of developing lab spaces as in 1000 discover drive in Cambridge (Fig.1), British Land's establishments of paper yard lab space (Fig.2) **(Alison Wring, 2023).** are the real-time examples of how the intervention of corporate sectors in basic and applied research serves as an incentive. As mentioned, initiating ventilation sustainability approaches across the research lab set-ups, aiding in the establishment of smart labs equipped with automations & AI, establishing connectivity among university research works to general public across urban and remote areas, pro-active actions in setting up R&D facilities in developing problem specific tailer-made instrumentations upon the recommendation of PIs, keeping the PI informed about the evolving regulations and economic policies pertaining to the current and future research prospects, support the construction of on-campus utilitysystems for power, water,

HVAC and gases etc can all add and boost the real-time productivity of female reproductive health research on giant scale **(Moe Fayz, 2023).** The lifescience sector is a hot asset for private investors. A record £2.5 billion in venture capital (VC)was invested into private UK biotech's in 2021: a 79 per cent increase on the total raised in 2020. Overall, this signals that life science companies in the UK are now strong targets for both state and private capital and suggests demand for lab space is unlikely to abate in the short term **(Alison Wring, 2023).** generating capital space. sponsor training facilities/programs and hence addressing value tensions i.e., "producing research results versus educating students". Organising communication skill sets camps **(CFPIE, 2024).**Identifying shortcomings and addressing or sponsoring strategies. Underfunding & overfunding - The degree of underfunding or overfunding is different for the groups of conditions, too. On average, female-dominant diseases that are underfunded are more severely so. For chronic fatigue syndrome, also known as myalgia encephalomyelitis (ME/CFS), for example, the ratio of burden to funding is 0.04. For HIV/AIDS, the ratio is 15.6 (Nature,2024).

Fig.1: 1000 Discovery Drive is a £42m new science facility on Cambridge Biomedical Campus, providing 100,000ft2 of flexible laboratory and office facilities, suitable for chemistry, biology or computational scientists (Alison Wring, 2023).

Fig.2: British Land's The Paper Yard in Canada Water is a life science laboratory building due to open in June 2023. The 33,000 sq ft of fitted and lab-enabled space has a modular design and can be configured and re-configured to suit tenant needs (Alison Wring, 2023).

Most business leaders understand the concept of impact metrics and know how they can drivestrategic investments. **(Kindig, 2013).** Develop and widely share case studies of businesses that are already making progress in community health improvement activity. **(Kindig, 2013).** The Triple Aim is a policy framework developed by the Institute for Healthcare Improvement. It advocates the simultaneous improvement of patient experiences of care (including quality and satisfaction), reduction in per capita health care costs, and improvement of population health. Although most Triple Aim sites define their populations by the service areas of health care delivery systems, several initiatives have adopted a regional approach and are defining their populations geographically **(Kindig and Whittington, 2011).** Dwelling of the corporate and university partnerships in extracting even more details and adaptability of the triple aim would definitely open the collaborative horizonof inclusive productivity.

Corporate sponsors can definitely identify permanent revenue streams for carrying out research activities. Though government policies exist wherein private sectors and universitiescan come together for availing research funds, sensitization across corporates as well as among university faculties is a much-needed task in the current scenario of lack of funds. Many experts argue that as much as 25 percent of current health care spending is ineffective, improving neither outcomes nor quality. Capturing these dollars for reinvestment in more effective programs and policies within and outside of health care will not be easy, but nevertheless should be a high priority for both public- and private-sector leaders. Consideration should be given to setting aside a community share from savings anticipated under the implementation of accountable care organizations, which are designed to provide higher-quality care in a more efficient manner **(Magnan et al., 2012).** Also, asuncompensated care burdens are reduced under health reform, community benefit resources required by the Internal Revenue Service for nonprofit tax-exempt status could be redirected from charity care into broader health-promoting investments **(Bakken and Kindig, 2012).**

