Title of the Case Study:

AI enabled Knowledge Systems for India: "The detection that saves lives".

"पहचान जो जीवन बचाए "

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AKSI SOLUTION: EXECUTIVE SUMMARY

Awareness to Action - Youth-Powered AI for Breast Cancer Early Detection

THE CHALLENGE :

Breast cancer has emerged as India's silent epidemic, with 200,000 new cases diagnosed annually yet 60% of patients presenting at advanced stages (III-IV) when treatment options narrow and survival becomes uncertain. The tragedy is preventable since early detection catapults survival rates to 98%, yet there persists a critical gap between what we know and what we actually practice. This gap is most visible among youth populations, who represent not only today's at-risk generation but tomorrow's health decision-makers, caregivers, and community leaders.

Our baseline survey of 117 respondents (as of January 22, 2026) at FORE School of Management using a structured 5-point Likert scale assessment exposed alarming deficiencies across five critical dimensions. Disease Awareness scored a mere 2.84 (SD 1.23), with only *45% of respondents confident in identifying breast cancer symptoms beyond the commonly known lump, leaving critical warning signs like skin dimpling, nipple discharge, and shape changes largely unrecognized. Screening Knowledge & Steps fared worse at 2.58 (SD 1.27), with 54.7% unable to describe the correct 3-step breast self-examination (BSE) technique of visual inspection, standing palpation, and lying palpation. Most concerning was the Practice & Behavior dimension at 2.56 (SD 1.19), revealing that 52.8% do not perform monthly breast self-examination despite available information. While respondents demonstrated relatively better Facility Proximity Awareness (mean 3.22, SD 1.25) and Action Orientation (mean 3.33, SD 1.40), with 55.7% expressing confidence in booking diagnostic screening, this readiness to act stands on a foundation of insufficient knowledge.* The overall target awareness score of 2.84 out of 5.0 crystallizes the problem that there is moderate-to-low awareness accompanied by a critical knowledge-behavior gap that transforms potential into peril.

AKSI SOLUTION: THREE-MODE INTEGRATED FRAMEWORK

AKSI (AI-powered Knowledge Systems for India) responds to this multifaceted challenge through an integrated three-mode framework that reimagines breast cancer prevention as a convergence of youth empowerment, artificial intelligence, and systematic capacity building. Rather than treating technology, awareness, and training as separate interventions, AKSI weaves them into a cohesive ecosystem where each element amplifies the others.

MODE 1: PREVENTION & PROMOTION STRATEGY emphasizing on leverage of Digital Transformation for Awareness

The Prevention and Promotion Strategy launches on World Cancer Day 2026 (February 4th) with a sophisticated multi-platform digital campaign designed to meet young people where they already are on their phones, in their social networks, and within their peer communities. WhatsApp serves as the backbone for intimate, group-based peer education modules that deliver BSE technique videos, appointment reminders, and interactive learning in a trusted environment where questions can be asked without stigma. Instagram transforms awareness into engagement through interactive stories, polls that challenge myths, and survivor testimonials that humanize statistics. YouTube Shorts distills complex medical information into compelling 15-60 second demonstrations of BSE techniques and symptom awareness, optimized for the attention patterns of digital natives.

The campaign's innovation lies not in its platform selection but in its content architecture. Gamification elements including quiz competitions with knowledge badges transform learning from obligation to achievement, tapping into competitive instincts that drive sustained engagement. A network of 2,000 student health ambassadors will serve as trusted messengers within their schools and colleges, leveraging peer influence more effectively than any external authority figure could. Multilingual content across 12 regional languages ensures cultural relevance and accessibility, while interactive tools like "*Know Your Breast Health Score"* create personalized entry points into deeper learning. This strategy directly addresses our baseline survey findings that if 54.7% don't know proper BSE technique and 52.8% don't practice monthly examination, then we must make both knowing and doing irresistibly engaging.

Target audiences cascade strategically by primarily focussing on the youth aged between 15-25 Years i.e., students at formative moments when health behaviors crystallize into lifelong patterns;

secondary emphasis on teachers and educators creates institutional multipliers who can sustain awareness beyond campaign timelines; tertiary engagement with ASHA workers and young healthcare professionals builds bridges between community awareness and clinical action. Expected outcomes include direct engagement of 100,000 youth, generation of 500,000+ social media impressions creating ambient awareness that normalizes breast health conversations, and establishment of health ambassador programs in 100 target schools that outlive the initial campaign.

MODE 2: AI-POWERED DIAGNOSTIC INTEGRATION utilizing Indigenous Technology Bridging Access and Excellence

The AI-Powered Diagnostic Integration represents a fundamental reimagining of screening infrastructure that makes excellence affordable and accessibility scalable. At its core sits a portfolio of indigenous AI technologies that prove innovation need not be imported. Thermalytix employs thermal imaging to achieve 95-99% diagnostic accuracy at ₹800 per screening—73% less expensive than the ₹3,000 cost of traditional mammography—while remaining completely radiation-free and non-invasive, attributes particularly important for younger women and repeated screenings. AI-enabled Point-of-Care Ultrasound (POCUS) delivers handheld diagnostic capability with AI interpretation achieving AUC scores of 0.95-0.98, crucially incorporating uncertainty quantification that allows the system to flag cases requiring human expert review rather than forcing decisions on borderline cases. Complementary technologies from iBreastExam, Niramai, and MedCognetics create redundancy and choice, ensuring no single vendor dependency while fostering healthy competition that drives continuous improvement.

The system architecture transforms these individual technologies into an orchestrated ecosystem through strategic integration layers. JotForm handles patient-facing interactions including registration, symptom checking, appointment booking, and consent management, creating a user-friendly front door that reduces administrative burden on healthcare workers. N8N workflow automation serves as the nervous system, orchestrating multi-platform communications across WhatsApp, SMS, voice calls, and Instagram to deliver automated appointment reminders that reduce no-shows, results delivery notifications that ensure timely follow-up, referral coordination that prevents patients from falling through cracks, and data synchronization with the NCD app that eliminates duplicate data entry. This automation doesn't

replace human judgment which amplifies it by handling routine tasks and flagging exceptions that require personalized attention.

Government integration ensures AKSI doesn't create a parallel system but strengthens existing infrastructure. Bidirectional data flow with the NCD App maintains screening records in official systems, NPCDCS receives confirmed cancer case referrals for treatment coordination, Ayushman Bharat Digital Mission integration enables health ID-based patient tracking across facilities, and National Health Mission coordination connects primary health centers into the screening network. MeghRaj Cloud hosting with AES-256 encryption ensures data sovereignty and DPDP Act 2023 compliance, addressing privacy concerns that might otherwise impede adoption. Federated learning allows AI models to improve from aggregated patterns without exposing individual patient data, while blockchain-based consent management creates auditable trails that build trust.

Edge computing deployment tackles India's infrastructure reality head-on. FPGA hardware acceleration reduces power consumption by 63.15% (from 3.8W to 1.4W), critical for rural settings with unreliable electricity, while improving execution time by 15.8% and enabling offline-first design that functions despite intermittent connectivity. SMS fallback and mobile van flexibility ensure that technology enhances rather than constrains reach, adapting to local conditions rather than demanding they adapt to technology's requirements.

MODE 3: HUMAN CAPACITY BUILDING for Sustainable Infrastructure Through Training

The Human Capacity Building component recognizes that technology without trained users creates expensive paperweights, while awareness without diagnostic capability generates anxiety without resolution. A four-level training cascade builds competency systematically from grassroots to specialist, each level designed for specific roles and responsibilities.