The issue and underfunding and over-funding data put forth by **Nature,2024,** is a wake-up call. The corporate boards can take a necessity actions by appointing science fraternities in re-addressing the philanthropy fund dispersal so the micro necessities required by university research labs would be dearly benefitted. A non-profit investor can also look forward to be a part of evaluation along with university committee about the final output of the micro- funding made in research activities. When governments and non-profits evaluate resources and policies across populations, they create an opportunity to advance health equity and benefit society. They could consider which investments reap the highest socioeconomicreturn, including in medical research. One example of targeted investment is the 3NOT30 campaign by the Women's Health Access Matters to increase women's health research and accelerate investment in sex-based research over the next three years (Fig.3) **(Women HealthAccess Matters, 2024).**

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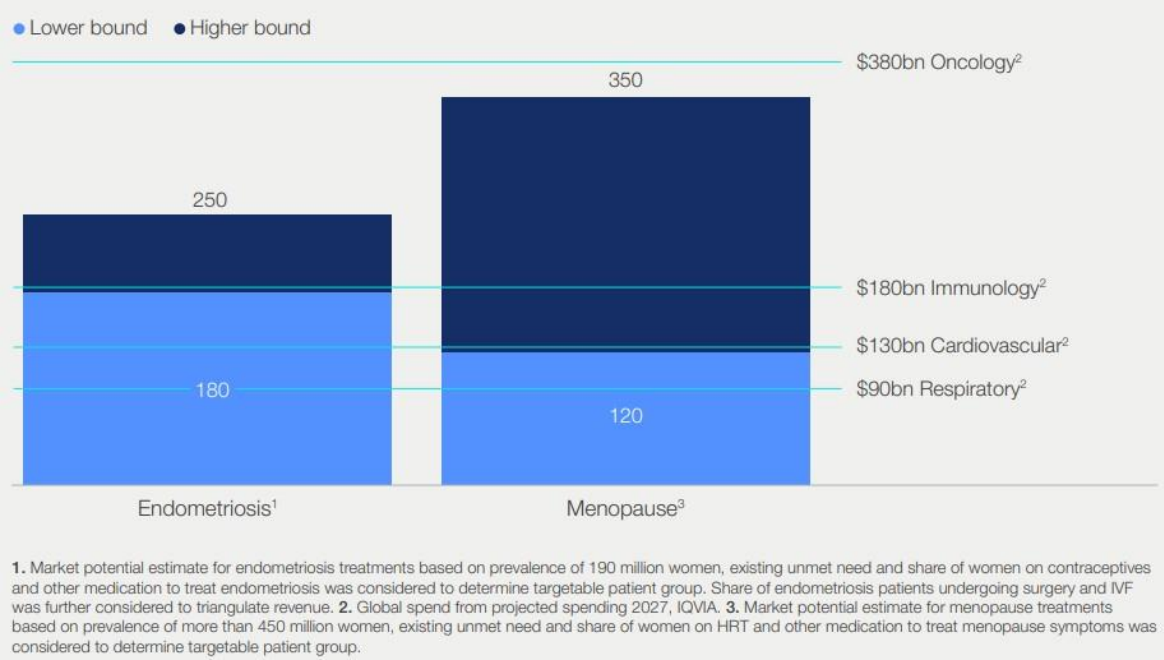

Fig.3: Global spend across women health treatment of endometriosis & menopause

Innovative Funding Models

The Petrie-Flom Centre for Health Law Policy, Biotechnology and Bioethics at Harvard Law School Launched the Innovative Funding Models in Translational Research Project in early 2018 to explore the bioethical, legal, and risk management challenges of translational research in the context of a shift from governmental funding to private funding for cutting edge biomedical research. In the age of frequent governmental budget crisis and government spending cutbacks, relying primarily on a government agency to promote such important developments may be problematic. The Harvard Law School has stated that an obvious solution to the funding gap that exists in current health care and biomedical research is the close investment and involvement of private, for-profit entities. These for-profit entities can pursue a role similar to that of non-profit organizations as funders of mission-oriented programs explicitly emphasizing the importance of bench-to-bedside innovations. By supporting early stage research development, intelligent investors can help refine the translational model and encourage the recruitment of talented researchers to translational activities.