Level 1 targets students with 2-hour interactive workshops that move beyond lecture to experiential learning. Participants practice the 3-step BSE technique on models, learn to identify concerning symptoms through case scenarios, understand when self-care ends and medical consultation begins, and develop peer education skills that transform them from passive learners to active teachers. This addresses our survey finding that knowledge exists in fragments but practice requires integrated understanding and confidence.

Level 2 elevates teachers into awareness multipliers through 1-day training programs that equip them with curriculum integration strategies for weaving breast health into existing biology, health education, or life skills classes; facilitation techniques for leading sensitive discussions without embarrassment or stigma; student counseling approaches for responding to questions or concerns that arise; and community engagement methods for extending school-based learning into households. Teachers represent institutional training that creates sustainability beyond any single campaign.

Level 3 transforms ASHA workers into community screening agents through 2-day hands-on workshops covering AI tool operation for Thermalytix, AI-POCUS, and other deployed technologies; community mobilization strategies that navigate cultural sensitivities and build trust; referral protocols that ensure appropriate cases reach appropriate facilities; and follow-up procedures that track patients through diagnosis and treatment. Financial incentives of ₹100 per screening conducted recognize their expanded role while creating measurable accountability. ASHA workers already serve as trusted bridges between formal healthcare and community life, equipping them with diagnostic tools multiplies their impact exponentially.

Level 4 prepares healthcare workers as quality assurance anchors through 3-day intensive training in AI interpretation and validation, quality control protocols, tele-consultation procedures, and data management. This ensures that AI augments rather than replaces clinical judgment, with human experts reviewing flagged cases, monitoring system performance, and providing oversight that maintains diagnostic integrity.

Training methodology emphasizes active learning over passive consumption: gamification-based modules make skill acquisition engaging, video demonstrations provide visual models that transcend literacy barriers, supervised practice sessions build confidence through repetition with feedback, peer-to-peer learning creates supportive cohorts that continue beyond formal training, and competency assessments ensure participants achieve minimum standards before operating independently. This approach recognizes that behavior change requires more than information transfer which demands experiential learning that builds both skill and confidence.

Evidences and Feasibility:

The baseline assessment survey of 117 respondents (as on January 22, 2026) at FORE School of Management provides an empirical foundation for understanding the current awareness landscape among educated youth populations and identifies specific knowledge gaps requiring targeted interventions. Using a structured 5-point Likert scale questionnaire, the survey assessed five critical dimensions:

1. *Disease Awareness (The "What")*: Mean 2.84 (SD 1.23) - Only 45% confident in identifying primary breast cancer symptoms beyond physical lumps

2. *Screening Knowledge & Steps (The "How"):* Mean 2.58 (SD 1.27) - 54.7% unfamiliar with the correct 3-step BSE technique

3. *Practice & Behavior (The "Self")*: Mean 2.56 (SD 1.19) - 52.8% do not perform monthly BSE among themselves or close female relatives

4. *Facility Proximity Awareness (The "Where"):* Mean 3.22 (SD 1.25) - 51.9% aware of nearby multi-specialty healthcare facilities

5. *Action Orientation (The "Trigger"):* Mean 3.33 (SD 1.40) - 55.7% confident in booking diagnostic screening without delay

The overall target awareness score of 2.84 out of 5.0 indicates moderate-to-low breast cancer awareness levels across all dimensions, with notable gaps in self-examination practice and stepwise knowledge despite relatively better awareness of facilities and action readiness. The distribution patterns showed negative skewness for Facility Proximity and Action Orientation (clustering toward higher scores) versus positive skewness for Screening Knowledge and Practice Behavior (clustering toward lower scores), highlighting that while students possess basic awareness of healthcare infrastructure accessibility, they lack fundamental knowledge about disease symptoms, screening techniques, and consistent self-examination practices.

Demographics revealed that 82.9% of respondents were aged 18-25 years, with 59% female and 41% male participation. This quantitative assessment establishes baseline metrics against which post-intervention outcomes can be measured to evaluate the effectiveness of the proposed social media awareness campaigns, AI technology integration, and capacity building initiatives scheduled for World Cancer Day 2026 (February 4th) and subsequent implementation phases.