Push Vs. Pull Models

In a “push” model, one aggregates the funding and adopt a mechanism to get it to researchers,typically a grant program. Usually, a sector has to announce the program and state your purpose and goals. In a “pull” model, one creates an institution to house research, and then to seek and attract funding. Many institutions combine both, e.g., NIH has both a grant program and in-house research. Push and pull models work together. A foundation (push) may give a grant to a university (pull) Or a prize (push) may justify investment from a for-profit company (pull) **(Jason Crawford, 2020).**

The push approach has been used intensively to address neglected diseases, while pullmechanisms dominate elsewhere—especially for clinical trials. This question is most relevantfor the $4bn of annual research spending on neglected diseases **(G-Finder Report, 2023).** For these diseases, the lack of

effective demand results in a failure of regular commercial incentives to operate effectively. Investment into treatments for these diseases depends on public or charitable funding, and, unlike with global diseases, research on neglected diseases is almost entirely funded on a "push" basis **(Matthey,2024).**

While pull mechanisms are predominantly used to incentivize later-stage pharmaceutical research for products with demand in the Global North, so-called neglected diseases are chiefly financed by push funding. This discrepancy has so far been ignored in the academic debate, and any compelling explanation for why we draw the line between push and pull at poor people is lacking **(Matthey,2024).**

Discussion & Conclusion

While women live longer than men on average, they spend 25 percent more time in poor health. A woman will spend an average of nine years in poor health, affecting her ability to bepresent and productive in her life—at home, in the workforce, and in the community. The women's health gap equates to 75 million years of life lost due to poor health or early death per year—the equivalent of seven days per woman per year. Closing the gap would improve the health and lives of millions of women and boost the global economy by at least $1 trillionannually by 2040 **(McKinsey & Company, 2024).**

Corporate governance is not a new venture among universities, as with the advent of the start-up concepts has already been envisaged successfully at university levels. The intent of the authors is to invite wider participation of corporate community in lending their corporateideas and support for the effective governance of research labs wherever possible. Research PIs can adopt the corporate compliance, succession planning, risk management, innovation & adaptability in enduring the leadership transition to ensure continuity of research. Corporate investments for the upscale and development of reproductive biology research is not always monetary centred, instead the large space of knowledge forum the corporate can bring into the life science research works is amassable. For far too long, society has overlooked women's health needs and failed them in doing so. Women are paying the ultimate price withan average of nine years spent in ill health across their lives. This is a quarter more than men suffer. The majority of these fall during their most productive and active years (**weforum.org, 2024).**

Earlier authors have believed that there is a solid argument to be made for a much stronger role for businesses in population health improvement. Such improvement can enhance corporate core objectives beyond those of social responsibility. It is hoped that the ideas presented here will contribute to a more robust discussion of this potential and lead to action at all levels, from individual communities to the nation as a whole **(Kindig, 2013).** The university – corporate sectors collaborations can seek guidelines of Global Alliance for Women's Health which is committed to contributing its expertise, resources and influence to advance initiatives that promote women's health, ensuring that it becomes a shared responsibility across diverse sectors. It envisages that the change is possible but will require concerted public-private action & the formation of the alliance is an important step on its mission to finally close the women's health gap **(Global Alliance for Women's Health).** According to the Organisation for Economic Co-Operation and Development (OECD), industry investment in pharmaceutical research and development is approximately twice as large as the public contribution **(OECD,2017).**

Most of the capital funding flow is towards patient care which is off course in need but forgetting the point that the care happens only after careful research which in turn happens after right capital hand, infrastructure and research personnels is the point authors are tryingto explore in this review so the intention of non-profit or for-profit funding will be holistic in the overall patient care. Creating startups

out of core research labs is a long-term goal for any nation which has to be sustained and nourished through meticulous cooperation of both corporate sectors and academia across knowledge, infrastructure, capital induction etc. Such initiatives hold the paths for health and economic benefits in a far-sightedness therebyensuring a guaranteed future for upcoming science students graduating from academics.**Declaration:** The authors declare the work is an original one and does not violate copyrightand the due credit wherever applicable is mentioned in references.

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