Cost Effectiveness & Viability:

AKSI's cost-effectiveness transforms breast cancer screening from a resource constraint into an investment opportunity. Traditional screening costs ₹3,000 per patient and requires 5 hours of radiologist time per 100 screens, achieves 88% accuracy (12% false positive rate), and detects 6 cancers per 1,000 screens at a cost of ₹5 lakh per cancer detected. AKSI's AI-enabled approach costs ₹800 per screening (73% savings), requires only 2 hours of radiologist time per 100 screens (60% reduction freeing specialists for complex cases), achieves 92% accuracy (8% false positive rate, 33% improvement reducing unnecessary anxiety and follow-up procedures), and detects 8 cancers per 1,000 screens (33% increase through earlier detection when symptoms are subtler) at ₹1.67 lakh per cancer detected (67% savings).

Five-year economic projections reveal transformative potential: ₹50-100 crores in savings through Years of Potential Productive Life Lost (YPPLL) reduction by preventing premature deaths of women in their productive years; 40-50% treatment cost reduction through stage-shift as patients diagnosed at stages I-II require less intensive, less expensive, and more successful interventions than those presenting at stages III-IV; and 60-70% screening cost reduction enabling coverage expansion from current urban-wealthy populations to underserved rural and economically disadvantaged communities where burden is highest and access is lowest.

IMPLEMENTATION ROADMAP & EXPECTED IMPACT

The first awareness campaign is targeted towards February 4, 2026 World Cancer Day launch, especially amongst the age group of 20 -35 years so as to prevent and promote *Early detection* since 15-20% early detection rates shows that 7,500 -10,000 women diagnosed at treatable stages who would otherwise have progressed, engagement of the youth with 70% awareness improvement (baseline 2.84 to target 4.0+ on 5-point scale), to be make it economic benefit through averted treatment costs and productivity preservation, and gain quality-adjusted life years (QALYs) representing both extended survival and improved quality during those years, and producing replicable model documentation enabling BRICS+ nations including Iran, Brazil, and South Africa to adapt and deploy locally.

The implementation unfolds across three phases: *Phase 1* establishes pilot infrastructure with World Cancer Day campaign launch, content development, student ambassador recruitment, with pilot AI screening in 5 locations; *Phase 2 (Months 4-9)* to scale -up across educational institutions and screening locations with training of healthcare workers, ASHA workers, and

teachers; *Phase 3 (Months 10-12)* achieves full system integration with NCD app, operationalizes NPCDS pathways, documents outcomes, and establishes sustainability frameworks across the nation.
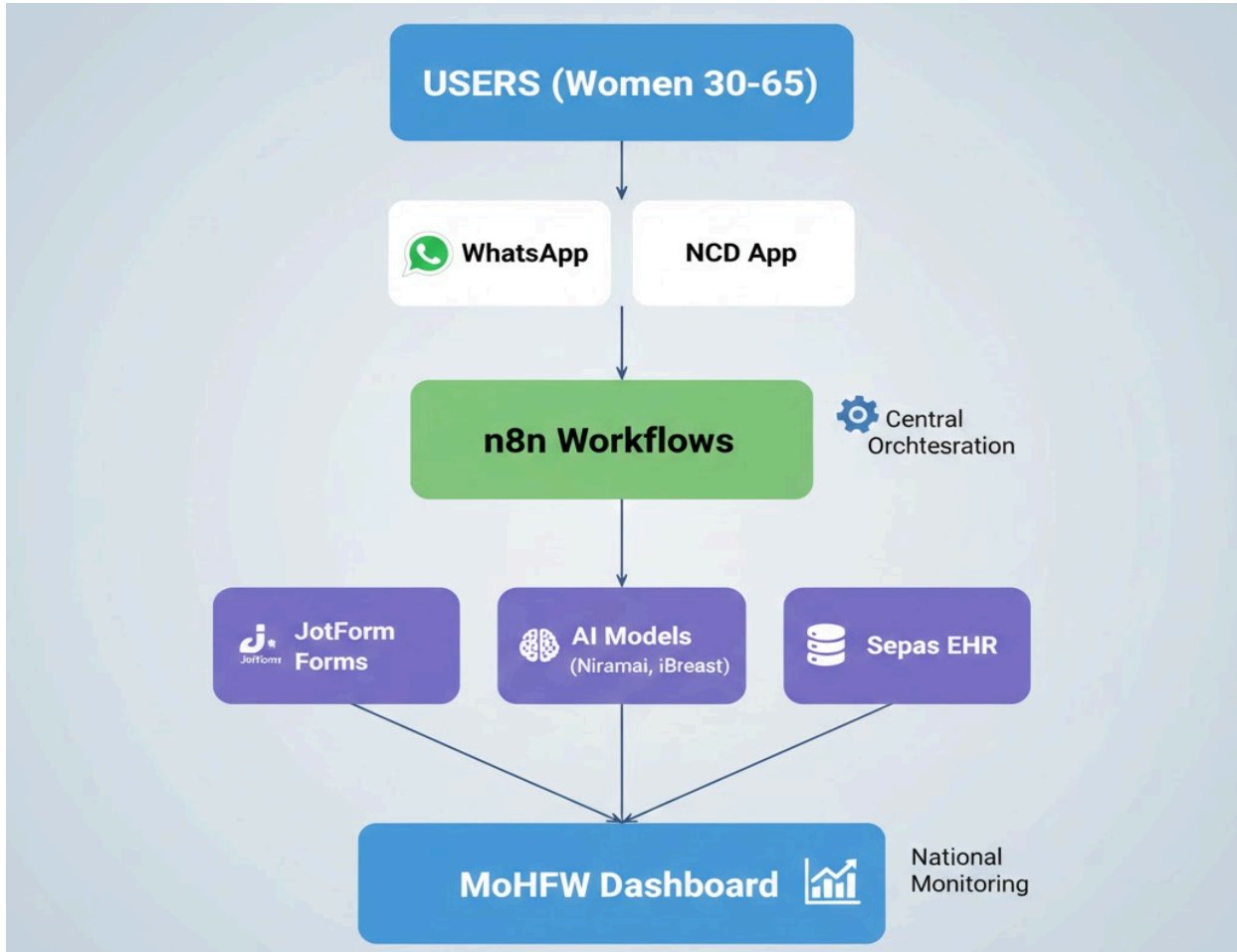
BRICS+ LEADERSHIP & STRATEGIC ALIGNMENT

AKSI embodies all BRICS AI Principles (2024) through intentional design choices: human-centric AI prioritizing youth and women as primary beneficiaries; inclusive development featuring rural-first design with offline capabilities; data sovereignty via MeghRaj Cloud hosting; ethical AI deployment with bias mitigation and informed consent regional languages of pilot implementation states; and South-South cooperation through open-source N8N workflows enabling BRICS+ nations to adopt and adapt. Long-term vision includes integration and development of a national breast cancer screening registry, AI diagnostic certification standards, youth health ambassador movement, and BRICS Health Technology Alliance pooling resources for collective problem-solving, positioning India as not just implementing but defining best practices for middle-income countries.

CONCLUSION: FROM CRISIS TO OPPORTUNITY

AKSI represents more than a case study since it embodies a paradigm shift from diagnostic based cancer treatment to proactive prevention, from top-down health interventions to youth-powered social movements, from imported technology to indigenous innovation, from parallel systems to government integration. *Our baseline survey data provides the evidence base: knowledge exists in fragments (overall score 2.84/5.0), practice lags dramatically (52.8% don't perform monthly BSE despite knowing they should), and readiness to act exceeds capacity to act appropriately (55.7% would book screening but 54.7% don't know proper self-examination*). AKSI bridges these gaps systematically through accessible technology that reduces cost barriers, comprehensive training that builds skills not just awareness, and youth mobilization that creates sustainable peer education networks. From awareness to action, from knowledge to practice, from pilot to scale, AKSI proves that with the right combination of technology, training, and youth energy, we can make early detection that saves lives not an aspiration but a reality. Every life deserves the 98% survival rate that early detection enables, and every society deserves the economic productivity and human potential of those lives saved by prevention, promotion through Awareness of Breast Cancer.

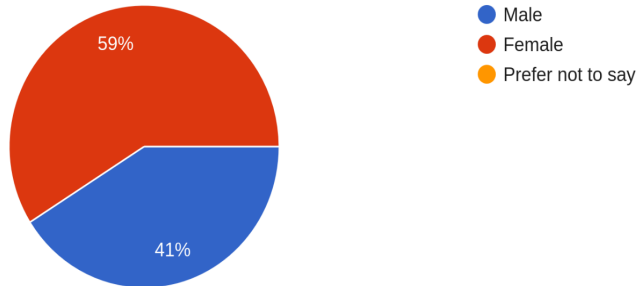**System Architecture for AKSI -Proposed Solution :**

Data Flow:

1. User registers on NCD app → ABHA ID created

2. Awareness WhatsApp message sent (n8n → WhatsApp API)

3. User clicks link → JotForm appointment booking

4. ASHA conducts screening → iBreastExam captures data

5. AI analyzes → result pushed to NCD app (n8n → NCD API)

6. High-risk case → auto-referral to district hospital (n8n → Sepas EHR)

7. All data aggregated → MoHFW dashboard (Power BI)

Survey Evidence of AKSI:The detection that saves lives.

"पहचान जो जीवन बचाए " : This is an informed consent created to know the level of healthcare awareness amongst the Youth. Kindly fill the form, your details will not be shared without your consent and the purpose is for academic oriented research only.
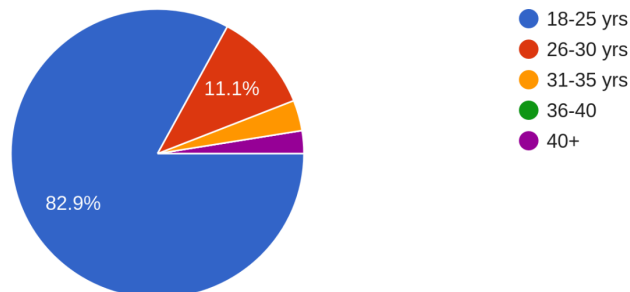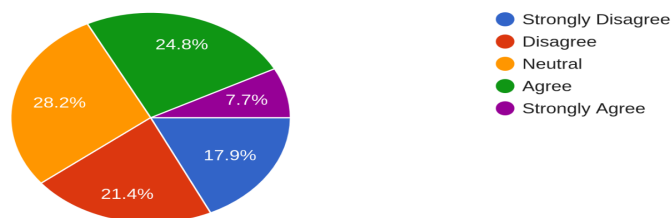
Gender
117 responses

- Male
- Female
- Prefer not to say

59%

41%

Demographics : Age :
117 responses

- 18-25 yrs
- 26-30 yrs
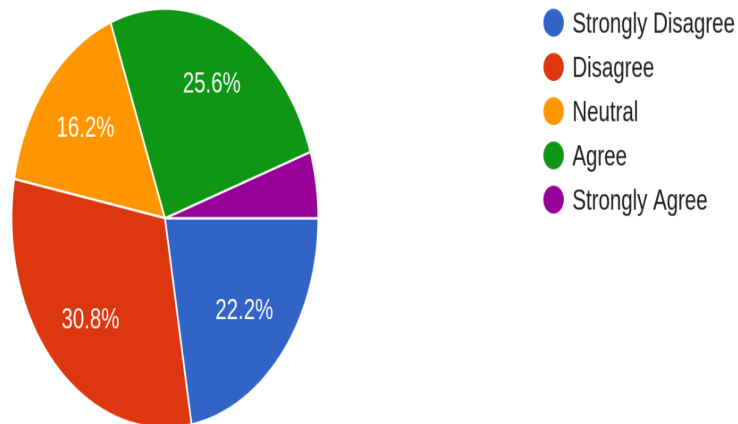- 31-35 yrs
- 36-40
- 40+

11.1%

82.9%

Q1. Disease Awareness (The "What") "I am confident in my ability to identify the primary symptoms of breast cancer beyond just a physical lump (e.g., ...ing, nipple discharge, or changes in breast shape)."
117 responses

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
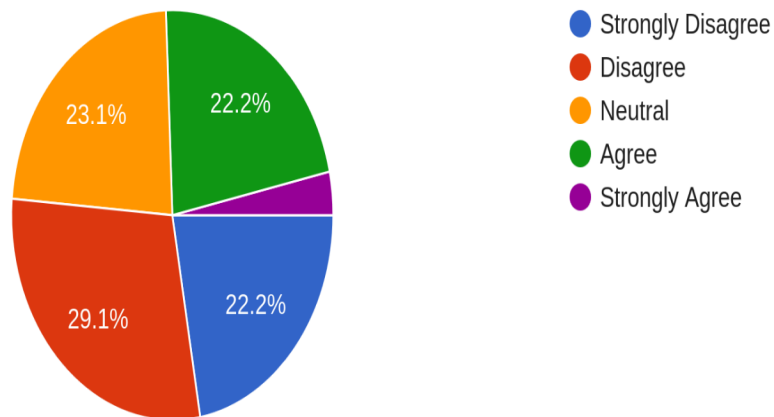
24.8%

7.7%

28.2%

17.9%

21.4%

Q2. Screening Knowledge & Steps (The "How") "I am well-aware of the correct 3-step technique for a Breast Self-Examination (BSE): Visual Inspection in... standing, and Manual Palpation while lying down."

117 responses

- Strongly Disagree
- Disagree
- Neutral
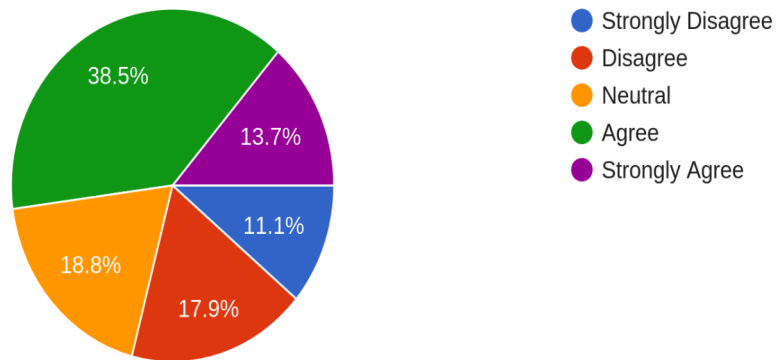- Agree
- Strongly Agree

25.6%
16.2%
30.8%
22.2%

Q3. Practice & Behavior (The "Self") "I (or my close female relatives) perform a monthly breast self-examination to monitor for any new abnormalities or changes."

117 responses

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

23.1%
22.2%
29.1%
22.2%

Q4. Facility Proximity Awareness (The "Where") "I am aware that multi-specialty healthcare facilities equipped for cancer screening are located close to your residence / Institution/ Organization ?

117 responses

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

38.5%
13.7%
11.1%
17.9%
18.8%

Q5. Action Orientation (The "Trigger") "If I (or a family member) detected a suspicious lump today, I would know exactly how to book a diagnostic screen...m/Ultrasound) at a nearby facility without delay."

117 responses

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

33.3%
22.2%
14.5%
13.7%
16.2%